EMBODIED RELATIONSHIPS: DOES THE ACT OF HUGGING INFLUENCE AN INDIVIDUAL’S FEELINGS TOWARD HIS OR HER ROMANTIC PARTNER, FAMILY, OR FRIENDS?

by

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Abstract

Embodied cognition is a theory indicating that thoughts, feelings, actions, and behaviors are grounded in physical experiences. Embodiment suggests that what individuals experience physically translates into a related mental representation of that experience which influences how they react to the world around them (Landau, Keefer, & Meier, 2010). Particularly, recent research in embodiment has attempted to examine the intrapersonal association between physical and cognitive experiences. Much research has examined this phenomenon with regards to judgments or perceptions of acquaintances and strangers, but has not heavily focused on close interpersonal relationships with others. The current research aimed to activate the schema for closeness and assigned individuals to engage in a variety of postures, some ended in a “hug” position and others ended on a neutral position. Then, participants were asked a variety of questions about their feelings of closeness in their intimate relationships. I hypothesized that those ending with a hug posture would rate greater feelings of closeness to others than those who ended on a neutral posture. However, results suggested that the manipulated posture had no significant effects on closeness ratings. It is possible that previous postures primed a logical flow of thought toward shapes which may have interfered with the intended priming effect of the “hug.”

*Keywords: Embodied cognition, relationships, closeness*
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Embodied Relationships: Does the Act of Hugging Influence an Individual’s Feelings Toward their Romantic Partner, Family, or Friends?

In psychology’s most infant stages, the overwhelming problem for psychologists was that of the mind-body problem, first proposed by René Descartes. According to Cartesian Dualism, the mind and the body are separate entities that act as such and only influence each other in a unidirectional manner: the mind influences the body to act (Mehta, 2011). However, psychologists eventually began to wonder if the body might also be able to influence the mind to act, and this relationship became extremely relevant for the theory of embodied cognition (Bargh, 2006). For example, a psychological state of happiness leads the mind to affect the physical state of the body, effectively causing the zygomaticus facial muscles to contract and the individual to smile (i.e., mind affecting body). Just as happiness leads individuals to smile, researchers began hypothesizing that smiling may also have an effect on emotional states if the physical experience actually precedes the affective one. This is because individuals learn by association: when one construct consistently follows another, those experiences become linked in the mind. When a cognitive association is formed, the activation of one of those ideas should activate the other (Bruner, 1957). Keeping with the previous example, happiness usually leads to smiling, so those experiences become so strongly linked that a schema is formed in the mind in which happiness includes the physical action of smiling. Because the concepts of happiness and smiling are so closely linked in the mind, the possibility that the “effect” (i.e., smiling) may activate the “cause” (i.e., happiness) via schema activation (Bargh, 2006) caused researchers to investigate this idea.

To illustrate this association between happiness and smiling, researchers manipulated the muscles used to smile by asking participants to hold a pen in their mouth in two different ways:
one way inhibits a smile (holding a pen vertically in the mouth between the lips forming an ‘o’) and the other facilitates a smile (holding the pen horizontally between the teeth) (Strack, Martin, & Stepper, 1988). Participants were then shown a cartoon and their affective responses were recorded. Those who experienced the facilitating condition reported more intense humor responses to the cartoon than those under the inhibiting condition ($d = 0.39$, $N = 92$). This was one of the earliest studies to provide evidence that the mind-body relationship is bidirectional (rather than unidirectional as Descartes proposed) because it suggested that the physical state can influence the affective state: that the body can also influence the mind.

Embodied cognition is an alternative theory to Cartesian dualism which suggests that a bidirectional relationship between the mind and body exists. Embodiment suggests that physical experiences have an influence on thoughts, feelings, behaviors, and actions that directly follow, in addition to the previously grounded mind-body relationship. The theory suggests that physical experiences influence affective and cognitive states by activating related concepts in the mind (Landau, Keefer, & Meier, 2010). Essentially, effects observed in embodiment research are grounded in the activation of these related concepts, called schemas. Schemas may be established based on motor movements and conceptualized metaphors so that experiencing a certain physical state activates corresponding cognitive constructs.

**Embodied and Metaphor Enhanced Cognition**

This connection between the body and mind can also be metaphor enhanced, which is consequently referred to as metaphor enriched cognition. In the same way that physical experiences cause the activation of related cognitive schemas, physical and cognitive experiences also cause the activation of established metaphors, which in turn cause the activation of schemas related to the metaphor. One example of such a metaphor is that up is good and down is bad.
(Meier, Moeller, & Riemer-Peltz, 2011). When individuals are feeling sad, they typically talk about “feeling down,” therefore making up (the opposite direction) “good.” When discussing directions, north is typically located at the top of the map, establishing an association between the constructs of north and up. Therefore, because north is up, north is perceived to be good and consequently better than south. As such, when given the option for a place to live, individuals will typically choose a place in the northern direction because of this metaphor (Meier et al., 2011). The size of this effect was moderate: \((d = 0.62, N = 50)\).

Another common metaphor is that of going in the same direction. When someone agrees with an individual, they may talk about being happy that the person is “seeing things my way.” When ideas are “leaning in the same direction,” such as in a brainstorming session during group projects, individuals are happy because it is seen as agreeable and simple. Going in the opposite direction is therefore seen as tense and complicated. This metaphor extends to physically traveling in the same direction as well. One classic study on metaphor enriched cognition suggested that martial satisfaction can be related to the couples’ commute to work: those who shared a commute in the same direction reported higher satisfaction than those who commuted in opposite directions. This link remained even in couples who commuted to work at different times of day (Huang, Don, Dai, & Wyer, 2012). Additionally, this effect was mirrored for strangers, who reported greater attraction to someone if they walked with them to the assigned experimental task in the same direction as opposed to different directions \((d = 0.89, N = 80)\) (Huang et al., 2012).

In both instances, individuals see those who are physically traveling in the same direction as them as being more agreeable to them. Metaphor enriched cognition begins to demonstrate how the operations of the body and mind are interconnected via formation and activation of
schemas, but the question of how it happens and how strong these connections are still remained unanswered until psychologists further explored schema activation in metaphor enriched cognition.

**Intrapersonal Effects**

Researchers wanted to investigate the mechanisms of schema activation behind these metaphorical associations and why they are strong enough to have psychological effects (i.e., are not just relevant to each other within the metaphor, but remain linked in various contexts). Results suggested that schema activation is the main mechanism involved in embodied effects. In one study, researchers utilized the “something smells fishy” metaphor for suspicion in the English language (Lee & Schwarz, 2012). Findings revealed that when individuals are exposed to a fishy smell, people report more suspicious attitudes and are consequently less willing to trust others in an economic trust game. Additionally, suspicion (induced socially via economic trust games with others, not by fishy smells) enhanced individuals’ abilities to deduce fishy smells ($d = 0.61, N = 91$). Then, researchers designed studies to track the progression of this metaphor to cognitively associated constructs and found that induced suspicion increases the accessibility of both suspicion and fish-related constructs via the metaphor, which improves the identification and labeling of fishy smells (but not other smells) (Lee & Schwarz, 2012). Thus, metaphors create such strong associations between constructs that it actually prioritizes activation of them, influencing both cognition and physical sensation sensitivities to associated concepts. In addition to identifying the mechanisms underlying embodiment (i.e., schema activation), researchers have explored the generalizability of these effects in various contexts, such as intrapersonal perceptions and judgments.
Recent studies on physical experiences and intrapersonal cognitive experiences suggested a link between kinesthetic experiences and schema activation. In a recent study on intrapersonal processes, researchers examined whether the physical sensation of temperature would activate thoughts regarding global warming (via schema activation of temperature changes). Participants chewed flavors of gum that produced sensations of hot and cold temperature and then answered questionnaires about global issues associated with changes in temperature. Those asked to chew “hot” cinnamon gum or “cold” mint gum reported greater awareness for topics such as global warming ($d = 0.50, N = 94$) than those who did not chew any gum at all (Lewandowski, Ciarocco, & Gately, 2012). Individuals chewing either flavor of gum (a physical experience of warm/cold sensations) also showed greater interest in learning more about/volunteering for events related to the cause of global warming than those who did not chew gum (Lewandowski et al., 2012). The embodied temperature experience of chewing cinnamon or mint gum was enough to activate the participants’ awareness of issues associated with temperature by activating the schema of temperature change.

Just as the physical experience of temperature sensations can activate schemas related to temperature changes, the physical experience of weight can activate schemas of importance (Jostmann, Lakens, & Schubert, 2009). The relationship between weight and the schema of importance can be traced to linguistic roots in many cultures (Jostmann et al., 2009). For instance, people “weigh” the value of options in decision making, and an opinion held by someone in a highly influential position “carries weight.” Additionally, heavier weight may mean that more of a product is present (e.g., more weight means more money which holds greater importance). Because this link between weight and importance is grounded in language, it is not only a strong association, but one that is shared amongst speakers of the language. Thus,
the association between weight and importance is a relevant topic for embodied cognition research.

In one study, individuals were given clipboards of varying weights at the beginning of a study and were asked to perform different cognitive tasks such as interpreting monetary value and judging the status of decision making. Results suggested that holding a heavier clipboard influenced individuals to estimate higher monetary values and judge decision making to be more important ($d = 0.61, N = 51$) in the given situation than those who held the lighter clipboard (Jostmann et al., 2009). Individuals holding heavy weight experienced activation of the schema of importance. Thus, heavier weight meant greater importance and more money present. Further research on this topic also validated the bidirectional nature of the embodied effect, in that those who were told an item was more important estimated that item to have greater weight than those who were told the item was less important ($d = 0.74, N = 55$) (Schneider, Rutjens, Jostmann, & Lakens, 2011). In this case, the manipulation of cognition was also able to influence the physical perceptions of the body. The two findings on weight and importance strongly support the bidirectional relationship between the mind and body.

Physical experiences not only influence judgments and decisions about external stimuli, but can even influence an individual’s intrapersonal feelings. For example, researchers wanted to observe whether visually experiencing an object expanding could influence participants’ self-concept change. The simple act of watching squares expand on a computer screen was enough to make participants report greater feelings of self-actualization ($d = 0.74, N = 32$) than having no expansion experience (Landau, Vess, Arndt, Rothschild, Sullivan, & Atchley, 2010). Even though watching squares expand is not directly related to the individuals’ physical experience, passively experiencing expansion of any sort is strong enough to activate perceptions of self-
concept change within that individual. However, embodied experiences can also influence self-concept processes in an active manner. Similarly, in a study of self-concept, researchers investigated whether the physical act of pulling something toward the self is enough to associate that object with expansion of the self, and thus self-concept. Participants either pointed to or pulled (toward themselves) novel/interesting or non-novel/uninteresting activities labeled on bricks, and then identified traits contained within their self-concept. Those who pulled novel/interesting activities reported larger self-concept sizes compared to those who pulled non-novel/uninteresting activities because novel activities should provide an opportunity for expansion, whereas a non-novel activity would not. Additionally, those who pulled novel/interesting activities reported larger self-concept sizes compared to those who pointed to novel/interesting or non-novel/uninteresting activities ($d = 0.58, N = 120$) (Mattingly & Lewandowski, in press). These results suggest that the outcome is a result of an embodied experience (i.e., pulling the activities) and that simply thinking about these activities is not strong enough to activate expansion schemas: the physical experience is therefore necessary for the effect to occur.

**Interpersonal Effects**

Not only can physical experiences influence attitudes, judgments, and sense of self, but they can also influence interpersonal processes. Physically experiencing warmth is able to activate schemas related to temperature (Lewandowski et al., 2012) so that experience should influence any schema associated with heat. As such, researchers examined whether the physical experience of warmth can influence perceptions of “warmth” in the personality of another individual. The act of holding a hot cup of coffee while in the presence of another individual causes individuals to rate the acquaintance as having a warmer personality than those who hold a
cold cup of coffee instead (Williams & Bargh, 2008). In a follow up study, those who held a hot pack reported greater likelihood of buying someone else a gift than those who held a cold pack (Williams & Bargh, 2008). The experience of heat activated the schema of “warmth” in the minds of the participants, influencing actions and perceptions that followed the experience. In the same way that heat is associated with feelings and perceptions of warmth, experiencing cold temperatures is associated with feelings and perceptions of mistrust with other individuals ($d = -1.17$, $N = 30$) (Kang, Williams, Clark, Gray, & Bargh, 2011).

Also, eating a sweet food (rather than a non-sweet food) can influence perceptions and actions of agreeableness ($d = 0.61$, $N = 55$) (Meier, Moeller, Riemer-Peltz, & Robinson, 2012). Sweet foods are very palatable because they are extremely agreeable to the taste buds (i.e., don’t burn like “spicy” foods). Thus, “agreeable” foods are able to activate schemas of agreeableness in other experiences. These studies suggest that physical experiences not only influence attitudes, judgments, and sense of self, but may also influence interpersonal processes, and possibly interactions with others. These studies are important because they show the strength of embodiment effects on perceptions of others, but much less is known about how these experiences may then influence interactions and outcomes in personal relationships.

Though there is little research on embodiment and intimate relationships, there is evidence to support a possible effect. Because heat influences perceptions of warmth in other individuals (Williams & Bargh, 2008), researchers wanted to examine whether this experience can also influence perceptions directly related to relationship formation. Utilizing gum flavor as a manipulation of temperature (Lewandowski et al., 2012), researchers randomly assigned individuals to one of three conditions: chewing “hot” cinnamon gum, chewing “cold” mint gum, or chewing no gum. Then, participants rated their perceptions of warmth and attraction of target
individuals in photographs. Those who chewed “hot” cinnamon gum reported greater perceptions of warmth and feelings of attraction to pictured individuals than those who chewed “cold” mint gum ($d = 0.85, N = 76$) or no gum ($d = 0.45, N = 76$) (Mosley & Bukovec, 2013). The physical experience of heat influenced perceptions and feelings toward others via activation of schemas connected with heat.

Results have already suggested that embodiment effects can activate schemas that influence the perception of another individual. The activation of these schemas, therefore, may be enough to strongly influence intimate relationships if it can influence perceptions about other individuals. To investigate this effect, researchers manipulated physical stability in an attempt to activate schemas of relationship stability or instability. One study found that when individuals sit in wobbly and unstable furniture, they are more likely to see others’ relationships as being unstable ($d = -0.76, N = 47$) and to desire stability in searching for a partner ($d = 0.83, N = 47$) (Kille, Forest, & Wood, 2013). Their physical experience became projected onto others and influenced their desired interaction with an individual in a close intimate relationship. This experience could therefore influence who they choose to date and how they interact with that individual based on the activation of the stability schema.

To date, research examining embodiment in relationships has strongly relied on processes involved in previously formed relationships. Research has suggested that embodiment can influence perceptions of others (Mosley & Bukovec, 2013), perceptions of other individuals’ relationships, and preferences for a future partner (Kille et al., 2013), but has not examined potential effects in ongoing interpersonal relationships. The present research aims to investigate the function of embodiment in existing relationships.

**Current Study**
In the current study, I tested the possibility that the physical experience associated with hugging an individual would activate feelings of closeness toward more intimate partners. Participants engaged in a manipulated physical experience of posture (either ending the series with a hug posture or ending the series with a neutral posture) and then answered questions about their feelings of closeness to their partner (or imagined partner for single participants), parents, and close friends. A hug posture was chosen as the manipulated physical experience of closeness because hugging an individual is an act in which someone pulls an individual close to them. Because hugging is an action strongly associated with feelings of affection, the mere motion of hugging should activate schemas of affection and thus influence feelings of closeness to others directly following the motion. In a hugging motion, one draws the other person closer to them, and thus associated schemas of closeness (i.e., holding someone close) should be activated following this type of motion. All ending postures had a measurement of the arms in relation to the body, with the ultimate goal being to discover whether a tighter hugging motion results in greater reports of closeness than more loose hugging postures. A tighter hugging motion would indicate bringing something closer to the self (Mattingly & Lewandowski, in press), and should thus be associated with stronger activation of closeness schemas. Because the manipulated posture is one associated with pulling toward the self, and pulling motions may activate approach motivation in individuals (Cacioppo, Priester, & Bernston, 1993), a questionnaire assessing motivation types was added to the study in order to control for this possible effect. The main hypothesis was that those who moved their arms into a hug posture would report greater feelings of closeness to their current (or imagined) partner, parents, and close friends than those who ended with a neutral posture. Thus, the physical experience of a hug should increase feelings of closeness.
Method

Participants

Sixty-seven students from Ashland University in Ashland, Ohio participated in this study. However, seven participants were removed from the original sample because they either: were confused about the procedure, did not follow directions, were in a hurry to complete the study and leave, did not report their age or some other demographic, said they felt that the study was “like a test,” or laughed during the assigned postures. Participants received credit towards an assignment for Psychology 101 for their participation. The final sample consisted of 49 females and 11 males with an age range of 18-29 years of age \((M = 19.08, SD = 2.06)\). Freshmen composed a majority of the sample at 58.8\%, while 20.6\% were sophomores, 5.9\% juniors, and 2.9\% seniors. The sample was 82.4\% Caucasian, 1.5\% of the following: African American, Asian/Pacific Islander, Bi-racial, and other, and 11.8\% did not identify and ethnicity. Of the participants, 39.7\% reported dating exclusively, 7.4\% reported dating casually, 1.5\% reported being engaged to be married, 1.5\% identified as married, and 43.3\% identified as single. Range of relationship lengths was 0 months to 108 months \((M = 17.20, SD = 20.44)\).

Design and Procedure

Prior to entering the research lab, participants were randomly assigned to one of two experimental conditions: hug or no hug. Before completing any postures or receiving materials, students were required to read and verbally consent to a written consent form. Then, participants were asked to engage in their assigned postures (Appendix A), including measurements of the end postures, followed by receiving the questionnaire packet of closeness ratings and other filler questionnaires (described below) to complete (Appendices B-F). All postures in both conditions were the same except the end posture. Extra postures were added to the procedure so that
participants were unaware of the intended manipulation posture. Measurements in each posture were of the arms in relation to the body and were necessary to mask the importance of the measurement of the hug tightness in the experimental condition. Measurement of hug tightness was achieved by measuring distance from the sternum to the back of the hands (i.e., from the chest to the outside edge of the hug). Because this measurement was of the arms in relation to a part of the body, measurements of the other postures consisted of this same relationship to keep consistency (so the participants were not alerted to the hug measurement in particular). Then, the researcher debriefed the participants, thanked them for their participation, and gave them credit for their Psychology 101 course.

**Materials**

Materials consisted of a questionnaire assessing demographic information, individuals’ feelings of closeness to their partner, parents, and friends, levels of approach and avoidance motivation, and filler attitude questionnaires assessing Big Five personality traits, sociosexual attitudes, and self-concept size. The filler questionnaires were added to distract participants from the true nature of the questionnaire, knowing that the true nature of the dependent measures might cause expectancy effects. All questionnaires were based on Likert-type scales. Assessments were taken from the following developed scales: Inclusion of the Other in the Self Scale (Aron, Aron, & Smollan, 1992), the Sociosexual Orientation Inventory (Simpson & Gangestad, 1991), Behavioral Inhibition System/Behavioral Activation System (BIS/BAS) scale (Carver & White, 1994), and a self-concept measure taken from unpublished raw data (Lewandowski & Mattingly, 2011).

**Personality.** Participants first completed five filler items, which I created, assessing the Big Five personality traits of Openness, Conscientiousness, Extraversion, Agreeableness, and
Neuroticism (Costa & McCrae 1990). Sample items included: “to what extent are you open to trying new activities?” and “do you see yourself as an anxious person?” Participants responded on 8-point Likert-type scales (0 = not at all, 7 = extremely). This was a filler questionnaire and reliability assessments are not needed (Appendix C).

**Relationship closeness.** Participants next completed three versions of the Inclusion of Other in the Self (IOS) Scale (Aron et al., 1992). The IOS Scale depicted seven sets of overlapping circles where one represents the self and one represents “other.” There were seven options that participants could choose from, with the first option having the least overlap to the last option having the most overlap. Participants completed the scale three times, one for each of the following targets: current partner (or desired relationship, if single), parents, and friends (Appendix D).

**Approach and avoidance motivation.** Participants responded to 24 items assessing approach and avoidance motivation on a 4-point Likert-type scale (1 = very true for me, 2 = somewhat true for me, 3 = somewhat false for me, 4 = very false for me) (Carver & White, 1994). Sample statements include: “When I get something I want, I feel excited and energized,” “I go out of my way to get things I want,” and “If I think something unpleasant is going to happen I usually get pretty worked up.” Four items on the scale (items 1, 6, 11, and 17) were filler questions unrelated to approach and avoidance motivation. Values in this scale were recoded so that higher numbers indicate more of each motivation as opposed to less (Mattingly, McIntyre, & Lewandowski, 2012). Reliabilities were calculated for the individual subscales of approach (α = .65) and avoidance (α = .78) (Appendix E).

**Sociosexual attitudes.** Participants responded to four questions based on a 7-point Likert-type scale (1 = strongly disagree, 7 = strongly agree) about their attitude towards sexual
encounters with other individuals besides their partner (Simpson & Gangestad, 1991). Sample questions included: “I can easily imagine myself being comfortable and enjoying ‘casual’ sex with different partners,” and “Sex without love is OK.” This was a filler questionnaire and reliability assessments are not needed (Appendix F).

**Self-concept size.** Participants were given a diagram of a circle which they were told represents their sense of self before their participation in the study. Then, below, participants viewed seven circles of varying size in relation to the standard circle and were asked to report which circle they felt described their current self (after study participation) (Lewandowski & Mattingly, 2011). This was a filler questionnaire (Appendix G).

**Results**

**Main analysis of closeness**

First, I wanted to determine whether feelings of closeness towards others increased as a result of engaging in a hugging motion versus a neutral motion. I conducted an independent samples $t$-test and found that there was no significant difference in self-reported feelings of closeness to the current partner between the hug condition ($M = 4.90, SD = 1.21$) and the neutral condition ($M = 5.10, SD = 1.24$), $t(58) = -0.63, p = 0.53$. There was also no significant difference in self-reported feelings of closeness to a best friend between the hug condition ($M = 4.67, SD = 1.73$) and the neutral condition ($M = 5.40, SD = 1.54$), $t(58) = -1.73, p = 0.09$. Lastly, there was no significant difference on self-reported feelings of closeness to one’s parents between the hug condition ($M = 4.67, SD = 2.00$) and the neutral condition ($M = 4.07, SD = 1.70$), $t(58) = 1.25, p = 0.22$. Additionally, none of the closeness measures were significantly correlated with hug tightness: partner $r(30) = -0.05, p = 0.80$; friend $r(30) = -0.04, p = 0.85$; parent $r(30) = 0.02, p =$
Overall, merely engaging in a hugging motion appeared to have no significant effect on self-reported feelings of closeness towards others, and thus the hypothesis was not supported.

**Exploratory analyses**

It is possible that the effect of the manipulation may have been moderated by gender or relationship status. To explore these effects, I conducted a 2 (gender: male, female) × 2 (posture condition: hug, neutral) analysis of covariance, and a 2 (relationship status: single, in a relationship) × 2 (posture condition: hug, neutral) analysis of covariance, both with approach and avoidance motivation as covariates due to the finding that arm movements can influence motivational states (Cacioppo et al., 1993). Both ANCOVAs were run three times for each dependent variable: partner closeness, friend closeness, and parent closeness. Tests of main effects suggested that individuals who were in a relationship reported decreased levels of closeness to their friend ($M = 4.59, SE = 0.26$) than those not in a relationship ($M = 5.63, SE = 0.30$), $F(1, 54) = 6.62, p = 0.01$. All other main effects and interactions were non-significant ($ps > .05$).

**Discussion**

Embodied cognition is a theory devoted to explaining the relationship between physical experiences and cognition, affect, judgments, and behaviors. Embodiment proposes a bidirectional relationship, where physical experiences influence cognitive processes and vice versa. Research in embodiment has supported the influence of physical experiences on intrapersonal processes, but much less is known about how they may affect interpersonal relations. The aim of the current study was to investigate whether physical sensations can influence or alter feelings toward other individuals. Participants engaged in a variety of postures,
either ending with a hugging motion or a neutral posture and then rated feelings of closeness towards their current partner (or desired relationship), parents, and friends.

The hypothesis of this study was that those who ended the series of postures with the hug posture would report greater feelings of closeness to others than those who ended the series of postures with the neutral posture. Results did not support this hypothesis. Participants in both the hug and no hug conditions reported equivalent levels of closeness with all three targets. However, analyses revealed that participants involved in relationships reported lower levels of closeness to friends than those who were not in relationships (though caution should be used in this interpretation; see footnote 1). I hypothesize that this result is may be due to derogation of alternatives, in which those in relationships devalue opposite sex alternatives in order to keep a current relationship satisfying (Johnson & Rusbult, 1989). However, because this main effect is tangential to the current study and does not provide further information on embodiment, there is no value in discussing it further at this time.

Additionally, comments by some participants raise the possibility that the four postures the participants engaged in prior to the experimental or control posture may have affected the results. Four participants, upon being shown the ending of the manipulation posture, asked the researcher “like a circle?” in search of clarification for how to complete the posture. From these comments, it is possible that the four prior postures (which essentially model basic shapes, such as triangles, squares, and lines) actually primed the schema of “shape” in participants’ minds, ultimately disrupting the intended priming effect of a “hug.”

Moreover, it is possible that the manipulation was simply not strong enough to actually prime the concept of a hug. Participants were merely completing the motion of a hug at its most basic form, but were not squeezing onto any objects as one would in a typical hug. It is possible
that the squeezing motion or contact with the other individual is actually what causes someone to identify a hug as being a hug, and not the rounded motion itself. Therefore, it is possible that this motion (without the squeeze) may not prime a hug at all on its own. This would undermine the results on the closeness measure due to the fact that participants were not “squeezing” or “pulling” anything towards them, so the activation of that schema may not have been achieved and therefore participants would not necessarily report greater feelings of closeness in the hugs condition. Additionally, a majority of participants were not in a committed relationship and were therefore reporting closeness to an imagined partner. This imagined closeness would not be the same as reporting closeness to an actual individual one is committed to, and therefore, replication of this study with only committed individuals may be valuable.

To investigate these possible explanations, further experiments would need to be conducted. Participants would need to engage in the manipulation and control postures alone, without prior postures, and then be questioned again on closeness ratings. This would help to determine if the rounded motion is strong enough to prime the thought of a hug on its own and whether it is possible that the previous postures primed “shapes” instead of thinking of a “hug.” Replication would be necessary in order to determine if these are plausible explanations.

Another possible explanation for this result is that the closeness questionnaires did not directly follow the prime: the two were interrupted by another short questionnaire consisting of five items about the Big Five personality traits. Priming is known to be a short-lived effect, so any amount of time between the prime and the intended construct is crucial to its effectiveness (Bargh, 2006). Essentially, too much time may have elapsed between the prime and the closeness measures to still be effective in influencing closeness responses. However, including filler questionnaires was necessary to distract from the true purpose of the study: only including the
main dependent variable of interest (i.e., the closeness measure) may have cued participants to
the true nature of the study and expectancy effects may have occurred.

Though the hypothesized result was not supported, replication of this research with the
necessary alteration in design may elicit promising results. Research in embodied cognition has
shown that physical experiences influence cognitive experiences, and these influences - though
relatively weak - are stronger than previously thought (Mattingly & Lewandowski, in press).
Additionally, further research has suggested that these embodied effects may not only be relevant
for the self, but also for experiences outside of the self (Kille et al., 2013). However, due to the
short-lived nature of schema activation, this result may not generalize to all relational decisions,
but may only be relevant for internal decision making in person perception. Replications and
further research would be required to determine if this is a realistic extension of the embodied
effect.

Conclusion

Research on the self and embodiment yielded significant results, changing the way
researchers think about the interpretation of experiences with the world. Therefore, significant
results in the context of interpersonal relationships signify an avenue of research worthy of
further investigation. Embodiment research has already supported that physical experiences can
lead individuals to perceive their partners as having a warmer personality (Williams & Bargh,
2008), as being more attractive (Mosley & Bukovec, 2013), and as providing a stable
relationship (Kille et al., 2013). Therefore, it is not unreasonable to predict that these experiences
can also make individuals feel closer to their partners, as this study attempted to investigate.
Further results supporting the claim that embodiment plays a role in the success of relationships
with others would be extremely valuable and important to the understanding of how and why individuals interact with others.
References


Lee, S. W. S., & Schwarz, N. (2012). Bidirectionality, mediation, and moderation


Endnotes

1 Embodied cognition is not the first alternative theory to Cartesian Dualism. Some theories prior to embodied cognition include Materialism, Epiphenomenalism, Idealism, Occasionalism, and Double-Aspect theory (Mohammed, 2012). However, these theories are not relevant to the current research and are therefore not discussed.

2 Failed replications are a “hot topic” in Social Psychology, and are a large avenue for debate in embodiment work. As an example, one can quickly find failed replications of the famous elderly prime study, in which those primed with elderly constructs walked more slowly down a hallway than those who were not primed with elderly constructs (Bargh, Chen, and Burrows, 1996). One particular study which attempted an effect replication found that the elderly prime only had an effect on high self-conscious individuals, but not low self-conscious individuals (Hull, Slone, Metayer, & Matthews, 2002). Another study found that the effect only held true for individuals with implicit positive attitudes toward the elderly (Cesario, Plaks, & Higgins, 2006). A third experiment failed to replicate the effect until a manipulation was added in which the experimenter’s beliefs about the participants walking speed was primed: experimenters were either told that the participants would walk slowly or would not walk more slowly. An effect was found only in the cases where experimenters expected the participants to walk more slowly (Doyen, Klein, Pichon, & Cleeremans, 2012). It is likely that more failed replications of this study exist, and that many of the existing articles in embodiment also have failed replications. However, it is important to note that failed replications do not entirely negate previously found effects.

3 Because nine exploratory analyses were conducted, this inflates the possibility of making a Type I error (i.e., rejection of the null hypothesis when it is actually true) with each
new test. Using the Bonferroni correction would help to reduce this inflation, but the alpha level would be reduced to .005. Thus, this result would no longer be significant using the correction, so caution should be used in the interpretation of this result.
Appendix A

Posture 1: Start
Posture 1: End
Posture 2: Start and End
Posture 3: Start and End
Posture 4: Start
Posture 4: End
Posture 5: Start (neutral)
Posture 5: End (neurtal)
Posture 5: Start (hug)
Posture 5: End (hug)
Appendix B

Demographics

Age: ________

Gender (circle one):  Male  Female

Year in college (circle one):  Freshman  Sophomore  Junior  Senior

Ethnicity/Race (circle one):
  Caucasian  African American  Native American  Asian/Pacific Islander
  Hispanic  Bi-racial  Other (please specify): ____________________

Relationship Status (check one):
  ___ Single
  ___ Dating Casually
  ___ Dating Exclusively
  ___ Engaged to be married
  ___ Married

Length of Relationship (if applicable): _____ years _____ months
Appendix C

Please read each of the following questions carefully before answering. On each of these questions, 0=“not at all” and 7= “extremely”

1) To what extent are you open to trying new activities?
   0  1  2  3  4  5  6  7
   Not extremely
   At all

2) Generally, how organized do you feel that you are?
   0  1  2  3  4  5  6  7
   Not extremely
   At all

3) Do you prefer to be in the presence of others rather than by yourself?
   0  1  2  3  4  5  6  7
   Not extremely
   At all

4) How trusting are you of others?
   0  1  2  3  4  5  6  7
   Not extremely
   At all

5) Do you see yourself as an anxious person?
   0  1  2  3  4  5  6  7
   Not extremely
   At all
Appendix D

Please read the following statement carefully and circle only ONE response.

Please circle the picture that best describes your current relationship with your **romantic partner**. If you are single, circle the picture that best describes the relationship you would like to have with a romantic partner:

Please read the following statement carefully and circle only ONE response.

Please circle the picture that best describes your current relationship with your **best friend**: 
Please read the following statement carefully and circle only ONE response.

Please circle the picture that best describes your current relationship with your parents:
Appendix E

Each item of this questionnaire is a statement that a person may either agree with or disagree with. For each item, indicate how much you agree or disagree with what the item says. Please respond to all the items; do not leave any blank. Choose only one response to each statement. Please be as accurate and honest as you can be. Respond to each item as if it were the only item. That is, don't worry about being "consistent" in your responses. Choose from the following four response options:

1 = very true for me
2 = somewhat true for me
3 = somewhat false for me
4 = very false for me

____ 1. A person's family is the most important thing in life.
____ 2. Even if something bad is about to happen to me, I rarely experience fear or nervousness.
____ 3. I go out of my way to get things I want.
____ 4. When I'm doing well at something I love to keep at it.
____ 5. I'm always willing to try something new if I think it will be fun.
____ 6. How I dress is important to me.
____ 7. When I get something I want, I feel excited and energized.
____ 8. Criticism or scolding hurts me quite a bit.
____ 9. When I want something I usually go all-out to get it.
____ 10. I will often do things for no other reason than that they might be fun.
____ 11. It's hard for me to find the time to do things such as get a haircut.
____ 12. If I see a chance to get something I want I move on it right away.
____ 13. I feel pretty worried or upset when I think or know somebody is angry at me.
____ 14. When I see an opportunity for something I like I get excited right away.
____ 15. I often act on the spur of the moment.
____ 16. If I think something unpleasant is going to happen I usually get pretty "worked up."
____ 17. I often wonder why people act the way they do.
____ 18. When good things happen to me, it affects me strongly.
____ 19. I feel worried when I think I have done poorly at something important.
____ 20. I crave excitement and new sensations.
____ 21. When I go after something I use a "no holds barred" approach.
____ 22. I have very few fears compared to my friends.
____ 23. It would excite me to win a contest.
____ 24. I worry about making mistakes.
Appendix F

For all of the following questions, please circle only ONE response:

1. I can easily imagine myself being comfortable and enjoying “casual” sex with different partners

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<th>3</th>
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<th>7</th>
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<tbody>
<tr>
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<td>slightly disagree</td>
<td>neutral</td>
<td>slightly disagree</td>
<td>agree</td>
<td>agree</td>
<td>strongly agree</td>
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2. I can imagine myself enjoying a brief sexual encounter with someone I find very attractive

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<tbody>
<tr>
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<td>disagree</td>
<td>slightly disagree</td>
<td>neutral</td>
<td>slightly disagree</td>
<td>agree</td>
<td>agree</td>
<td>strongly agree</td>
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3. Sex without love is OK

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<tbody>
<tr>
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<td>slightly disagree</td>
<td>neutral</td>
<td>slightly disagree</td>
<td>agree</td>
<td>agree</td>
<td>strongly agree</td>
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4. I could enjoy sex with someone I find highly desirable even if that person does not have long term potential

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<tbody>
<tr>
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<td>slightly disagree</td>
<td>neutral</td>
<td>slightly disagree</td>
<td>agree</td>
<td>agree</td>
<td>strongly agree</td>
</tr>
</tbody>
</table>
Appendix G

Instructions: Please assume that the following circle represents your self, prior to this research study.

As a result of participating in this research study, please circle the picture below that best describes your current self.
Appendix H

TO: Diane Bonfiglio, Amanda Mosley
FROM: Carol Reece, HSRB Chair
DATE: October 1, 2013
SUBJECT: Human Subjects Review Board Approval
PROJECT TITLE: Posture and Attitude Changes
HSRB APPROVAL CODE: 09-16-13-#031

The Human Subjects Review Board has approved the research proposal you submitted. You may proceed with the project.

The primary function of the HSRB is to ensure protection of human research subjects. As a result of this mandate, we ask that you pay close attention to the fundamental ethical principles of autonomy, justice, and beneficence when establishing your research proposal. These ethical principles pertain specifically to the issues of informed consent, fair selection of subjects, and risk/benefit considerations.

If you have any questions, please contact me.

Sincerely,

Carol Reece, DNP, APRN-CPNP
Phone: 419-521-6877
E-mail: creece1@ashland.edu
Author Biography

Amanda Mosley was born in Meridian, Mississippi on March 2, 1992. She grew up in Vermilion, OH, graduating from Vermilion High School in 2010. At Ashland University, Amanda is majoring in Psychology with a minor in Marketing. She is a member of ALD, ODK, Psi Chi, has been on the Dean’s List every semester of her college career, was a research assistant in the Psychology department her Freshman-Junior year, was awarded outstanding Junior student in the Psychology department in the Spring of 2013, and has been an active member of the Residence Life community both as an RA and an ARD since Fall semester of 2012. She will be receiving her Bachelor’s Degree in Psychology (with honors) in May 2014. Upon graduation, Amanda will be attending the University of Akron for the Terminal Master’s degree program in Industrial/Organizational Psychology.