Emotion

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Evaluations of Affective Stimuli Modulated by Another Person's Presence and Affiliative Touch

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Affiliative touch carries affective meaning and affects the receiver. Although research demonstrates that receiving touch modulates the neural processing of emotions, its effects on evaluations of affective stimuli remain unexplored. The current research examined the effects of affiliative touch on the evaluation of affective images across 3 studies and aimed to disentangle the effect of another person's mere presence from the addition of affiliative touch. Participants thus underwent experimental conditions of social manipulation (presence, alone) and touch manipulations (receiving, self-providing, providing to experimenter) while viewing affective images (negative, neutral, and positive valence) and evaluated their valence. Study 1 included hand-squeezing ($N = 39$), and Study 2 included forearm-stroking ($N = 40$) in a within-subjects design. Study 3 included hand-squeezing ($N = 109$) in a between-subjects design. Across both studies, the results suggested that the receiving condition decreased the negativity of negative images, and the providing condition reduced the positivity of positive images. Furthermore, the other presence condition increased the positivity of positive images compared with the alone condition in Study 1 and to the receiving condition in Study 2. Hand-squeezing and forearm-stroking had differential effects on affective image evaluations depending on the image valence and who provided the touch. Overall, receiving touch seems to attenuate negative evaluations in negative contexts and the presence of others amplifies positive evaluations in positive situations. Discussion highlights the importance of affiliative touch within social interactions.

Keywords: affect, affective images, emotion, touch, valence

Humans communicate emotions through different modalities. One vital component to communicate emotions is through interpersonal touch, which is essential to human social development (literature review by Field, 2010; Hertenstein, 2002), as touch provided by a caregiver can express affection (e.g., hugging) but also provide comfort during distress (e.g., holding the infant tightly). Interpersonal touch involves skin-to-skin contact between individuals and often includes an intent to affiliate, and is thus thought to constitute a form of prosocial behavior (Gruber & Keltner, 2011) in primates (Dunbar, 2010; Harlow, 1958). The types of interpersonal touch that aim at affecting the receiving individual positively is what we define as *affiliative touch*, as providing touch to another person can also communicate specific affective states (literature review by Gallace & Spence, 2010).

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Beatriz Ribeiro and Caroline Nakao contributed equally to the work. Neither of the experiments reported in this article was formally preregistered. Neither the data nor the materials have been made available on a permanent third-party archive; requests for the data or materials can be sent via email to the Social and Cognitive Neuroscience Laboratory at neurociencia@mackenzie.br. The data will be made available on Open Science Framework after publication.

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Seminal work by Hertenstein, Keltner, App, Bulleit, and Jaskolka (2006) demonstrated that touch variations applied to the arm can communicate distinct emotions ranging from anger to love. A form of affiliative touch exchanged between close individuals is affectionate touch (e.g., kissing, caressing) and has been shown to have positive effects on recipients' well-being (literature review by Jakubiak & Feeney, 2017). Despite the importance of affiliative touch for human social interaction, the literature on the specific ways affiliative touch might *influence* emotion experience itself is scarce.

There is a dearth of work on the influence of affiliative touch on emotion experience, especially in the context of interaction of strangers. Of the few published studies in this domain, one earlier study demonstrated that a casual touch by a stranger (e.g., library clerk) within a professional environment (e.g., university library) amplifies the experience of positive affect compared with a no-touch condition (Fisher, Rytting, & Heslin, 1976). More recent research has shown that experiencing affiliative touch influences the neural processing of affective stimuli as evidenced by enhanced early event-related potentials during picture viewing (Schirmer et al., 2011). It was further shown that when touch is received which is perceived as pleasant, this subjective pleasantness aligns with the facial muscle activations of the receiver thought to reflect affective valence, that is, less corrugator activity during pleasant touch than unpleasant touch (Mayo, Lindé, Olausson, Heilig, & Morrison, 2018). These initial studies suggest that touch may not only signal affective meaning but might also alter the subjective and neural processing of affective stimuli and affective experience itself. An arising question is whether affiliative touch also alters the evaluation or perception of affective stimuli.

Furthermore, the majority of published research to date has focused on the effects of receiving touch, or how touch can communicate emotions (literature review by Gallace & Spence, 2010), leaving the effects of affiliative touch on the provider relatively unexplored. One study investigated female participants using functional MRI while they provide support to their romantic partner who received electric shocks by means of holding their arm and found more brain activation in reward-related areas compared with a control condition without support-providing (Inagaki & Eisenberger, 2012). This finding suggests positive effects on the person providing affiliative touch, but how this neural activity translates into behavioral responses, that is, evaluations of affective stimuli, remains unanswered to date.

It is critical to consider the role of the social *context* in which the person receives the touch and to meaningfully differentiate it from the mere presence of another person. This affords the opportunity to examine the effects of touch itself rather than a social context via the mere presence of others and the known impacts on our behavior more generally (e.g., performance and learning processes; Zajonc, 1965). For example, humans express their emotions more facially in the presences of others as compared with being alone (Buck, Losow, Murphy, & Costanzo, 1992) and rate images more positively when viewing them together with a friend than alone (Wagner et al., 2015). This literature provides indirect evidence that the presence of another person may amplify the experience of positive emotions in particular, although this possibility has not yet been examined in the context of whether the presence of another person affects evaluations of visual affective stimuli.

The extant literature on the effects of affiliative touch on affect raise the following research questions: (a) Does affiliative touch alter evaluations of affective images? (b) Are there differential effects of affiliative touch on affective evaluations when it is provided versus received? (c) Are affective image evaluations influenced by being in a social situation or by affiliative touch? The overall aim of the current research was to investigate the effects of affiliative touch on the evaluation of affective images using a novel within-subjects design across two studies and an additional between-subjects design study. It was hypothesized that receiving affiliative touch increases the positivity of affective images (Hypothesis 1) and the mere presence of another person increases the positivity of affective images (Hypothesis 2) but that affiliative touch amplifies the positivity of affective images more than the mere presence of another person (Hypothesis 3).

Study 1 – Influence of Affiliative Touch (Hand-Squeezing) on Affective Image Evaluations

In Study 1, participants evaluated the valence of standardized affective images (positive, negative, and neutral) across five experimental conditions, including three conditions involving hand-squeezing as affiliative touch (receiving, self-providing, providing to experimenter) and two conditions involving social presence of another (another present, alone). Because the affiliative touch to the participant was provided by a stranger (the experimenter), the hands were chosen as the target for the touch in this first study, as it was previously demonstrated that acceptance of being touched by a stranger is limited mostly to this body part (Suvilehto, Glerean, Dunbar, Hari, & Nummenmaa, 2015). In addition to the hypotheses outlined above, the valence of the affective stimuli as potential implicating factor was explored.

Method

Participants. Sample size estimation was conducted using G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007). Given the novelty of the approach, precise values for the estimation could not be derived from the literature. Thus, a conservative calculation was conducted with a small effect size ($f = .20$), alpha level of 5% and a power of .80 for a within-subject repeated-measures ANOVA with five experimental conditions and three imagine valences as factors and yielded a required sample size of $N = 33$ participants. Only heterosexual female participants (M(age) = 22.3, $SD = 3.7$) from the Sao Paulo (Brazil) metropolitan area were recruited to control for sex effects of touch (Hertenstein & Keltner, 2011) and effects of touch when it is perceived as sexual (literature review by Hertenstein, Verkamp, Kerestes, & Holmes, 2006). Recruitment took place through standard e-mail and social network advertisements (e.g., Facebook and WhatsApp). Fifty participants were initially recruited, and four were excluded because of potential mental health problems (see the Procedure section), for a total of 46 participants. These 46 participants arrived to the laboratory to complete the task (described below), and a total of seven participants were excluded from analyses, leading to a final sample size of 39 ($M_{age} = 21.8$, $SD = 3.2$) for analyses. Of these seven excluded participants, three participants were excluded because

they did not fully comply with the task instructions, two participants were excluded because of medical conditions, and two participants were excluded because of unusual ratings on the pleasantness of touch scales. The latter two participants found hand-squeezing unpleasant, whereas the rest of the sample rated the hand-squeezing as neutral to pleasant ($M_{providing}$ = 6.13, SD = 1.49; $M_{receiving}$ = 6.90, SD = 1.37; $M_{self\text{-}providing}$ = 6.26, SD = 1.53). Of the participants included in analyses, the majority were enrolled in an undergraduate program at the Mackenzie Presbyterian University (n = 34) from law (n = 17) and psychology (n = 17), and some were employed (n = 5).

Affective image experiment. Images from the International Affective Picture Set (Lang, Bradley, & Cuthbert, 1997) were used as stimuli. Fifty images were selected for each of the three image valence categories (positive, neutral, and negative) and distributed across the five experimental conditions. That is, each of the five experimental conditions contained 10 images of each valence category. Positive images were taken from the categories 'animals', 'food,' 'people,' 'landscapes', negative images were taken from the categories 'mutilations', 'death,' 'disasters', 'war,' 'disgust,' and neutral images were taken from the category 'objects'; Table 1 displays the image numbers of the stimuli included and their distribution across the experimental conditions. Across all participants, valence ratings for each image valence category were kept constant across experimental conditions based on the Brazilian norms (Ribeiro, Pompéia, & Bueno, 2004): providing ($M_{negative}$ = 1.14, SD = .12; $M_{neutral}$ = 5.15, SD = .20; $M_{positive}$ = 8.63, SD = 0.18), receiving ($M_{negative}$ = 1.15, SD = .12; $M_{neutral}$ = 5.15, SD = .19; $M_{positive}$ = 8.63, SD = .17), self-providing ($M_{negative}$ = 1.15, SD = .12; $M_{neutral}$ = 5.15, SD = .20; $M_{positive}$ = 8.61, SD = .14), presence ($M_{negative}$ = 1.15, SD = .12; $M_{neutral}$ = 5.16, SD = .19; $M_{positive}$ = 8.62, SD = .14), alone ($M_{negative}$ = 1.15, SD = .12; $M_{neutral}$ = 5.16, SD = .19; $M_{positive}$ = 8.61, SD = .14).

Table 1
International Affective Picture System (IAPS) Image Numbers Used as Stimuli

	Experimental condition				
Image valence	Touching	Touched	Self-touch	Presence	Absence
Negative	3060	3000	3053	3102	3168
	9410	9300	9090	6213	3301
	3062	3071	3550	6260	9340
	3010	3261	2800	9420	6313
	3266	6212	9007	9910	3170
	3150	9400	9433	3064	3015
	9320	6550	3051	3400	9040
	6821	6571	6360	6350	3530
	6510	3350	3110	9921	3120
	6570	2710	2353	6370	6560
Neutral	7224	7100	7950	1321	7500
	7182	7211	2385	7035	7096
	7235	2280	7490	7705	8116
	2190	2372	2749	6150	7000
	7130	7175	2495	5500	2600
	2850	7830	7170	4605	1313
	9045	5530	8160	7080	2383
	5535	7050	5510	7009	2575
	7183	7820	4150	2485	7187
	7004	4000	5520	7496	1121
Positive	2660	5480	7430	1603	5820
	8420	2310	7220	2091	2540
	1610	2150	1900	2160	5891
	2260	2216	2345	1440	5870
	1920	7330	8496	2040	5831
	5260	5626	5849	5830	4614
	5201	8041	5780	2655	5982
	5720	1812	7325	1710	1750
	7230	7470	8370	1463	2057
	8210	2209	2165	2058	2070

The experiment was programmed and presented in E-Prime 2.0 (Psychology Software Tools, Pittsburgh, PA) and used on a 32″ PC screen (resolution: 1280 × 720, refresh rate: 60 Hz). The resolution of the experiment was set to 640 × 480, and the images appeared at 75% of this resolution. The experiment included a total of 150 experimental trials plus six practice trials at the start and specific instruction for each experimental condition. A fixation cross indicated the beginning of a trial presented for 2 s and followed by the stimulus presented for 4 s. After stimulus-offset, the answer screen appeared containing the Self-Assessment-Manikins (Bradley & Lang, 1994) rating scale for the dimension of valence ranging from 1 (negative) to 9 (positive). Answering time was unrestricted. The keyboard was set as input measures with the number corresponding to the rating scale (i.e., 1–9). The experiment was programmed to initiate the next trial after a keyboard response was recorded (see Figure 1C for trial procedure).

Procedure. Participants were screened for study eligibility via an online survey for potential mental health problems using the Portuguese versions of the Beck's Depression Inventory and the Beck's Anxiety Inventory (Gorenstein & Andrade, 1996), and only participants with scores <18 and <16, respectively were invited to the testing session at the laboratory.[1] Eligible participants arrived at the laboratory and were greeted and informed about the procedures of the study without revealing the hypotheses, after which participants provided written informed consent (ethical approval for the study was provided by the Mackenzie Ethics Committee in line with the Declaration of Helsinki). Two female experimenters were present for all testing sessions. One experimenter interacted with the participant, the other experimenter provided the touch and remained unseen to the participant until the end of the testing session. Adopting the procedure by Schirmer et al. (2011), a black curtain separated two chairs in the laboratory, for individuals to remain unseen; both chairs had arm rests (see Figure 1A for the laboratory set-up). The PC screen displaying the experiment was visible from both chairs with a distance of approximately 1 m from participants. The curtain had a small hole at arm rests level, so that the touch could be carried out while the arm was resting on the arm rest. It was always the same experimenter who verbally interacted with the participant and the same experimenter who provided the touch.

After consent was obtained, electrodes for facial electromyography (EMG) were attached and facial EMG recorded from all

[1] It was aimed at including participants without symptomology that could potentially point towards the presence of a syndrome. Depression and anxiety disorders in particular fall under the umbrella of mood disorders, and altered affect processing and experience are main characteristics of the disorders as classified in the *Diagnostic and Statistical Manual of Mental Disorders* (fifth edition; American Psychiatric Association, 2013). It was thus important to control for potential effects of such affect-related symptoms on our results.

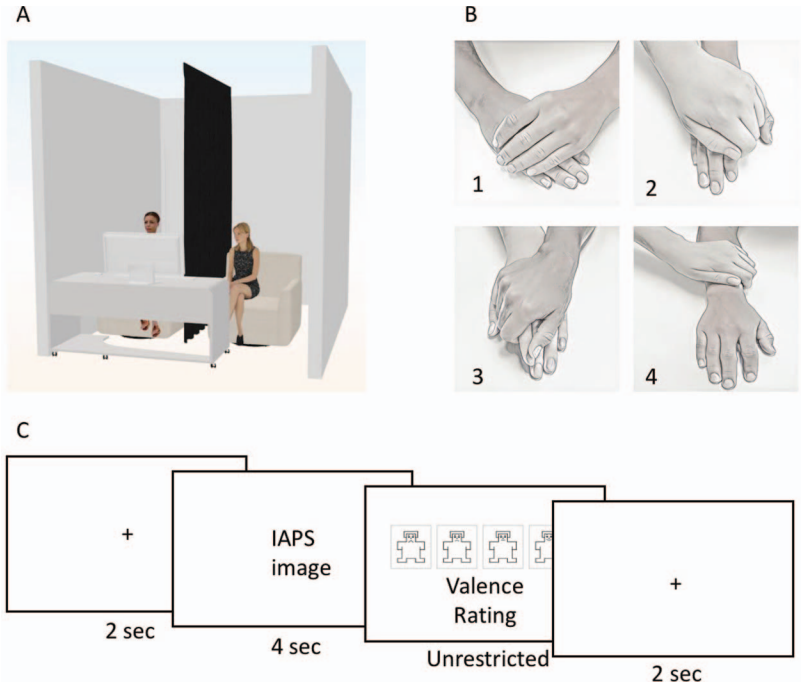

Figure 1. Laboratory set-up and trial procedure. Panel A displays the laboratory set-up with a curtain dividing the room to assure that experimenter and participant cannot see each other while the PC screen was shared between both. This image portrays the presence condition. In the alone condition, the chair to left remained empty. Squares 1–3 in panel B display the hand-positioning for the three touch conditions in the hand-squeezing studies (i.e., Study 1 and 3): 1 = self-providing, 2 = receiving, 3 = providing to experimenter; square 4 displays the hand-positioning in the forearm-stroking study (i.e., Study 2) in the receiving condition. The three experimental conditions including touch involved skin-to-skin contact throughout the whole trial, but the onset and offset of the image indicated the start and end of the affiliative touch action (i.e., hand-squeezing in Study 1 and 3 and forearm-stroking in Study 2). Panel C displays the standard trial procedure. The second fixation cross indicates the start of the next trial. See the online article for the color version of this figure.

participants.[2] Next, participants completed the affective image experiment. The order of the experimental conditions was random for each participant. Participants were informed that for parts of the experiment another person, a female member of the laboratory, was sitting next to them behind the curtain. The touch conditions always included holding the back of the hand throughout the experimental condition with slight pressure (i.e., hand-squeezing) during viewing of the affective images (i.e., stimulus-presentation). When participants had to provide touch to the experimenter, the instruction was to always have the hand resting on the other person's hand and to apply a slight squeeze for the duration of the image presentation. Similarly, when participants had to self-provide touch, they were instructed to have their left hand resting on their right hand and to apply a slight squeeze for the duration of the image presentation. When the experimenter was providing the touch, participants were informed that the other person would always have their hand resting on the participant's hand and would apply a slight squeeze for the duration of the image presentation. Figure 1B displays the hand-positioning for the touch conditions. For the two conditions without touch, participants were informed when they were alone in the room and when the experimenter was sitting next to them separated by the curtain. Instruction was to watch the images and evaluate their valence in all experimental conditions. After completion of all trials within each of the three touch conditions, participants rated the pleasantness of the touch on a 9-point Likert-scale ranging from 1 (*unpleasant*) to 9 (*pleasant*). At the end of the testing session, participants were debriefed and granted course credit for participation.

Data preparation and analyses. Data preparation and analyses were conducted in SPSS Version 24 (SPSS IBM, Armonk, NY). The valence ratings of the three image valences within each of the five experimental conditions were inspected for outliers. Boxplots were used for identification of outliers and all data points that were $\pm 1.5\times$ IQR from the median were defined as outliers. Identified outliers were each changed to the lowest score on the respective variable instead of eliminating the data, as suggested by Field (2009). This did not change the rank of those cases but made them less extreme to account for the sensitivity of ANOVA to extreme values. Repeated-measures ANOVA was conducted for the valence ratings including image valence (three: positive, neutral, negative) and experimental condition (five: alone, presence, self-provided, receiving, providing) as within-subject factors. Adjustment of degrees of freedom was applied when sphericity was violated using Greenhouse-Geisser when the Greenhouse-Geisser estimate of sphericity was $< .75$ and Huynh-Feldt when the

[2] A fault in the technical equipment rendered the EMG data unusable.

Greenhouse-Geisser estimate of sphericity was > .75 (Field, 2009). Partial eta squared is presented as effect size measure. Significant main effects and interactions were followed up with paired samples *t* tests; 95% CIs for the differences of the means and Cohen's *d* as effect size measure are presented. All the graphs were produced in R Studio adapting the raincloud plot codes developed by Allen, Poggiali, Whitaker, Marshall, and Kievit (2018).

Results

Manipulation check. Results from the repeated-measures ANOVA showed a significant main effect of image valence, $F(1.33, 50.56) = 1910.37$, $p < .001$, partial $\eta^2 = .98$, power = 1.00. Greenhouse-Geisser adjustment of degrees of freedom was applied because of violation of sphericity. Post hoc paired samples *t* test showed that negative images ($M = 1.44$, $SD = .26$) were rated as significantly more negative than neutral images ($M = 5.24$, $SD = .37$), $t[38] = -49.93$, $p < .001$, $d = 11.54$, 95% CI [−3.95, −3.64], and positive images ($M = 7.56$, $SD = .70$), $t[38] = -46.89$, $p < .001$, $d = 7.54$, 95% CI [−6.38, −5.86]. Positive images were rated as significantly more positive than neutral images, $t(38) = 27.46$, $p < .001$, $d = 4.41$, 95% CI [2.15, 2.50].

Main effect of experimental condition. It was hypothesized that receiving affiliative touch increases the positivity of affective images and the mere presence of another person increases the positivity of affective images but that affiliative touch amplifies the positivity of affective images more than the mere presence of another person. Results showed a significant main effect of experimental condition, $F(3.46, 131.45) = 17.26$, $p < .001$, partial $\eta^2 = .31$, power = 1.00. Huynh-Feldt adjustment of degrees of freedom was applied due to violation of sphericity. Post hoc paired samples *t* test showed that the evaluations of the images' valence were significantly lower when participants were squeezing the experimenter's hand ($M = 4.52$, $SD = .39$) than when participants were alone in the room ($M = 4.70$, $SD = .37$), $t(38) = -3.37$, $p = .002$, $d = 0.54$, 95% CI [−.29, −.07], when participants squeezed their own hand ($M = 4.81$, $SD = .35$), $t(38) = -6.92$, $p < .001$, $d = 1.13$, 95% CI [.20, .37], when the experimenter was present but no touch was involved ($M = 4.83$, $SD = .35$), $t(38) = -7.81$, $p < .001$, $d = 1.26$, 95% CI [−.39, −.23], and when the experimenter squeezed participants' hand ($M = 4.87$, $SD = .39$), $t(38) = -5.74$, $p < .001$, $d = 0.92$, 95% CI [.23, .47]. Valence evaluations of the images were also significantly lower when participants were alone in the room than when the experimenter was present without touch, $t(38) = -3.13$, $p = .003$, $d = 0.51$, 95% CI [.05, .21], when participants were squeezing their own hand, $t(38) = -2.74$, $p = .009$, $d = 0.45$, 95% CI [.03, .19], and when the experimenter squeezed participants' hand, $t(38) = -3.06$, $p = .004$, $d = 0.49$, 95% CI [.06, .29]. There were no significant differences in the image valence evaluations between the condition where the experimenter was squeezing participants' hands and participants squeezing their own hand, $t(38) = 1.30$, $p = .203$, $d = 0.19$, 95% CI [−.04, .17], and the mere presence of the experimenter, $t(38) = 0.83$, $p = .410$, $d = 0.12$, 95% CI [−.06, .15], and between participants squeezing their own hand and the experimenter's presence, $t(38) = -0.57$, $p = .570$, $d = 0.09$, 95% CI [−.09, .05].

Interaction of experimental condition and image valence. The valence evaluations of the various image valence categories varied between the experimental conditions as indicated by the significant two-way interaction, $F(8, 304) = 7.86$, $p < .001$, partial $\eta^2 = .17$, power = 1.00; see Figure 2. The evaluations of *negative images* were significantly less negative when the experimenter was squeezing participants' hand than when participants squeezed the experimenter's hand, $t(38) = 3.80$, $p = .001$, $d = 0.59$, 95% CI [.12, .41], when the experimenter was present without any hand-squeezing, $t(38) = 3.10$, $p = .004$, $d = 0.49$, 95% CI [.07, .33], and when participants were alone in the room, $t(38) = 3.92$, $p < .001$, $d = 0.61$, 95% CI [.14, .44]. Evaluations of negative images were significantly less negative when participants were squeezing their own hand than when squeezing the experimenter's hand, $t(38) = 5.21$, $p < .001$, $d = 0.83$, 95% CI [.12, .28], when the experimenter was present without any hand-squeezing, $t(38) = 2.53$, $p = .016$, $d = 0.42$, 95% CI [.03, .24], and when participants were alone in the room, $t(38) = 4.74$, $p < .001$, $d = 0.75$, 95% CI [.13, .31]. No other comparisons were significant for the negative images, *p*s > .05.

Whereas there were no significant differences in evaluations of *neutral images* between the experimental conditions, *p*s > .05, the evaluations of the *positive images* differed significantly between experimental conditions. Positive images were evaluated as significantly less positive when participants squeezed the experimenter's hand than when the experimenter was present without any hand-squeezing, $t(38) = -7.55$, $p < .001$, $d = 1.21$, 95% CI [−.96, −.56], when the experimenter squeezed participants' hand, $t(38) = -6.03$, $p < .001$, $d = 0.98$, 95% CI [.47, .94], when participants squeezed their own hand, $t(38) = -5.81$, $p < .001$, $d = 0.94$, 95% CI [.41, .84], and when participants were alone in the room, $t(38) = -4.21$, $p < .001$, $d = 0.67$, 95% CI [−.77, −.27]. Evaluations of positive images were significantly more positive when the experimenter was present than when participants were alone in the room, $t(38) = 2.38$, $p = 023$, $d = 0.39$, 95% CI [.03, .44]. No other comparisons were significant for the positive images, *p*s > .05.

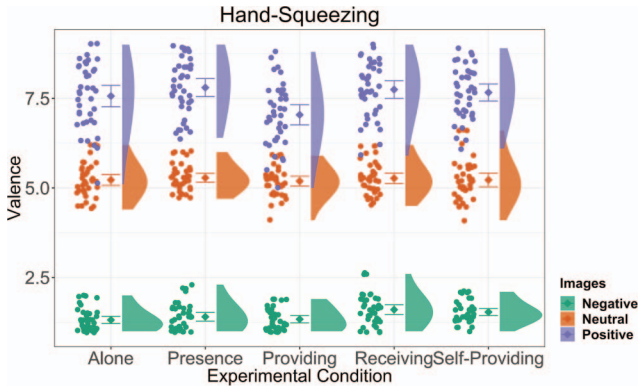

Figure 2. Evaluations of the affective images from the five experimental conditions based on valence ratings from Study 1. Valence ratings per participant (dots), mean rating ± 95% CI, and violin plots are displayed for each of the three image valence categories (positive, negative, neutral) and the five experimental conditions (alone, presence, providing touch, receiving touch, and self-providing touch). Valence ranged from 1 (*negative*) to 9 (*positive*). See the online article for the color version of this figure.

Discussion

Study 1 assessed evaluations of affective images ranging from negative to positive valence in experimental conditions with manipulations of the social situation for the participant and who was providing the hand-squeezing as affiliative touch. It was replicated that the evaluations of the IAPS stimuli (Lang et al., 1997; Ribeiro et al., 2004) differed significantly between the image valence categories, as evaluations were significantly more positive for positive images, neutral for neutral images, and negative for negative images. The evaluations of the images also varied for the experimental conditions, with significantly more positive evaluations in the conditions of receiving affiliative touch from the experimenter, providing self-touch, and the mere presence of the experimenter than in the touching the experimenter and alone conditions. These results align with the hypothesis that affiliative touch and another's presence increase the positivity of affective images, as creating a social situation and receiving affiliative touch (either self-provided or by the experimenter) made participants perceive the affective images as more positive. The results further suggest that providing affiliative touch in addition to creating a social situation does not add significantly to the advantage of being in the company of another person when evaluating affective images on valence. Interestingly, providing affiliative touch to the experimenter influenced the image evaluations negatively, as the ratings were not only lowest in this experimental condition but also significantly lower than when participants were alone. It appears receiving affiliative touch from others and providing affiliative touch to others have differential effects on affective image evaluations. However, and more importantly, when interpreting the effects of being in a social situation and adding affiliative touch on affective image evaluations, image valence needs to be considered, as indicated by the significant two-way interaction from the current study.

The manipulations of another's presence and affiliative touch had effects specific to the valence of the images where positive and negative image evaluations were affected but not neutral images. This finding indicates that the effects are specific to affective content. However, it was hypothesized that the presence of another person and receiving touch would make affective images (positive and negative) more positive. Whereas the *presence of another person* had little effect on valence ratings of negative images compared with being alone, positive images were evaluated as most positive in the presence of another person and significantly more positive than in the alone condition. Thus, another person's presence does not make affective images more positive in general, instead, magnifies the positivity of positive images.

Conversely, the effect of *receiving affiliative touch* was specific to negative images, which were evaluated more positively compared with the mere presence condition. Interestingly, self-providing touch had the same effect on evaluations of negative images as receiving affiliative touch by the experimenter. Thus, receiving affiliative touch does not make affective images more positive in general, instead, attenuates the negativity of negative images. It is possible that squeezing someone's hand (or the own hand) is perceived as a comforting gesture and would explain the less negative evaluation of negative images in the receiving conditions. This interpretation aligns with research demonstrating that touch sends strong individual signals, as humans can distinguish distinct emotions based on the various kinds of touch used (Hertenstein, Holmes, McCullough, & Keltner, 2009).

Providing affiliative touch to the experimenter resulted in the least positive evaluations for positive images, significantly lower than being alone. Conversely, the evaluations of negative images did not differ significantly when participants were alone compared with providing affiliative touch to the experimenter or the experimenter's mere presence. Thus, providing affiliative touch does not only affect the receiver but also the provider themselves, although it leaves evaluations of negative images unaffected whereas the positivity of positive images is attenuated. A study involving romantic partners showed that receiving affiliative touch (stroking) decelerates the heart rate and is perceived as more pleasant than stroking the partner (Triscoli, Croy, Olausson, & Sailer, 2017). Because providing affiliative touch does not have the same effect on the pleasantness perception as receiving affiliative touch, this could explain the lowered positive evaluations of positive images in the providing condition from the current study. That is, the pleasantness from the affiliative touch might interact with the pleasantness of the affective image.

The results from Study 1 led us to conclude that receiving affiliative touch indeed alters evaluations of affective images and is more beneficial for the evaluation of negative images than the mere presence of another person. The mere presence, however, is beneficial for evaluation of positive images compared with being alone, and providing affiliative touch decreases the positivity.

The affiliative touch applied in the current study was squeezing of the hand. Squeezing does not effectively stimulate C-tactile afferents and is likely to have stimulated A-beta afferents (McGlone, Wessberg, & Olausson, 2014). However, it is the stimulation of C-tactile afferents in particular that induces a pleasant feeling, achieved through slow stroking of hairy skin (McGlone et al., 2014), and the skin on top of the hand does not have much hair. Given that research has shown different types of touch communicate specific emotions and stimulates different nerve fibers, it raises the question whether a different kind of affiliative touch, that is, C-tactile afferent stimulating touch, would yield the same or different effects on evaluations of affective images. Or in other words, does affiliative touch have a dampening effect on evaluations of negative affective images independent of the type of affiliative touch?

Study 2 – Influence of Affiliative Touch (Forearm-Stroking) on Affective Image Evaluations

That slow stroking of the forearm activates C-tactile afferents and is perceived as pleasant (McGlone et al., 2012, 2014) also reflects in physiological responses associated with positive affect, for example, heart rate and facial muscle activity (Pawling, Cannon, McGlone, & Walker, 2017). Thus, a second study was conducted using forearm-stroking as affiliative touch instead of hand-squeezing to investigate its effects on affective image evaluations. Given that stroking is associated with positive affect (Mayo et al., 2018) and stimulates C-tactile afferents, it was expected that receiving C-tactile afferent stimulating touch would augment evaluations of positive images. Akin to Study 1, participants evaluated the valence of standardized affective images (positive, negative, and neutral) across the same five experimental conditions as in

Study 1: two conditions addressing the social component ([a] presence, [b] alone), and three conditions involving touch ([c] receiving, [d] providing to experimenter, and [e] self-providing).

Method

Participants. The sample size matched Study 1. Specifically, 46 (M_{age} = 22.8, SD = 5.2) female heterosexual participants were recruited and tested at the laboratory. Of the 46 participants who underwent the testing session at the laboratory, six were excluded from analysis because they did not fully comply with the task instructions. A total sample of 40 participants were included in the final analyses (M_{age} = 22.4, SD = 5.3). All participants were undergraduate students at the Mackenzie Presbyterian University, with the majority from law (n = 24) or psychology (n = 11).

Stimuli and experiment. The stimuli and experiment were identical to Study 1.

Procedure. Written informed consent was obtained from all participants. The procedure was identical to Study 1, except the study instructions were adapted to the specific type of touch in Study 2. When participants had to provide touch to the experimenter, the instruction was to always have the hand resting on the other person's forearm (see Figure 1B square 4) and to apply a slow stroking for the duration of the image presentation. Similarly, when participants had to self-provide touch, they were instructed to have their own hand resting on their forearm and to apply a slow stroking for the duration of the image presentation. When the experimenter was providing the touch, participants were informed that the other person would always have their hand resting on their forearm and would apply a slow stroking for the duration of the image presentation. Facial EMG data was recorded in this study and the results will be presented elsewhere.[3]

Data preparation and analyses. Data preparation and analyses were identical to Study 1.

Results

Manipulation check. Results from the repeated-measures ANOVA showed a significant main effect of image valence, $F(1.30, 47.99) = 960.63$, $p < .001$, partial $\eta^2 = 0.96$, power = 1.00. Greenhouse-Geisser adjustment of degrees of freedom was applied because of violation of sphericity. Post hoc paired sample t tests showed that negative images (M = 1.65, SD = .47) were rated as significantly more negative in valence than neutral images (M = 5.15, SD = .38), $t(38) = -36.17$, $p < .001$, d = 5.91, 95% CI [−3.70, −3.31], and positive images (M = 7.34, SD = .77), $t(38) = -33.04$, $p < .001$, d = 5.38, 95% CI [−6.05, −5.35]. Positive images were rated as significantly more positive than neutral images, $t(38) = 19.63$, $p < .001$, d = 3.20, 95% CI [1.96, 2.42].

Main effect of experimental condition. Results showed a significant main effect of experimental condition, $F(4, 148) = 6.35$, $p < .001$, partial $\eta^2 = .15$, power = .99. Post hoc comparisons showed the evaluations of the images were significantly more negative when participants were stroking the experimenter's arm (M = 4.57, SD = .44) than when participants stroked their own arm (M = 4.84, SD = .47), $t(38) = -4.00$, $p < .001$, d = 0.65, 95% CI [.13, .41], when the experimenter was present but no touch was involved (M = 4.79, SD = .34), $t(38) = -3.16$, p = .003, d = 0.52, 95% CI [−.36, −.08], and when the experimenter stroked participants' arm (M = 4.72, SD = .36), $t(38) = -3.15$, p = .003, d = 0.51, 95% CI [.05, .25]. Image evaluations were also significantly more negative when participants were alone in the room than when the experimenter was present without touch, $t(38) = -2.51$, p = .016, d = 0.44, 95% CI [.02, .22], and when participants were stroking their own arm, $t(38) = -3.07$, p = .004, d = 0.52, 95% CI [.06, .29]. There were no significant differences in evaluations of the images when the experimenter was stroking participants' arm compared with the experimenter's presence, $t(38) = -1.09$, p = .282, d = 0.18, 95% CI [−.20, .06], and being alone, $t(38) = 1.00$, p = .325, d = 0.18, 95% CI [−.06, .16], when participants stroked their own arm compared with mere presence of the experimenter, $t(38) = 0.82$, p = .418, d = 0.14, 95% CI [−.07, .17], when participants were stroking the experimenter's arm compared with when participants were alone in the room (M = 4.66, SD = .36), $t(38) = -1.67$, p = .103, d = 0.25, 95% CI [−.22, .02]. There was a trend toward significance with more positive evaluations when participants were stroking their own arm compared with when the experimenter stroking participants' arm, $t(38) = 1.90$, p = .065, d = 0.32, 95% CI [.13, .41].

Interaction of experimental condition and image valence. It was hypothesized that forearm-stroking would amplify evaluations of positive affective images. Evaluations of the various valence categories of the images varied between the experimental conditions as indicated by the significant 2-way interaction, $F(8, 296) = 10.92$, $p < .001$, partial $\eta^2 = .23$, power = 1.00; see Figure 3. Evaluations of *negative images* were significantly less negative when the experimenter was stroking participants' forearm than when participants stroked the experimenter's forearm, $t(37) = 3.01$, p = .005, d = 0.50, 95% CI [.07, .36], when the experimenter was present without any forearm-stroking, $t(37) = 2.50$, p = .017, d = 0.41, 95% CI [.04, .36], and when participants were alone in the room, $t(37) = 5.40$, $p < .001$, d = 0.89, 95% CI [.25, .55]. Evaluations of negative images were significantly less negative when participants were stroking their own forearm than when stroking the experimenter's forearm, $t(37) = 4.33$, $p < .001$, d = 0.71, 95% CI [.19, .54], when the experimenter was present without any forearm-stroking, $t(37) = 4.17$, $p < .001$, d = 0.68, 95% CI [.18, .52], and when participants were alone in the room, $t(37) = 6.61$, $p < .001$, d = 1.08, 95% CI [.38, .72]. Being alone was associated with significantly more negative evaluations of negative images compared with when the experimenter was present, $t(37) = -2.87$, p = .007, d = 0.47, 95% CI [.06, .34], and when participants were stroking the experimenter's forearm, $t(37) = -2.86$, p = .007, d = 0.46, 95% CI [.05, .31]. No other comparisons were significant for the negative images, ps > .05.

Whereas there were no significant differences in evaluations of *neutral images* between the experimental conditions, ps > .05, the evaluations of *positive images* differed significantly between conditions. Positive images were evaluated significantly less positive when participants stroked the experimenter's forearm than when the experimenter was merely present, $t(37) = -5.61$, $p < .001$,

[3] The findings presented in this article focus on the evaluation of affective images, whereas the facial EMG data were assessed to reflect affective reactions to the images. This research question is beyond the scope of the current manuscript and will thus be presented elsewhere.

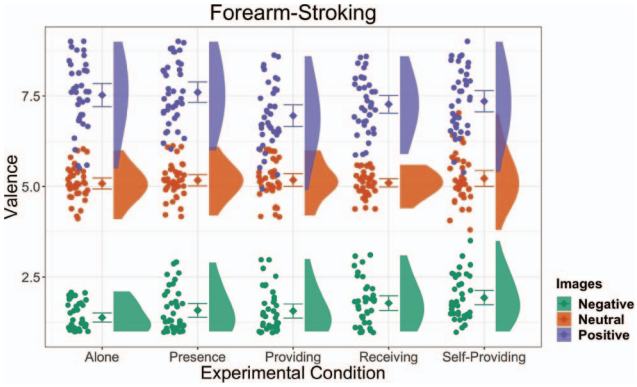

Figure 3. Evaluations of the affective images from the five experimental conditions based on valence ratings from Study 2. Valence ratings per participant (dots), mean rating ± 95% CI, and violin plots are displayed for each of the three image valence categories (positive, negative, neutral) and the five experimental conditions (alone, presence, providing touch, receiving touch, and self-providing touch). Valence ranged from 1 (*negative*) to 9 (*positive*). See the online article for the color version of this figure.

$d = 0.91$, 95% CI [−.88, −.42], when the experimenter stroked participants' forearm, $t(37) = -3.35$, $p = .002$, $d = 0.53$, 95% CI [.13, .51], when participants stroked their own forearm, $t(37) = -3.34$, $p = .002$, $d = 0.54$, 95% CI [.16, .64], and when participants were alone in the room, $t(37) = -4.98$, $p < .001$, $d = 0.81$, 95% CI [−.80, −.34]. Evaluations of positive images were significantly more positive when the experimenter was present than when participants' forearm was stroked by the experimenter, $t(37) = 3.01$, $p = .005$, $d = 0.50$, 95% CI [−.56, −.11], and when participants stroked their own forearm, $t(37) = 2.59$, $p = .014$, $d = 0.42$, 95% CI [−.45, −.05]. Evaluations of positive images were significantly more positive when participants were alone in the room than when the experimenter stroked participants' forearm, $t(37) = 2.38$, $p = .022$, $d = 0.40$, 95% CI [−.47, −.04]. No other comparisons were significant for the positive images, $ps > .05$.

Additional analyses. Because Study 1 and Study 2 only differed in the type of affiliative touch applied, additional analyses were carried out to explore whether the types of touch qualitatively differed from each other. A 2 × 3 × 5 repeated-measures ANOVA was conducted with study (1 = hand-squeezing, 2 = forearm-stroking) as between-subjects factor, and image valence (three: negative, neutral, positive) and experimental condition (five: alone, presence, self-providing, receiving, providing) as within-subject factors. The main effects and interactions of image valence and experimental conditions are not presented here, because they are not relevant to the research question and reported in the individual studies. Partial eta squared was used as effect size measure for the main effects and interaction effects, whereas Cohen's *d* represents the effect size for the post hoc comparisons.

The main effect of study was not significant, $F(1, 75) = 0.19$, $p = .665$, partial $\eta^2 = .03$, power = .07. The interaction of Image Valence × Study was significant, $F(2, 150) = 3.55$, $p = .031$, partial $\eta^2 = .05$, power = .65. Post hoc independent samples *t* tests showed that the evaluations of negative images were significantly more positive for Study 2 (forearm-stroking sample, $M = 1.64$, $SD = .47$) than Study 1 (hand-squeezing sample, $M = 1.44$, $SD = .26$), $t(57.72) = 2.38$, $p = .021$, $d = 0.63$, 95% CI [−.38, −.03]. The evaluations of positive images did not differ significantly between Study 2 (forearm-stroking sample, $M = 7.34$, $SD = .77$) than Study 1 (hand-squeezing sample, $M = 7.56$, $SD = .70$) $t(75) = 1.31$, $p = .195$, $d = 0.30$, 95% CI [−.12, .56]. There were no significant differences for the evaluations of neutral images between Study 2 (forearm-stroking sample, $M = 5.15$, $SD = .38$) and Study 1 (hand-squeezing sample, $M = 5.24$, $SD = .37$), $t(75) = 0.99$, $p = .328$, $d = 0.23$, 95% CI [−.09, .25]. The interaction of Experimental Condition × Study was trending toward significance, $F(4, 300) = 2.13$, $p = .077$, partial $\eta^2 = .03$, power = .63. Post hoc independent samples *t* tests showed that the evaluations were trending toward being significantly more positive when the experimenter applied hand-squeezing ($M = 4.87$, $SD = .39$) than forearm-stroking ($M = 4.72$, $SD = .36$), $t(75) = 1.79$, $p = .077$, $d = 0.41$, 95% CI [−.02, .33]. There were no significant differences in evaluations between self-provided hand-squeezing ($M = 4.81$, $SD = .35$) and forearm-stroking ($M = 4.83$, $SD = .47$), $t(75) = 0.30$, $p = .766$, $d = 0.07$, 95% CI [−.21, .16], and between squeezing the experimenter's hand ($M = 4.52$, $SD = .39$) and stroking the experimenter's forearm ($M = 4.57$, $SD = .44$), $t(75) = 0.47$, $p = .640$, $d = 0.11$, 95% CI [−.23, .14]. The evaluations from Study 1 also did not differ significantly from Study 2 in the mere presence of the experimenter ($M_{\text{hand-squeezing}} = 4.83$, $SD = .35$, $M_{\text{forearm-stroking}} = 4.79$, $SD = .34$), $t(75) = 0.52$, $p = .604$, $d = 0.12$, 95% CI [−.12, .20], or the alone condition ($M_{\text{hand-squeezing}} = 4.70$, $SD = .37$, $M_{\text{forearm-stroking}} = 4.67$, $SD = .36$), $t(75) = 0.45$, $p = .658$, $d = 0.10$, 95% CI [−.13, .20].

Notably, the interaction of Image Valence × Experimental Condition × Study was significant, $F(8, 600) = 2.36$, $p = .017$, partial $\eta^2 = .03$, power = .89. To test whether the image evaluations were affected by the type of touch for the individual image valence categories, 2 × 3 repeated-measures ANOVAs were conducted per experimental condition with study (2) as between-subjects factor and image valence (3) as within-subject factor. The image evaluations per valence category should be comparable between Study 1 and Study 2 in the experimental conditions were no touch was involved if the found effects are specific to the kinds of touch applied in the two studies and only differ for the experimental conditions involving touch. The main effects of image valence were disregarded, as the same pattern of evaluations emerged for all experimental conditions in the order of positive images > neutral images > negative images. Significant interactions of image valence and type of touch were followed up with independent samples *t* tests.

The main effect of study was trending toward significance for the *receiving touch from the experimenter* condition, $F(1, 75) = 3.21$, $p = .077$, partial $\eta^2 = .04$, power = .42, with more positive evaluations in the hand-squeezing ($M = 4.87$, $SD = .76$) than forearm-stroking sample ($M = 4.72$, $SD = .76$). More importantly, the interaction of Study × Image Valence was significant, $F(2, 150) = 6.85$, $p = .001$, partial $\eta^2 = .08$, power = .92. Post hoc *t* tests showed that hand-squeezing sample had significantly more positive evaluations of positive images ($M = 7.75$, $SD = .76$) than the forearm-stroking sample ($M = 7.27$, $SD = .75$), $t(75) = 2.73$, $p = .008$, $d = 0.63$, 95% CI [.13, .82], and a trend toward significance was found for neutral images ($M_{\text{hand-squeezing}} = 5.27$, $SD = .46$, $M_{\text{forearm-stroking}} = 5.10$, $SD = .36$), $t(75) = 1.79$, $p = .078$, $d = 0.41$, 95% CI [−.02, .35]. The evaluations did not differ for negative images between the hand-squeezing sample ($M =$

1.60, $SD = .43$) and forearm-stroking sample ($M = 1.78$, $SD = .61$), $t(65.92) = -1.47$, $p = .146$, $d = -0.36$, 95% CI [−.42, .06].

The main effect of study was not significant for the *self-providing touch* condition, $F(1, 75) = 0.09$, $p = .766$, partial $\eta^2 = .00$, power = .06, but the interaction of Study × Image Valence was significant, $F(1, 75) = 6.21$, $p = .003$, partial $\eta^2 = .08$, power = .89. Post hoc t tests showed that self-provided forearm-stroking resulted in significantly more positive evaluations of negative images ($M = 1.93$, $SD = .60$) than hand-squeezing ($M = 1.54$, $SD = .30$), $t(53.98) = 3.62$, $p = .001$, $d = 0.99$, 95% CI [−.61, −.18]. There were no significant differences for evaluations of neutral images between the self-provided hand-squeezing sample ($M = 5.22$, $SD = .59$) and forearm-stroking sample ($M = 5.22$, $SD = .67$), $t(75) = -0.00$, $p = .997$, $d = 0.00$, 95% CI [−.29, .29]. There were no significant differences for evaluations of positive images between the self-provided hand-squeezing ($M = 7.66$, $SD = .73$) and forearm-stroking ($M = 7.36$, $SD = .89$) samples, $t(75) = 1.67$, $p = .100$, $d = 0.39$, 95% CI [−.06, .68].

Neither the main effect of study, $F(1, 75) = 0.22$, $p = .640$, partial $\eta^2 = .00$, power = .08, nor the interaction of Study × Image Valence, $F(2, 150) = 1.38$, $p = .254$, partial $\eta^2 = .02$, power = .29, were significant for the condition where participants *provided touch to the experimenter*. Neither the main effect of study, $F(1, 75) = 0.27$, $p = .604$, partial $\eta^2 = .00$, power = .08, nor the interaction of Study × Image Valence, $F(2, 150) = 2.03$, $p = .135$, partial $\eta^2 = .03$, power = .35, were significant for the condition where the experimenter was merely present. Neither the main effect of study, $F(1, 75) = 0.20$, $p = .658$, partial $\eta^2 = .00$, power = .07, nor the interaction of Study x Image Valence, $F(2, 150) = 2.03$, $p = .617$, partial $\eta^2 = .00$, power = .13, were significant for the condition where participants were *alone*.

Discussion

Study 2 applied forearm-stroking as affiliative touch in addition to a social situation manipulation of another person's presence versus absence to investigate the effects on affective image evaluations. Results showed that the evaluations were significantly more positive for positive images, neutral for neutral images, and negative for negative images, and the image evaluations differed significantly for the experimental conditions. The presence of the experimenter had a positive effect on the image evaluations compared with being alone, and adding touch by the experimenter did not augment this effect; in fact, it was not significantly different from the alone condition. However, participants' evaluations of the images were significantly more positive when participants stroked their own forearms than when the experimenter provided the affiliative touch. Further, even though providing affiliative touch to the experimenter descriptively led to the most negative valence ratings, it did not affect participants more negatively than being alone, since the difference was not significant. The image evaluations when the experimenter stroked participants' forearm were not significantly different to when participants were alone but providing self-touch made evaluations more positive. Creating a social situation and forearm-stroking as affiliative touch affect evaluations of affective images, although image valence needs to be considered when interpreting the effects of the social and touch manipulations on affective image evaluations, because the two-way interaction from the current study was significant.

The found effects were specific to affective images, as evaluations of *neutral images* were not affected by the presence of another person or touch provider variations. There were no significant differences in evaluations for *negative images* between the receiving affiliative touch conditions (self-touch and experimenter), but the evaluations were significantly more positive in both receiving conditions than in the mere presence of the experimenter and the alone condition. When participants provided affiliative touch to the experimenter and in the mere presence of the experimenter, evaluations were significantly more positive for negative images than when participants were alone. That is, another person's presence attenuated the negativity of negative images and receiving touch augmented this effect.

Positive images were evaluated as most positive in the presence of another person and least positive when forearm-stroking was provided to the experimenter by participants. Providing affiliative touch to the experimenter significantly decreased the positivity of positive images compared with all other experimental conditions. It was, however, expected that receiving forearm-stroking would augment evaluations of positive images, although the experimenter's presence had a significantly more positive effect than receiving forearm-stroking by either the experimenter or self-provided. In fact, evaluations for positive images were more positive in the alone condition than when affiliative touch was received by the experimenter. Thus, creating a social situation (i.e., the mere presence of the experimenter) was of greater benefit for evaluations for positive images than affiliative touch.

Receiving forearm-stroking did not specifically increase the positivity of positive images but attenuated the negativity of negative images. As such, the found pattern was similar to Study 1 and thus additional analyses were carried out directly comparing the image evaluations from the two studies to investigate whether the two types of affiliative touch qualitatively differ from each other in their specific effects on evaluations of positive and negative images. Overall, the valence ratings did not differ between the two studies, but there were specific effects on the evaluations of affective images depending on the images' valence. The hand-squeezing sample evaluated negative images as more negative than the forearm-stroking sample (across experimental conditions), but not positive or neutral images. Considering the experimental condition (across image valence), hand-squeezing by the experimenter resulted in slightly more positive evaluations than her forearm-stroking, although this result was merely trending toward significance and the only found effect. The image evaluations did not differ between the studies in the other four experimental conditions, indicating that there were no general differences in evaluations between the samples of the two studies and that the two types of affiliative touch differ qualitatively only when touch is provided by another person.

Importantly, the manipulations of creating a social situation and providing and receiving affiliative touch had differential effects on the evaluations of negative, positive, and neutral valence images depending on whether hand-squeezing or forearm-stroking was involved, as indexed by the significant three-way interaction. Precisely, positive and neutral valence image evaluations were more positively affected by the experimenter's hand-squeezing than forearm-stroking, although the result for neutral valence images was based on a trend toward significance. The type of touch did not affect evaluations of negative valence images. There were

no significant differences in image evaluations between participants who stroked the experimenter's forearm and those who squeezed the experimenter's hand. Within the self-providing touch conditions, more positive evaluations emerged for participants who stroked their own forearm compared with those squeezing their own hand when negative images were evaluated and there were no effects for neutral or positive valence images. A more detailed discussion of the findings is provided in the General Discussion.

Studies 1 and 2 both entailed a within-subject design. Because of the risk of participants figuring out the underlying hypotheses and altering their ratings according to their assumption of what the experimenters wanted them to rate, we conducted a replication of the previous studies using a between-subjects design.

Study 3 – Influence of Affiliative Touch (Hand-Squeezing) on Affective Image Evaluations

Studies 1 and 2 had a within-factor design, that is, all subjects evaluated the valence of standardized affective images (of positive, negative, and neutral valence) across the same five experimental conditions: two conditions addressing the social component ([a] presence, [b] alone), and three conditions involving touch ([c] receiving, [d] providing to experimenter, and [e] self-providing). This within-subject design has the advantage of comparing the data from the same participants in all conditions accounting for potential individual differences that could drive effects in between-subjects designs. However, participants from within-subject designs could have altered their ratings aligning with their assumptions about the hypotheses. To rule out this possible effect, a between-subjects design study was carried out including five groups. Each group corresponds to one of the five experimental conditions from Studies 1 and 2, that is, (a) presence, (b) alone, (c) receiving, (d) providing to experimenter, and (e) self-providing. Participants from all groups evaluated the valence of standardized affective images (positive, negative, and neutral). It was aimed to replicate the results from Study 1 including hand-squeezing as the type of touch. That is, it was hypothesized that negative affective images would be evaluated as less negative in the conditions where the participant was receiving touch (receiving and self-providing) compared with the other conditions (Hypothesis 1) and that positive images would be evaluated as more positive in the presence of the experimenter than in the alone condition (Hypothesis 2).

Method

Participants. Because of the between-subjects design of Study 3, the required sample size was not calculated based on the effect sizes from Studies 1 and 2; instead, the same values were used as for the sample size calculation from Studies 1 and 2: small effect size ($f = .20$), alpha level of 5% and a power of .80, but considering the between-subjects design with five groups (presence, alone, receiving touch, providing touch, self-providing touch) and the within-subjects factor of image valence with 3 levels (negative, neutral and positive). The estimated required total sample size was 95 (19 per group). Recruitment took place through standard e-mail and social network advertisements (e.g., Facebook and WhatsApp) and 115 participants were recruited. However, four were excluded because of their previous participation in either Study 1 or 2. Thus, 111 participants were invited to the laboratory to complete the task (described below). Of those 111, two participants were excluded from analyses, because they did not fully comply with the task instructions, leading to a final sample size of 109 ($M_{age} = 21.17$, $SD = 2.71$) for analyses. Participants rated the hand-squeezing as neutral to pleasant ($M_{providing} = 6.68$, $SD = 1.49$; $M_{receiving} = 7.77$, $SD = 1.27$; $M_{self\text{-}providing} = 5.73$, $SD = 1.87$). Of the participants included in analyses, the majority were enrolled in an undergraduate course at the Mackenzie Presbyterian University ($n = 105$) from law ($n = 67$), psychology ($n = 22$), biological and health sciences ($n = 7$), journalism ($n = 3$), marketing ($n = 3$), computer science ($n = 2$), and economy ($n = 1$), and some were employed ($n = 4$).

Procedure. The procedure was identical to Studies 1 and 2, except that participants only received the instruction relevant to the experimental condition they had been allocated to. Participants were randomly assigned to the groups. All participants were female, and no significant difference was observed between groups with regard to Age: $F(4,108) = 0.88$, $p = .48$ ($M_{providing} = 20.55$, $SD = 2.22$; $M_{receiving} = 21.55$, $SD = 4.06$; $M_{self\text{-}providing} = 20.64$, $SD = 2.08$; $M_{alone} = 21.71$, $SD = 2.15$; $M_{presence} = 21.45$, $SD = 2.56$).

Data preparation and analyses. Data preparation were identical to Study 1. Data analyses were conducted in SPSS Version 24 (SPSS IBM, Armonk, NY). Repeated-measures ANOVA was conducted for the valence ratings including Group (five: alone, presence, self-provided, receiving, providing) as between-subjects factor and image valence (three: positive, neutral, negative) as within-subject factor. Adjustment of degrees of freedom was applied when sphericity was violated using Greenhouse-Geisser when the Greenhouse-Geisser estimate of sphericity was $< .75$ and Huynh-Feldt when the Greenhouse-Geisser estimate of sphericity was $> .75$ (Field, 2009). Partial eta squared is presented as effect size measure. Significant main effects and interactions were followed up with paired-samples t tests; 95% CIs for the differences of the means and Cohen's d as effect size measure are presented.

Results

Manipulation check. Results from the repeated-measures ANOVA showed a significant main effect of image valence, $F(1.50, 167.85) = 1262.31$, $p < .0001$, partial $\eta^2 = 0.95$, power = 1.00. Greenhouse-Geisser adjustment of degrees of freedom was applied due to violation of sphericity. Post hoc paired sample t tests showed that negative images ($M = 1.79$, $SD = .72$) were rated as significantly more negative in valence than neutral images ($M = 5.26$, $SD = .56$), $t(108) = -36.77$, $p < .001$, $d = 3.52$, 95% CI [−3.66, −3.28], and positive images ($M = 7.65$, $SD = .85$), $t(108) = -45.67$, $p < .001$, $d = 4.38$, 95% CI [−6.11, −5.61]. Positive images were rated as significantly more positive than neutral images, $t(108) = 31.37$, $p < .001$, $d = 3.01$, 95% CI [2.24, 2.54].

Main effect of experimental condition. Results showed a significant main effect of experimental condition, $F(4, 104) = 5.25$, $p = .001$, partial $\eta^2 = .17$, power = 0.96. Post hoc comparisons showed the evaluations of the images were significantly more positive when experimenter stroked the participant's hand ($M = 5.18$, $SD = .41$) than when participants were stroking the experimenter's hand ($M = 4.73$, $SD = .43$), $t(42) = 3.55$, $p =$

.001, $d = 1.07$, 95% CI [.19, .71], when participants stroked their own hand ($M = 4.82$, $SD = .26$), $t(42) = 3.46$, $p = .001$, $d = 1.05$, 95% CI [.15, .57], when the participant was alone and ($M = 4.83$, $SD = .34$), $t(41) = 3.00$, $p = .005$, $d = 0.93$, 95% CI [.11, .58], and when the experimenter was in the room and no touch was involved ($M = 4.92$, $SD = .29$), $t(42) = 2.38$, $p = .02$, $d = 0.73$, 95% CI [.04, .47]. There were no significant differences in evaluations of the images when the participants were stroking experimenter's hand compared with being alone, $t(41) = -0.90$, $p = .37$, $d = 0.26$, 95% CI [−.34, .13], and when participants stroked their own hand, $t(42) = -0.83$, $p = .41$, $d = 0.25$, 95% CI [−.31, .13]. There were no significant differences in the evaluations for the mere presence of the experimenter group compared with when participants were stroking the experimenter's hand $t(42) = 1.77$, $p = .08$, $d = 0.52$, 95% CI [−.03, .42] and when participants stroked their own hand, $t(42) = 1.27$, $p = .21$, $d = 0.36$, 95% CI [−.06, .27]. Finally, there were no significant differences in evaluations of the images when the participants were alone compared with when participants were stroking their own hand, $t(41) = 0.18$, $p = .86$, $d = 0.03$, 95% CI [−.17, .20], and for the mere presence of the experimenter, $t(41) = -0.94$, $p = .35$, $d = 0.28$, 95% CI [−.28, .10].

Interaction of experimental condition and image valence. Evaluations of the various valence categories of the images varied between the experimental conditions as indicated by the significant two-way interaction, $F(6.00, 156.06) = 4.07$, $p = .001$, partial $\eta^2 = .14$, power = 0.97 (see Figure 4).

Evaluations of negative images were significantly less negative when the experimenter stroked the participant's hand compared with when the participant was alone, $t(41) = 2.71$, $p = .01$, $d = 0.83$, 95% CI [.12, .84], and when the experimenter was in the room but not stroking the participant's hand, $t(42) = 2.10$, $p = .04$, $d = 0.64$, 95% CI [.01, .72]. A trend toward significance was observed on the comparison between the group in which the experimenter stroked the participant's hand with the self-stroking group, $t(42) = 1.82$, $p = .07$, $d = 0.55$, 95% CI [−.03, .61].

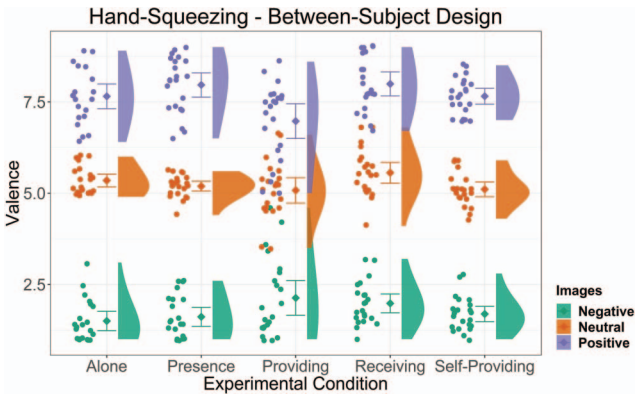

Figure 4. Evaluations of the affective images from the five experimental groups based on valence ratings from Study 3. Valence ratings per participant (dots), mean rating ± 95% CI, and violin plots are displayed for each of the three image valence categories (positive, negative, neutral) and the five experimental groups (alone, presence, providing touch, receiving touch, and self-providing touch). Valence ranged from 1 (*negative*) to 9 (*positive*). See the online article for the color version of this figure.

Evaluations of negative images were significantly less negative when the participant stroked the experimenter's hand experimenter compared with alone, $t(41) = 2.38$, $p = .02$, $d = 0.73$, 95% CI [.09, 1.17], and to presence groups, $t(41) = 1.99$, $p = .05$, $d = 0.60$, 95% CI [−.01, 1.04]. No other comparisons were significant for the negative images, $ps > .05$.

For the neutral images, evaluations were significantly more positive when the experimenter stroked participants' hand than when participants were stroking their own hands $t(42) = 2.70$, $p = .01$, $d = 0.82$, 95% CI [.12, .79], when participants were stroking the experimenter's hand, $t(42) = 2.22$, $p = .03$, $d = 0.66$, 95% CI [.04, .92], and when the experimenter was in the room but not touching the participant, $t(42) = 2.42$, $p = .02$, $d = 0.73$, 95% CI [.06, .68]. No other comparisons were significant for the negative images, $ps > .05$.

Evaluations of positive images were significantly more positive when the experimenter stroked the participant's hand than when the participants stroked the experiment's hand, $t(42) = 3.67$, $p = .001$, $d = 1.11$, 95% CI [.46, 1.58]. Evaluations of positive images were also significantly more positive when the experimenter was present than when participants stroked the experimenter's hand, $t(42) = 3.56$, $p = .001$, $d = 1.07$, 95% CI [.43, 1.55]. Evaluations of positive images were significantly less positive when participants stroked the experiment's hand than when participants stroked their own hand, $t(42) = -2.71$, $p = .01$, $d = 0.82$, 95% CI [−1.19, −.17], and when participants were alone, $t(41) = -2.41$, $p = .02$, $d = 0.74$, 95% CI [−1.25, −.11]. Finally, a trend toward significance was observed on the comparison between the group in which the experimenter stroked the participant's hand with the self-stroking group, $t(42) = 1.78$, $p = .08$, $d = 0.54$, 95% CI [−.05, .72]. No other comparisons were significant for the positive images, $ps > .05$.

Discussion

Like both Studies 1 and 2, Study 3 assessed evaluations of affective images ranging from negative to positive valence. However, the five experimental conditions from Studies 1 and 2 were now applied separately in five different groups in a between-subjects design. As observed in Studies 1 and 2, it was again replicated that the evaluations of the IAPS stimuli (Lang et al., 1997; Ribeiro et al., 2004) differed significantly between the image valence categories, as evaluations were significantly more positive for positive images, neutral for neutral images, and negative for negative images. The evaluations of the images also varied for the experimental groups with significantly more positive evaluations in the group receiving affiliative touch from the experimenter than in providing self-touch, mere presence of the experimenter, providing touch to the experimenter and alone groups. Unlike Studies 1 and 2, the mere presence and the self-touch groups did not differ significantly as compared with alone and providing touching. Thus, these results align with the hypothesis that affiliative touch increases the positivity of affective images, but not with the hypothesis that another's presence also has this effect by creating a social situation. This important difference might be explained by the main difference between Studies 1 and 2 and 3 regarding their experimental designs. In Studies 1 and 2, the person in the room during the presence condition was there during the other conditions (both receiving and providing touch).

Despite being a stranger, the participants received and provided affiliative touch to that person, thus, creating a social and intimate situation. In Study 3, participants were enrolled only to one of the five groups; thus, the participants in the presence group did not provide or receive any touch to/from the experimenter. This lack of interaction through touch might have a key role on the lack of effect during the presence situation; that is, touching and receiving touch (even from a strange) created a social situation different of the social situation in the presence group only. Importantly, all participants (in all three studies) rated touch conditions as neutral to positively pleasant; therefore, the positive effect of the mere presence condition in Studies 1 and 2, but not in Study 3, might be related to a social connection mediated through the level of touch agreeableness. The experimental designs of our three studies do not allow us to confirm this possible mediation effect; thus, new experiments could evaluate the effect of touch considering different levels of pleasantness. All these findings are from the main effect of group; thus, it is needed to consider image valence and the interaction with group, as the two-way interaction from the current study was significant. Table 2 presents the significant comparisons between conditions/groups considering the valence of the images for the three studies.

Like Studies 1 and 2, receiving touch resulted in more positive evaluations of the negative images compared with the two no-touch groups (presence and alone). The replication of these findings in a between-subjects design reinforces the role of receiving affiliative touch on reducing the perceived negativity from negative stimuli. However, unlike Studies 1 and 2, self-providing touch did not result in more positive evaluations of the negative images while providing touch did it. Thus, the most prominent effects of Study 3 were the more positive evaluations of the negative images during affiliative touch (both receiving and providing) as compared with no-touch conditions. In the other studies, self-providing (Studies 1 and 2) and another person's presence (Study 2) attenuated the negativity of the negative images. In Study 3, the self-providing and mere presence were not enough to induce that effect. Therefore, from Study 3 we could derive that the mere presence effects observed in the other studies are not simply because of the mere presence, but rather it seems that the mere presence works when the person in the room also interacts with the participants via touch in some moments (receiving and providing conditions). The lack of effect observed for self-providing might be explained in the same direction—self-touching works in the presence of someone that you have, at least, interacted via touch.

Receiving touch also resulted in more positive evaluations of the neutral images when compared with providing and presence groups. Thus, in Study 3 the positive effect of receiving touch was extended from the negative to the neutral images. We did not observe these effects in Studies 1 and 2. One possible reason for that is the fact that participants were under three conditions of touch and two of social interaction and, therefore, exposed more time to negative, neutral and positive. This might have induced more answers around the mean of each image.

Like Studies 1 and 2, positive images were evaluated as less positive when participants provided touch as compared with all other groups. These findings reinforce that providing affiliative touch to others reduces how positive you evaluate a positive stimuli. Curiously, providing touch made positive images less positive and negative images less negative. One possible interpretation is that providing touch acts as a distraction factor to the provider; that is, the need to provide affiliative touch to another person enhances the attention toward the receiver while reducing the attention to the other stimuli (in this case, the images independently of being negative or positive). Therefore, to provide affiliative touch not only affects the receiver but also the provider; however, not necessarily in the same direction.

Table 2
Significant Comparisons Between Conditions and Groups for the Three Studies

	Within-subjects design		Between-subjects design
Images	Hand (Study 1)	Forearm (Study 2)	Hand (Study 3)
Negative	Receiving > Providing	Receiving > Providing	
	Receiving > Presence	Receiving > Presence	Receiving > Presence
	Receiving > Alone	Receiving > Alone	Receiving > Alone
			Receiving > Self-providing
	Self-providing > Providing	Self-providing > Providing	
	Self-providing > Presence	Self-providing > Presence	
	Self-providing > Alone	Self-providing > Alone	
		Presence > Alone	
		Providing > Alone	Providing > Alone
			Providing > Presence
Neutral			Receiving > Providing
			Receiving > Presence
Positive	Providing < Presence	Providing < Presence	Providing < Presence
	Providing < Receiving	Providing < Receiving	Providing < Receiving
	Providing < Self-providing	Providing < Self-providing	Providing < Self-providing
	Providing < Alone	Providing < Alone	Providing < Alone
	Presence > Alone		
		Presence > Receiving	
		Presence > Self-providing	
		Alone > Receiving	

General Discussion

Across three studies, the effects of providing and receiving affiliative touch (hand-squeezing and forearm-stroking) and the mere presence of another person on affective image evaluations were investigated. The three studies evaluated the effects of five experimental conditions; however, participants in Experiment 3 were divided into groups and only participated in one of five experimental conditions. As common results to the three studies, we found that (a) positive images were evaluated as least positive when affiliative touch was provided to the experimenter by participants in the three experiments; (b) negative images were evaluated as least negative when participants received affiliative touch from the experimenter and (c) as most negative when participants were alone in the room. Only to the within-subjects design (Studies 1 and 2), the results indicated that (a) positive images were evaluated as most positive in the presence of another person, and (b) negative images were evaluated as least negative when participants received affiliative touch from themselves (self-touching). From Studies 1 and 2, the results showed differential effects of the two types of affiliative touch on affective image evaluations depending on the image valence and who provided the touch. It seems that receiving affiliative touch can attenuate negative evaluations in negative contexts and the presence of another person can amplify positive evaluations in positive situations. However, comparison of the two within-subjects studies showed that hand-squeezing is favorable to forearm-stroking for evaluations of observed positive contexts when touch is received from another person; forearm-stroking is favorable to hand-squeezing for evaluations of observed negative contexts when touch is self-provided. That is, the context in which the affiliative touch occurs, the subject applying the affiliative touch, and the type of affiliative touch interact in their modulation of affective image evaluations. With regard to the neutral images, there was no effect of another person's presence or affiliative touch on the valence ratings, neither in the hand-squeezing nor the forearm-stroking study. However, neutral images were rated as more positive when participants received affiliative touch in Study 3. Thus, beyond the observed differences between the conditions of touch and other's presence on valence ratings, some findings were attributable to the experimental designs: between versus within-subjects. The following discussion is structured around the main findings across Studies 1 and 2 (hand vs. forearm stroking in a within-subjects design) and across the within (1 and 2) and between (3) studies.

Mere Presence of Others Amplifies Positive Evaluations in Positive Contexts Only When Touch Happened Between Participants and Experimenter

Including a social element to the evaluation of *positive images* increased their positivity significantly compared with being alone in Study 1. Study 2 showed the same pattern, but this effect did not reach significance. Instead, the mere presence amplified evaluations of positive images compared with the touch conditions. Nonetheless, it appears that positive situations become more positive when they are shared between people (and affiliative touch is not a necessity). This conclusion is in line with reports from related literature where increased positive affect was reported when participants believed to be sharing an emotional experience (Wagner et al., 2015). It is striking that these effects emerged based on the mere knowledge about another person's presence without seeing each other or interacting in any way as was the case in the current research and the study by Wagner et al. (2015).

When participants from Study 2 evaluated *negative images*, the presence of another person led to less negative evaluations compared with the alone condition. The same pattern was found from Study 1 but did not reach significance. Nonetheless, the presence of another person seems to attenuate the negativity of negative images (even though not as clearly as adding affiliative touch to the social situation). It is possible that having someone there provides comfort in a negative situation. The findings are again in line with reports by Wagner et al. (2015) who found subjective affect ratings also to be less negative for negative images in their social condition. This concordance is interesting, because participants were asked to evaluate the viewed images in the current research as opposed to stating their own affective states. These findings combined suggest that stimuli evaluations and the associated emotional experience align. That the valence of *neutral images* did not change significantly in the presence of others can be explained by neutral images neither making comforting necessary nor providing grounds for sharing of positivity (Wagner et al., 2015).

Interestingly, these findings were valid only for the within-subjects studies (1 and 2). In Study 3, the valence ratings from the presence group on the positive images were similar to the alone and receiving touch groups. The main and the only difference between these studies is the experimental design. In Studies 1 and 2, participants received and provided touch to the same person as well as self-touched and didn't touch themselves while this exact person stayed there in the room. Thus, even not seeing or knowing this person, the participants from Studies 1 and 2 established a social connection during the multiple trials from different conditions. In Study 3, the participants were enrolled for only one condition (group) and, therefore, the participants from the groups of presence and self-touch never got in contact with the experimenter—they only knew that someone was in the room. These findings seems to align to Wagner et al. (2015) experiment, too. In Wagner's experiment, the participant's dyads were friends, thus, social connection already existed. In Study 3, our effects were related to receiving or providing touch, or in other words, the effects only occurred in the groups in which participants and the experimenter physically interacted via touch. In sum, the three studies together show that creating a social connection via touch enables the mere presence or the self-touching (with the presence, too) to be effective in modulating valence rating, that is, affiliative touch is not a necessity only if the participant and experimenter had touched each other before.

Receiving Affiliative Touch Attenuates Negative Evaluations in Negative Contexts

The results from the three studies suggest that the mere presence of others is not as beneficial in negative situations as with the addition of affiliative touch. When participants evaluated *negative images* while receiving touch from the experimenter, the negativity of the images was attenuated in both within and between-subjects studies. Attention should be drawn to the finding that self-provided touch decreased the negativity of negative images only in the

within-subjects design. In both the within and between-subjects studies, the experimenter was presented in the room while participants self-touched. But the main difference is that in Studies 1 and 2, participants and experimenter interacted via touch in all other conditions. Thus, the attenuation on the negativity of the negative images seems not only from this affiliative touch, but by the sum of self-providing touch while in presence of someone you had already interacted. That is, gentle touch in itself will be meaningful when in the presence of another one we had socially connected (even briefly as our case in Studies 1 and 2). Strikingly, even imagined touch by a romantic partner dampens the effect of negative stimuli on the individual (Jakubiak & Feeney, 2016).

When *positive images* were evaluated while the experimenter provided affiliative touch to participants, there were no significant differences to the mere presence condition in the hand-squeezing study. However, in the forearm-stroking study, the positivity of positive images was significantly higher when another person was present compared with adding affiliative touch to the social situation. The results suggest that receiving affiliative touch is of greater importance to the evaluation of negative than positive affective stimuli. Finally, the valence ratings of neutral images in both studies did not change significantly across the experimental conditions involving touch in Studies 1 and 2, emphasizing the specificity of the effects of affiliative touch on affective images (i.e., positive and negative). However, receiving touch in Study 3 resulted in more positive ratings of the neutral images. This finding might be related to the fact that in Study 3 participants were exposed only to one out of five conditions of touch and, therefore, neutral images were not rated by the same participants multiple times which could reduce the valence rating across conditions as observed in Studies 1 and 2.

Qualitative Differences Between Affiliative Touch Type

Because the findings from Study 1 and Study 2 regarding the effect of affiliative touch on evaluations of affective images were similar, this raised the question of whether one type of affiliative touch is more favorable than the other, that is, has increased effects. Significant differences in image evaluations between the two types of affiliative touch were found for the two experimental conditions of receiving affiliative touch, but not the providing, alone, or presence conditions. This result highlights that the findings from the studies reported here are specific to the touch manipulations.

There were no significant differences in evaluations of negative images between the two types of affiliative touch when participants *received touch from the experimenter*. However, the evaluations of positive images were significantly higher when the affiliative touch was hand-squeezing than when it was forearm-stroking, which is against the expectation when C-tactile afferents are stimulated. It should be taken into account, though, that the experimenter providing the affiliative touch was a stranger and forearm-stroking by a stranger might have felt less adequate than hand-squeezing in this context. Why the type of affiliative touch led to a difference in the evaluation of positive and not negative affective stimuli can only be speculated about; maybe social norms were at place that apply to positive contexts more than negative ones and have partially overwritten the effects of the C-tactile afferents stimulation. It can be concluded that hand-squeezing is the favorable kind of affiliative touch when the touch is provided by a stranger in an observed positive context.

Because stroking is a kind of affiliative touch generally occurring between familiar individuals, it is possible that stroking provided by a friend or partner would change the results. Forearm-stroking could then increase the positivity of positive images and decrease the negativity of negative images compared with hand-squeezing. This is because the tactile pleasantness from stroking (i.e., stimulation of C-tactile fibers; McGlone et al., 2012; Pawling et al., 2017) and its accompanying positive affect (Mayo et al., 2018) could amplify the visually perceived pleasantness of the positive affective images and so lead to more positive evaluations. This assumption aligns with the finding from the current research that when *touch was self-provided* and negative images evaluated, then forearm-stroking had more positive effects than hand-squeezing. It can be concluded that self-provided stroking favorably attenuates the negativity of negative images compared with hand-squeezing, which might result from the feeling of pleasantness coming from C-tactile afferent stimulation.

It could be argued that there were differences in whether and how much participants liked forearm-stroking and hand-squeezing which might have affected the results. However, when comparing the pleasantness ratings by participants for receiving forearm-stroking or hand-squeezing from the experimenter from Study 1 to Study 2, there were no significant differences, $t(76) = 1.32$, $p = .189$, Cohen's $d = .30$. Given that the samples reacted comparably in the conditions without touch, it can be assumed that there were no fundamental sample differences; the findings regarding image evaluations seem to result from the different kinds of affiliative touch applied in the two studies.

Caveats and Limitations

The findings of the study should be interpreted within the confines of several limitations. First, the current research included female heterosexual participants and female experimenters to control for sex differences in both perception of the provided touch and providing touch (literature review by Hertenstein, Verkamp, et al., 2006; Stier & Hall, 1984). For example, research has shown that dyads composed of females only communicate happiness better than male–male or male–female dyads, whereas anger was better communicated by male–male dyads as compared with the other pairs (Hertenstein & Keltner, 2011). Receiving touch by a person of the same sex is perceived differently than the touch of an opposite sex individual and this perception is differential for the sexes (see literature review by Hertenstein, Verkamp, et al., 2006). It is possible that the opposite-sex and same-sex effects are inversed in individuals with homosexual orientation, which is why the current study only included heterosexual individuals. Future research should replicate the current research on a male sample, as well as include male and female experimenters and participants, to systematically investigate the effects of same and opposite sex experimenters on image evaluations including affiliative touch in both sexes. Future research should further include the factor of sexual orientation.

Second, the research was conducted in Brazil. Generalizability to other cultures is worth further examination (see literature review by Gallace & Spence, 2010). Although touch on the hand region

has been found to be well-accepted cross-culturally (Suvilehto et al., 2015), further work examining the perception of touch exchange with a stranger as a function of cultural norms is warranted.

Third, the current research included only university-educated participants, which limits generalizability of the results to the wider population varying in socioeconomic and educational background. Although touch constitutes the fifths of human senses and a basic form of communication (Hertenstein et al., 2006, 2009; Montagu, 1971), it would be interesting for future work to disentangle potential effects of socioeconomic background on touch perception and its effects on affect and affective evaluations.

Concluding Comments

Human touch is a vital ingredient to social societies and affective exchanges. Previous work suggests that touch does not modulate affective evaluation of emotional stimuli (Spapé, Harjunen, & Ravaja, 2017). However, the present investigation systematically examined in a multimethod approach across two studies whether affiliative touch, as compared with the mere social presence of another, influenced the evaluation of affective stimuli. The results reported raise two important considerations for the importance of affiliative touch in perception of affective contexts and social interactions. For one, positive situations might be perceived as more positive when being in company than when being alone, emphasizing the social nature of humans and the importance of socializing and sharing experiences. Importantly, this positive effect is dependent on at least a brief social connection as provided by touch condition in Studies 1 and 2. For another, the importance of receiving a specific kind of affiliative touch in the right situation is highlighted. Providing affiliative touch to another person in negative situations might supersede the mere presence of another person in altering the evaluation of the negative situation if the results from the laboratory situation translate to natural situations outside the laboratory. The importance of providing touch is furthered by the decreasing tendency to provide touch in our current society, for example in the form of hugs, which has been acknowledged by the mainstream media (see Cocozza, 2018). Affiliative touch appears to be a vital ingredient of expressing and influencing our everyday emotional lives.

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