Synchrony and Attachment

by

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ABSTRACT

Attachment relationships serve a variety of important functions for infants and adults. Despite the importance of attachment relationships in adults, the mechanisms that underlie the formation or maintenance of these kinds of relationships outside of romantic relationships remains chronically understudied. The current research investigated whether the mechanism of synchrony, which is associated with attachment formation in the parent-infant literature, may still be tied to attachment in adults. To measure this association, these studies showed participants videos to prime synchrony, and then measured activation of attachment concepts in a word completion task. The results of Experiment 1 showed that attachment style moderated the effects of the video prime such that those who were securely attached showed activation of attachment concepts while watching the Synchrony video. Those with a preoccupied attachment style showed activation of attachment concepts when they viewed the Asynchrony video. Those with a dismissive attachment style showed an unhypothesized activation of social distance concepts when viewing the Synchrony video. Experiment 2 suggested an overall effect of the Synchrony video on activation of attachment concepts. However, there was no effect of attachment style on these results. Limits of these studies and future directions are discussed.

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INTRODUCTION

Based on his observations of human and primate infants, John Bowlby first proposed the attachment behavioral system (Bowlby, 1969/1982), a homeostatic control system that uses emotions and behaviors to balance the need to explore with the need to maintain proximity to a caregiver. In infants, caregivers serve as protection from dangers in the environment, as well as a source of food and comfort. In adults, attachment figures continue to serve the same functions as seen in children's attachment figures: safe haven, secure base, and proximity seeking. Despite the extensive literature on the existence of attachment relationships in adults, one of the questions that remains is what mechanisms support the formation of these intense attachment bonds as adults. The developmental literature has demonstrated several mechanisms that underlie the formation of the early attachment relationship between mothers and infants. One particular mechanism, known as synchrony, has been demonstrated to predict strength of early attachment relationships. Given the developmental literature on synchrony as a mechanism for parent-infant relationships, does this same mechanism foster attachment in relationships between adults?

Close Adult Relationships as Attachment Relationships

Bowlby (1969/1982) originally described attachment as consisting of a desire to maintain proximity to the attachment figure, turning to the attachment figure as a safe haven in times of stress, and relying on the attachment figure as a secure base for exploration. Close adult relationships have been found to share many of these same characteristics, suggesting ongoing involvement of the attachment system. Much of the research on attachment processes in adults has focused on romantic partners. For

example, Hazan and Shaver (1990) reported that adults who felt secure in their romantic relationships were more likely to be creative in work or leisure-related challenges. Similarly, adult partners experienced distress once separated and comfort when reunited, just as infants experienced distress and then solace when reunited with a parent attachment figure (Fraley, Davis, & Shaver, 1995; Fraley & Davis, 1997). In a survey of college students, romantic relationships exhibited all three of Bowlby's characteristics of parent-infant relationships after two years. A more recent study provides additional support that romantic relationships can function as attachment relationships. Adults ages 20-28 are more likely to report their romantic relationships having core attachment characteristics, such as proximity seeking, than relationships with either parent or their relationships with friends (Markiewicz, Lawford, Doyle, & Haggart, 2006). Such research supports the idea that, as people move through different life stages, attachment can be transferred from one's parents to one's romantic partner (Shaver & Hazan, 1987).

Romantic partners are not the only ones capable of fulfilling attachment-related functions. In a study by Florian, Mikulincer, and Bucholtz (1995), college students were equally likely to report seeking emotional support from friends as they were to report seeking support from mothers or romantic partners. Fraley and Davis (1997) reported that college students' friendships of five years also exhibited proximity-seeking, safe haven and secure base characteristics. Markiewicz and colleagues (2006) reported that although young adults were most likely to ascribe core attachment characteristics to their romantic relationships, those aged 12-15 and those without a romantic partner were more likely to describe their friendships as attachment relationships (Markiewicz, Lawford, Doyle, & Haggart, 2006). In a survey of adults ages 16-90, participants' descriptions of their

relationships with their friends were more likely to include the three attachment behaviors than their descriptions of their relationships with their parents (Doherty & Feeney, 2004). These studies demonstrate Ainsworth's (1989) hypothesis that adult attachment relationships can exist outside of romantic or parent-child relationships.

Mechanisms of Childhood Attachment Relationships

These studies take an important step in understanding whether or not close adult relationships can serve the same attachment functions as parents do for their infants. However, the mechanisms underlying the formation of adult attachment relationships have received little research attention. This is particularly true of close friendships. In romantic relationships, mechanisms including sex, oxytocin, and shared interests including children have been hypothesized to support attachment formation (Hazan & Shaver, 1987; Ahern & Young, 2009). The mechanisms underlying attachment to friends, on the other hand, are less studied. Given Bowlby's theory of a universal attachment system, the same mechanisms that support parent-infant relationships may also support attachment relationships in adult friendships.

One particular mechanism underlying parent-infant attachment is known as synchrony. The majority of developmental literature on synchrony and attachment follows Fogel's (1993) definition of synchrony as the process of "coordinating" one's actions with that of another person over time. It is important to note that in the developmental literature, the timescale of synchronization between parents and their infant can range from milliseconds to minutes. Synchronization in the developmental literature also encompasses any type of responsive behavior. For instance, mother-smile followed by infant-smile is classified as synchronization, as well as an infant vocalizing

and then a mother directing her gaze toward the infant. The developmental literature encompasses synchronized coordination along these time scales in vocal patterns (Jaffe, et al., 2001), behaviors (body movements (Bernieri, Reznick, & Rosenthal, 1988); eye gaze (Wright, 1991); and expressions of affect (Haft & Slade, 1989; for review, see Harrist & Waugh, 2000). These studies document numerous ways in which parents and their infants coordinate their actions to one another. Feldman (2007) proposed that it is this responsiveness in behavior that helps foster attachment. Researchers hypothesize that coordination between infant and parent creates a shared history of the parent responding to the infant's cues. This history becomes important in times of actual distress, when an infant needs a reliable caregiver to help deal with the source of the distress. Thus, researchers suspect that regularly coordinated synchrony helps foster a secure attachment relationship.

Several studies have offered support for the link between synchrony and attachment. Studies by Isabella and colleagues (1989, 1991) found that coordination of specific behaviors at one and three months predicted attachment security at the age of 12 months. Jaffe and colleagues (2001) also found that coordination at four months predicted attachment at 12 months. A meta-analysis by De Wolff and van Ijzendoorn (1997) confirmed that the degree to which a parent and infant coordinate their behaviors consistently predicts attachment security later on. However, researchers have not experimentally tested whether synchrony creates attachment.

Synchrony in Adult Relationships

Experimental research on synchrony of adults' behavior has focused less on implications for the close bonds of attachment and more on the initial stage of liking

between strangers. In the adult literature, the timescale of synchronized behavior focuses on milliseconds to seconds. Thus, one individual's smile must precede another individual's smile within a much shorter period of time in order for it to count as synchronized behavior in the adult literature. The actual type of behavioral response that must occur is also restricted in the adult literature. In the adult literature, only repetition of the exact same behavior, for instance, touching one's cheek after seeing someone else touch their cheek, is counted as synchronized behavior. In a study by Chartrand and Bargh (1999), a confederate was instructed to mimic a participant's mannerisms such as foot tapping or posture. This artificially created mimicry resulted in the participant viewing the confederate as more likeable, and perceiving the interaction as having gone more smoothly. Reversing the causal direction, participants primed with the goal of affiliating are more likely to mimic a stranger than those primed with a neutral goal (Lakin & Chartrand, 2003). Together, these studies suggest that mirrored behavior can help foster initial liking of a stranger.

Experiments with synchronization in adults have also demonstrated its effect on fostering group cooperation. In a series of experiments, Wiltermuth and Heath (2009) created several instances of behavioral synchrony and measured group cohesion. In the first experiment, participants walked with their footsteps either in or out of sync with two others. Synchronized walking participants expected their fellow group members to contribute more in a public goods game than participants who walked with their footsteps out of sync. In a separate experiment, engaging in the same behavior, such as tapping cups, at the same time as other participants led the synchronized participants to donate more in a public goods game than participants who tapped cups at different tempos from

each other. These results demonstrate that behavioral and vocal synchrony can lead to greater group cooperation.

Importantly, neither group cooperation nor liking reflects the type of relationship seen in true attachment relationships. For example, attachment relationships imply a deeper level of intimacy than general liking. Attachment figures also provide comfort in times of distress, as well as a trusted resource. Because these behaviors require deep levels of trust and intimacy, they occur only among close relationships. Such behaviors differ from the more casual affiliative attitudes and behaviors towards strangers previously assessed in adult synchronization literature.

Proposed Research

The current experiment looks at the effect of priming synchrony on the activation of attachment-related concepts. Given Bowlby's claims regarding a universal attachment system, I proposed that the same mechanisms supporting the formation of infants' attachments to their parents can also promote attachment between adults. The present study investigated whether behavioral synchrony is tied to concepts of attachment in adults. According to the perception-behavior link, watching others acting in synchrony should activate the concept of synchrony in the perceiver. Activating the concept of synchrony should in turn activate the attachment system and related conceptual network. To test this, I primed synchrony by showing participants a video of two people walking in sync with each other, and then examined whether attachment-related concepts were activated.

Hypothesis 1: Participants primed with synchrony should be more likely to have attachment-related concepts activated than participants viewing a neutral prime.

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I also tested whether the effect of priming synchrony depends on, or is moderated by, adult attachment style. Previous research on synchronized behavior fails to address those for whom synchronized behavior might not foster liking and positive attitudes toward others. Specifically, prior research has demonstrated that there are different attachment styles thought to be rooted in history of one's close relationships. These styles may play a role in whether mechanisms that usually lead to attachment relationship formation are able to exert their influence. Over time, parents' remaining close to the infant and reliably responding to their infant's cries leads to an internal working model for the infant that others can be counted on during times of need. However, repeated experiences with an attachment figure who fails to reliably respond to an infant's needs can lead to an internal working model that others cannot be counted on (Bretherton & Munholland, 1999).

This distrust may play out in adults in two ways. Attachment anxiety stems from a negative internal working model of the self. Thus, anxiously attached individuals are preoccupied by fears of abandonment by others because of low feelings of self-worth and desirability as a relationship partner. The other form of insecurity, known as attachment avoidance, stems from a negative working model of others' ability to meet the individual's needs. This leads avoidantly-attached individuals to dismiss the value of close relationships in general, and reduced reliance on others (for review see Shaver & Hazan, 1993). Research on attachment style in adults supports the idea that adults high on attachment avoidance, in particular, may be less likely to form attachments to strangers, friends and romantic partners (Fraley, Shaver, & Davis, 1998). Participants high in avoidance were better able to suppress their attachment system when discussing their

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partner hypothetically leaving them as indicated by reduced physiological arousal and reduced activation of attachment concepts (Fraley & Shaver, 1997). Together, these findings support the idea that those high in attachment avoidance may be less susceptible to activating mechanisms that would normally promote attachment to others.

Hypothesis 2: The effect of a synchrony prime on attachment-related concept activation will be moderated by attachment avoidance, such that those higher in avoidance will be less predisposed to have attachment concepts activated when primed with synchrony.

EXPERIMENT 1

This experiment examines the effect of a video priming synchrony on three types of words in order to examine implications of the prime for concept activation. These words reflect the constructs of attachment, social distance, and a neutral category. The social distance category of words was included in order to examine whether the effects of the synchrony prime activate concepts of relational distance (i.e., overall concern with relationships), as well as attachment. The neutral target words were included to ensure the synchrony prime did not make participants better at the task overall.

METHOD

Participants

144 individuals (83 females) from Amazon Mechanical Turk were paid $0.50 for their participation. The average age was 37.44(SD=12.99). Of those who participated, 20 were excluded because they reported that they did not watch the video, either from technical difficulties or for other reasons. This left a complete sample of 124 participants.

Procedures

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Participants randomly viewed one of three, 30-second videos. After watching the video, participants completed the 15 word strings. The order in which the word strings were presented was random. Participants then completed a measure of attachment insecurity and demographic variables before being debriefed and paid.

Materials

Primes Participants watched a 30 second video of one or two women walking on treadmills. In the Synchrony video, the two walkers' footsteps became synchronized over the course of the video, and then remained in sync for the remainder of the video. In the Asynchrony video, the two walkers' footsteps started and remained out of sync for the full 30 seconds. In the Single video, a single woman walked on one of two treadmills for 30 seconds.

Word Completion Task Participants were given a total of 15 separate strings of letters and blanks. Participants completed each string by filling in the blanks with letters to form a word. Each string was created by starting with a specific target word. These target words were intentionally chosen to reflect three constructs: Attachment (ex: cuddle), Relationship Distance (ex: reject), and Neutral (ex: button) (see Appendix A). One to three letters were then replaced by blanks, such that the word could be completed either with the target word or a variety of neutral words. Distance and neutral target words were matched to the five attachment target words for number of letters and part of speech. Five strings were created to reflect each of the three constructs. The key dependent variable was the number of attachment-related word strings completed with the target attachment word, as opposed to alternative words.

Attachment Style. After the word completion task, participants completed the Experiences in Close Relationships Scale-Short Form (ECR-S; Wei, Russell, Mallinckrodt, & Vogel, 2007). This questionnaire measured individual differences in attachment anxiety and avoidance through 12 questions about romantic relationships. The questionnaire is composed of two subscales. Six questions were averaged together to form the anxiety subscale, which assessed concerns about abandonment (ex: I need a lot of reassurance from my partner; Cronbach's α=.831). The other six items were averaged to form the avoidance subscale, which measured one's discomfort with intimacy (ex: I want to get close to my partner, but I keep pulling back; Cronbach's α =.862).

Demographic Measures Participants also reported their sex, age, and relationship status.

RESULTS

All analyses were run using SPSS, version 22. Means and standard deviations for the key study variables are presented in Table 1. In order to test both hypotheses, I ran a repeated measures general linear model with four factors: Word String Type (within-subjects) x Video x Attachment Anxiety x Attachment Avoidance. In this model, Word String Type and Video condition were treated as categorical variables, whereas both types of attachment insecurity were treated as continuous variables. Anxiety and Avoidance were both standardized before being entered into the model. This model showed a main effect of Word type, such that distance strings were the least likely to be completed with the target word ($F(2,112)$ =88.92, $p < .01$, *Partial Eta^2* = .61). There was also a marginal interaction between Video and Word type ($F(4, 226)$ =2.141, p =.08,

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Partial Eta^2 = .04), and a four way interaction among all predictors (*F*(4,226) =3.16, *p* =.02, *Partial Eta^2* = .05).

I also ran this model with all four predictors and their interactions, this time excluding those participants who saw the Single video. This model was run in order to be able to look for more specific contrasts between the two most theoretically relevant Video conditions. In this model, there was a significant main effect of Word type (*F*(2,67) =41.98, *p* < .01, *Partial Eta^2* = .56), such that Distance strings were less likely to be completed with the target distance word than Attachment strings with the attachment target word. There was also a significant interaction between Word type and Video (*F*(2,67) =5.11, *p* < .01, *Partial Eta^2* = .13), and a significant interaction among all four predictors (*F*(2,67) =5.29, *p* < .01, *Partial Eta^2* = .14). Where it is relevant, these specific contrasts between the two most theoretically relevant conditions will be reported alongside the results of the model including all three Video conditions.

To test whether there was an overall effect of the Synchrony video on word string completion, we examined the main effect of the video (*F*(2,113) =1.33, *p* =.27, *Partial Eta^2* = .02). The video condition did not have an effect on completing the word string task in general. The next step was to test Hypothesis 1 by examining the significant interaction between Word string type and the Video condition in order to see whether the video prime affected completion of particular word string types. Simple main effects revealed that this interaction was driven by differences between the Synchrony and Asynchrony video on the completed number of neutral word strings only (*p* < .01). Results did not change when limiting the analyses to the Synchrony and Asynchrony video conditions. These results did not support the prediction that the Synchrony video

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would increase completion of the attachment word strings with the attachment target word, regardless of attachment style (see Figure 1).

In order to test Hypothesis 2, we examined the interaction among all four factors. In order to clarify the effects of the Video, separate models were run predicting each Word Type from Video, Attachment Anxiety, and Attachment Avoidance. This was to determine exactly how the types of attachment insecurity altered the effect of the video manipulation on each word string type.

Attachment Words

In order to examine whether the effect of Video on activation of attachment concepts depends on attachment insecurity, I ran a general linear model predicting number of attachment word strings completed with the attachment target word from three factors: Video Condition x Attachment Anxiety x Attachment Avoidance. This three-way interaction was significant ($F(3,113) =3.42$, $p = .02$, *Partial Eta^2 = .07*), indicating that both types of attachment security interact with the video. Thus, further analyses were performed to break down this three-way interaction.

In order to look at the moderating effects of attachment insecurity on the effect of the Video for completing attachment word strings, I ran four simple slope analyses evaluating the Video condition effect at different levels of attachment anxiety and avoidance. The anxiety and avoidance values for these four analyses were chosen to reflect four profiles widely acknowledged in the attachment literature – secure, preoccupied (high anxiety, low avoidance), dismissive (high avoidance, low anxiety) and

fearful (high on both anxiety and avoidance). Each analysis estimated the effect of the Video condition on number of attachment word strings completed while holding attachment anxiety and avoidance at +/- one standard deviation from the mean, as appropriate for the intended attachment style quadrant.

First, one simple slope analysis was run setting both avoidance and anxiety at one standard deviation below the mean, to reflect a secure attachment style. Evaluating the effect of the Video condition at these values of attachment security did not show a significant main effect of the Video condition ($F(2,113) = 1.82$, $p = .17$, *Partial Eta^2* = .03). However, when looking only at the Synchrony and Asynchrony video conditions, the main effect of Video approached significance ($F(1,68) = 3.15$, $p = .08$, *Partial Eta^2* = .04). Those who viewed the Synchrony video were more likely to complete the Attachment strings with the target word than those who saw the Asynchrony video. Estimated marginal means for each of the simple slope analyses are presented in Figure 2.

The effect of a preoccupied attachment style was estimated using one standard deviation below the mean on attachment avoidance and one standard deviation above the mean on attachment anxiety. The main effect of the Video condition was not significant ($F(2,113) = 2.29$, $p = .11$, *Partial Eta^2* = .04). When using a model looking only at the Synchrony and Asynchrony videos, there was a main effect of ($F(1,68) = 4.57$, $p = .04$, *Partial Eta^2* = .06), such that those who saw the Asynchrony video completed significantly more attachment word strings with the target attachment word than those who watched the Synchrony video – the opposite of the pattern seen with secure attachment.

The effect of a dismissive attachment style was estimated using one standard deviation above the mean on attachment avoidance and one standard deviation below the mean on attachment anxiety. The main effect of the Video condition was also not significant ($F(2,113) =1.07$, $p = .35$, *Partial Eta^2* $= .02$), and neither were comparisons between the Synchrony video and to those who saw the Asynchrony or Single video. These effects did not change when looking only at the Synchrony and Asynchrony videos.

The effect of a fearful attachment style was estimated using one standard deviation above the mean on attachment avoidance and one standard deviation below the mean on attachment anxiety. Neither the main effect of the Video Condition ($F(2,113)$ $=0.64$, $p = .53$, *Partial Eta^2* $= .01$), nor the pairwise comparisons between Synchrony and Asynchrony or Single video conditions, were significant. These results did not change when looking only at the Synchrony and Asynchrony videos.

Distance Words

In order to examine whether there was an effect of video on activation of social distance concepts, I ran a general linear model predicting number of distance word strings completed with the target distance word from three factors: Video Condition x Attachment Avoidance x Attachment Anxiety. This three-way interaction was not significant, even when restricting to the Synchrony and Asynchrony Video conditions ($F(2,113) =.33$, $p = .72$, *Partial Eta^2* $< .01$). Although this result does not support the effect of both types of attachment insecurity on the effect of video condition, theoretical definitions of attachment avoidance suggest the possibility of an interaction between avoidant attachment and Video condition alone. Thus, a general linear model was run

including Avoidant Attachment and Video condition as predictors. The interaction between these two factors was significant ($F(2,119) =5.97$, $p <.01$, *Partial Eta^2* $= .09$). A simple slope decomposition was used to estimate the effect of Video condition at one standard deviation above and below the mean on Avoidance. There was a main effect of Video condition when evaluated at one standard deviation above the mean ($p = .01$; *Partial Eta^2* $= .07$); contrast comparisons showed that more distance word strings were completed when participants watched the Synchrony video as compared to the Asynchrony ($p = .02$) and Single video conditions ($p < .01$). These results are illustrated in Figure 3. In contrast, there was no effect of Video condition when evaluated at one standard deviation below the mean on Avoidance ($p = .154$; *Partial Eta^2* $= .03$) either when looking at a model containing all three Video conditions or a model containing only the Synchrony and Asynchrony conditions. These results did not change when looked at in a model only including the Synchrony and Asynchrony videos.

Neutral Words

In order to examine whether there was an effect of video on completion of neutral words with the target word, I ran a general linear model predicting the number of neutral word strings completed with the neutral target word from three factors: Video Condition x Attachment Avoidance x Attachment Anxiety. This three-way interaction was not significant ($F(2,113) =1.99$, $p = .14$, *Partial Eta^2* $= .03$), indicating that the video manipulation had no effect on whether participants were more likely to complete the neutral word strings with the target neutral word. In this model, there were also no main effects of the video, either attachment style, or interactions among the three variables.

There was still no main effect of Video or significant interactions even in the restricted Video condition model (Synchrony vs. Asynchrony only).

DISCUSSION

The results of Experiment 1 did not support an overall effect of the Synchrony video on activation of attachment concepts. Instead, the effects of the video manipulation depended on attachment style. Those who had a secure attachment style did show the predicted increase in completing attachment word strings with the target word when they watched the Synchrony video, as compared to those who watched the Asynchrony video. This suggests that, among individuals with secure attachment styles, the perception of synchronized physical movement primes attachment-related concepts, as hypothesized. Individuals with a preoccupied attachment style showed the opposite effect, more likely to complete attachment strings with the target word when primed with the Asynchrony video. This suggests that it is *asynchrony* that primes attachment-related concepts among those with distinctly attachment-anxious styles. Finally, in an effect that was not hypothesized, distinctly avoidant (dismissive) individuals who viewed the Synchrony video demonstrated greater completion of distance-related words than those in either of the other video conditions, suggesting heightened activation of social distance concepts.

EXPERIMENT 2

Experiment 2 used the same procedure as Experiment 1, but included a set of general positive target words rather than distance-related words. This experiment tested whether the effects of the Synchrony video on the activation of attachment concepts for secure and preoccupied individuals would replicate. This experiment was also designed to test whether the effects of the video prime on attachment-related words in Experiment

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1 reflected general activation of positive concepts, rather than attachment concepts specifically.

METHOD

This experiment used 148 participants (96 females) with an average age of 37.49(SD=12.39). Of the 148, 15 were excluded because they did not view the video. All materials and procedures were the same as Experiment 1, with the exception of the word strings. The three categories of word strings included the original five attachment word strings, five new positive word strings, and five new neutral word strings (see Appendix A). The same procedure was used to create the word string such that target words were chosen to create the strings based on the same number of letters and part of speech as the original attachment strings.

RESULTS

Means and standard deviations for the key study variables are presented in Table 2. The analysis strategy was similar to that for Study 1. I ran a repeated measures general linear model predicting attachment word strings from Word String Type, Video condition, Attachment Anxiety, and Attachment Avoidance. In this and all subsequent models, Word type and Video condition were treated as categorical variables while both types of Attachment insecurity were treated as continuous variables. Both types of attachment insecurity were centered before being entered into the model. The model showed an overall main effect of Word type, such that attachment strings were overall more likely to be completed with the target word than any other word string type $F(2,124) = 18.48$ $p < .01$; *Partial Eta^2 = .23*). This model also showed a marginal interaction between Word type and Video $F(4,250) = 2.11$ $p = .08$; *Partial Eta^2 = .03*).

The same model was also run, but restricting the Video conditions to Synchrony and Asynchrony. In this restricted model, there was still a main effect of Word type and the Word type x Video interaction. However, there was also a marginally significant four-way interaction among all of the predictors $F(2,85) = 2.67$ $p = .08$; *Partial Eta^2 = .06*).

As in Experiment 1, there was no main effect of Video condition $F(2,125) = 0.47$ $p = .63$; *Partial Eta^2 < .01*) on overall likelihood of completing the word strings with the target word. To test whether the Synchrony video affected completion of attachment word strings, regardless of attachment style, we decomposed the significant interaction between Word string type and Video condition. An analysis using simple main effects showed that this interaction was driven by the effect of the Video condition on Attachment word strings. Those who viewed the Synchrony video, compared to those who watched the Asynchrony video, were more likely to complete attachment word strings with the attachment target word ($p = .06$; see Figure 4). The results were the same in a model including only the Synchrony and Asynchrony Video conditions.

Attachment Words

In order to assess whether attachment style moderated the effect of Video condition on activation of attachment concepts, replicating the findings from Study 1, I ran a general linear model predicting number of attachment word strings completed with the attachment target word from three factors: Video Condition x Attachment Anxiety x Attachment Avoidance. This three-way interaction was not significant ($F(2,125) = .72$, $p = .49$, *Partial Eta^2 = .01*). There was also no main effect of Video ($p = .58$; *Partial Eta^2 <*

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.01); Attachment Anxiety ($p = .66$; *Partial Eta^2* < .01); Avoidance ($p = .12$, *Partial Eta^2* = .02); or interactions among these predictors. Using the same simple slope decomposition as in Experiment 1 showed no effect of Video, either as a main effect of Video or specific to any of the four attachment profiles.

When looking at the restricted Video condition model (Synchrony and Asynchrony conditions only), however, there was a significant main effect of video, such that those who saw the Synchrony video completed more attachment strings with the target word than those who saw the Asynchrony video ($F(1,86) = 3.84$, $p = .05$, *Partial Eta^2* = .04). This effect was not significantly moderated by attachment style (for the three-way interaction, $F(1,86) = 1.197$, $p = .28$, *Partial Eta^2* = .01), and none of the simple slope decompositions estimating the effect of video in particular attachment style quadrants demonstrated a significant effect of Video. These results failed to replicate the finding that the effect of Video on attachment word completion was dependent on attachment style (Figure 5).

Positive Words

In order to examine whether there was an effect of Video on completion of general positive words with the target word, I ran a general linear model predicting the number of positive word strings completed with the positive target word from three factors: Video condition x Attachment Avoidance x Attachment Anxiety. This three-way interaction was not significant ($F(2,125) = 1.51$, $p = .23$, *Partial Eta^2* = .02). There was, however, a marginal main effect of the video manipulation on positive word strings, such that those who saw the Single video were marginally more likely to complete positive

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word strings with the target positive words than those who saw the Asynchrony video (p = .05, *Partial Eta^2* = .05). There was no interaction between the video manipulation and Attachment Anxiety (p = .75, *Partial Eta^2* = .03) or Attachment Avoidance (p = .12, *Partial Eta^2* = .04). Repeating these analyses in the two Video conditions model (Synchrony vs. Asynchrony) yielded no main effect of Video, and no interaction of Video with attachment style.

Neutral Words

In order to examine whether there was an effect of Video on completion of neutral words with the target word, I ran a general linear model predicting the number of neutral word strings completed with the neutral target word from three factors: Video Condition x Attachment Avoidance x Attachment Anxiety. This three-way interaction was not significant ($F(2,125)$ =0.61 p = .55, *Partial Eta^2* = .01), and there was no overall main effect of Video Condition (p = .70, *Partial Eta^2* < .01). There was also no interaction between Video Condition and Attachment Anxiety (p = .49, *Partial Eta^2* < .01) or Avoidance (p = .83, *Partial Eta^2* < .01). These results did not change in the model containing only the Synchrony and Asynchrony Video conditions. These results indicated that the video manipulation had no effect on whether participants were more likely to complete the neutral word strings with the target neutral word.

DISCUSSION

The results of Experiment 2 demonstrated an overall effect of the Synchrony video on activation of attachment-related concepts. Those who saw the Synchrony video were more likely to complete attachment strings with the target word, providing support for Hypothesis 1. However, the results failed to support Hypothesis 2, and thus replicate

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the results of Experiment 1. The effect of the Synchrony video on attachment concept activation did not depend on attachment style. These results also showed an unpredicted effect of the Single video on completing the positive word strings with the target positive word.

DISCUSSION

I hypothesized that priming synchrony would activate concepts of attachment in adults. Across two studies, this hypothesis received partial support. In Experiment 1, the predicted effect occurred only for securely attached individuals, but not for the rest of the participants. The results of Experiment 2 did show the hypothesized effect of the synchrony video on activation of attachment concepts for the general sample.

Although I hypothesized that attachment style would moderate the effect between synchrony and attachment, I specifically hypothesized that those who were avoidantly attached would not show an activation of attachment concepts if they saw the synchrony video. This hypothesis was driven by previous literature demonstrating that dismissive individuals are less likely to engage in attachment relationships in general (Shaver & Hazan, 1993). Because of these findings, I hypothesized that attachment mechanisms as a whole would be less likely to activate in these individuals. Literature suggests that this reluctance comes from repeated experiences with an attachment figure's inability to meet one's needs. Individuals subsequently avoid becoming dependent on others since others cannot be counted on for help when it is needed. In accordance with Hypothesis 2, dismissive individuals in the current data sets do not show increased activation of attachment concepts. They did, however, show an unexpected pattern of increased activation of social distance concepts when shown the synchrony video. Such a finding

could be consistent with previous literature indicating that dismissive individuals perpetually avoid getting close to potential attachment figures.

The pattern of findings with preoccupied individuals, while also unhypothesized, may reflect a similar activation of a regulation strategy. For preoccupied individuals, their relationship insecurity focuses on beliefs of being unworthy of being loved by others, leading to behaviors that try to draw an attachment figure in at any sign of threat of abandonment. For dismissive and preoccupied individuals, the synchrony and asynchrony videos may respectively activate a primary source of concern regarding relationships. The results of the word completion task could be tapping into the appropriate regulation strategy for each type of insecurity based on their beliefs about themselves and others in relationships.

Such an interpretation, while consistent with the literature, should be regarded with caution. For dismissive individuals, the same pattern of results could occur if giving these individuals an unstimulating task, primes overall negative concepts, rather than negative relationship concepts specifically. For preoccupied individuals, the asynchrony video may have exacerbated their relationship concerns, leading them to be distracted when completing the attachment strings. As will be discussed in the limitations section, attachment words may be the most frequently-used words, and thus, most easily accessible words. Preoccupied individuals may have been more easily distracted by the video and continued to perseverate either on the video or their own relationship concerns, thus, leading to completion with the most accessible words. Because these effects were not originally hypothesized and there are alternative explanations for these patterns of

results, the meaning of these results should be regarded with caution until further replication.

Together, these studies suggest that synchrony may be linked with activation of the attachment system. However, further studies are needed to establish a more reliable pattern in the effects synchrony has on attachment, while accounting for potential individual differences in attachment proclivities.

Limitations

These studies had a number of important limitations. First, they were limited by not including a true "baseline" condition – a condition in which word completion/construct activation could be assessed in the absence of a prime. Although the "Single" video was intended to serve as a baseline condition, this video may have activated relevant concepts such as loneliness or isolation instead. A condition should have been included in which participants did not watch any video before completing the word task. Adding this condition would provide an estimate of the degree to which the concepts measured by the word completion task are normally activated. Adding this condition for future studies is especially important given that I did not control for the frequency of the target or alternative words. Thus, the findings meant to reflect video effects on activation of attachment concepts may actually reflect differences in frequency of the attachment as compared to distance and neutral words.

These studies also did not offer a manipulation check measuring what the synchrony video actually primed. It is possible that those who watched the synchrony video did not subconsciously encode its content in terms of synchrony at all. For example, the similarity between the women's footstep patterns in the synchrony video

may have visually been less interesting than watching two people whose footsteps never match up. If participants really were more bored in the synchrony condition, then they may have entered the first word that happened to be the most accessible. As previously discussed, this study did not control for frequency of the target or alternative words. Thus, participants may have entered the most commonly accessible word, which may have been an attachment word because it is a more frequently used word than the alternatives. Participants watching the more visually stimulating asynchrony video may have been more engaged in the study overall and devoted more time to thinking of how to fill in the word strings. Without measuring whether the prime actually activated concepts of synchrony, we cannot be certain that the differences in word type completion can be attributed to this mechanism.

The nature of the word completion task assumes that completing a word string with a target word reflects accessibility of the intended construct. Accessibility, in turn, presumes activation of the intended construct. However, there may be other reasons, beyond concept activation/accessibility, for participants to complete a word string with one word rather than another. For example, it may have been that participants thought of a different word first, but chose instead to write down a more socially desirable answer. In this case, results of the present studies might reflect effects of synchrony prime and attachment style on social desirability concerns, not activation of attachment-related concepts.

Finally, these studies used videos of women walking in sync to prime synchrony. However, watching other people synchronize may not appropriately represent the original mechanism of synchrony studied in the developmental literature. In previous literature,

the mechanism of synchrony occurred between the two individuals who would form the attachment relationship. The synchrony in the experimental primes for this study did not require the participant to engage in synchrony. There was also no possibility of being able to form an attachment relationship with the people in the video. It should be acknowledged that the kind of synchrony and attachment in these studies are very far removed from the original context in which these constructs were originally measured in the developmental literature.

Future Directions

The current studies did not consistently find effects of the synchrony video on activation of attachment concepts. It may be that, in order to reliably see the effect originally predicted, there must be a threat, necessitating activation of the attachment system. This may especially be the case if secure individuals already have attachment relationships. As a result, attachment concepts may chronically be less activated if they are not looking for new attachment relationships. Such an effect may obscure the researchers' ability to find the predicted effect. Future studies should include a threat condition, such as the mental arithmetic task in the Trier Social Stress Test in order to see if the synchrony condition will reliably activate attachment concepts.

Future studies are also needed to replicate the effects of the synchrony video on activation of social distance concepts for avoidantly-attached individuals. This effect was not predicted at the start of these studies and should be regarded with caution. In addition to studies replicating the specific effects of the synchrony video, future studies should also investigate whether engaging in actual synchrony leads dismissive individuals to create social distance between themselves and the person with whom they are

synchronizing. More broadly, studies should examine how attachment insecurity might change the perceptions of engaging in synchrony and what the behaviors towards potential attachment figures would be as a result.

Although the attachment-related target words for this study measured proximity-seeking and the safe haven function of attachment, they did not include words that would measure the "secure base" or exploration function of attachment relationships. Future studies should incorporate words that appropriately capture facilitation of exploration in adults as an aspect of attachment. The priming stimuli could also be improved by including videos of real people synchronizing in more relationship-related contexts. For example, showing videos of couples holding a conversation where their movements synchronize would get closer to the original construct that inspired these studies.

Ideally, future studies would also be able to measure attachment towards an actual individual. The present studies took an initial step forward in demonstrating that synchrony and attachment-related concepts are still linked in adults. Moving forward, studies should measure whether synchronizing with another person fosters the start of a real attachment relationship. For example, creating synchrony between college roommates, who have the opportunity to develop a deep friendship in the future, would be an ideal approach to testing the proposed effects. Synchrony as a mechanism for *maintaining* relationships should also be examined. In parents and infants, synchrony persists even once an attachment is formed. Experiments could create synchrony between individuals already in an attachment relationship, especially who are experiencing a current threat to the relationship. In each case, these experiments could examine whether experimentally induced synchrony leads to improved relationship outcomes. Such studies

could help demonstrate that this mechanism remains important in supporting existing attachment bonds.

The current research draws on literature examining synchrony as a mechanism for facilitating attachment between mothers and infants to address the lack of research on attachment relationships in adults besides romantic relationships. This research takes an important step in examining one possible mechanism that may underlie the formation of these important bonds in adults. Together, these two studies demonstrate that the concepts of synchrony and attachment may still linked in adults. Future research should investigate whether this link can facilitate the creation or maintenance of an actual attachment relationship.

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**Table 1: Descriptives of Attachment Styles and Word Completion Strings from Experiment 1**.

Experiment 1			
	M (SD)	**Minimum**	**Maximum**
Anxiety	3.65(1.33)	1.00	7.00
Avoidance	2.75(1.20)	1.00	5.80
Attachment Words*	2.68(1.17)	0.00	5.00
Distance Words	1.07(.93)	0.00	5.00
Neutral Words	2.36(.96)	0.00	5.00

Note: "Attachment Words Completed" refers to the average number of attachment word strings completed with the target attachment word.

Table 2: Descriptives of Attachment Styles and Word Completion Strings from Experiment 2.

Experiment 2			
	M (SD)	Minimum	Maximum
Anxiety	3.39(1.28)	1.00	6.67
Avoidance	2.59(1.27)	1.00	5.67
Attachment Words*	2.901.19)	0.00	5.00
Distance Words	2.09(1.10)	0.00	5.00
Neutral Words	2.11(1.04)	0.00	5.00

Note: Attachment Words Completed refers to the average number of attachment word strings completed with the target attachment word.
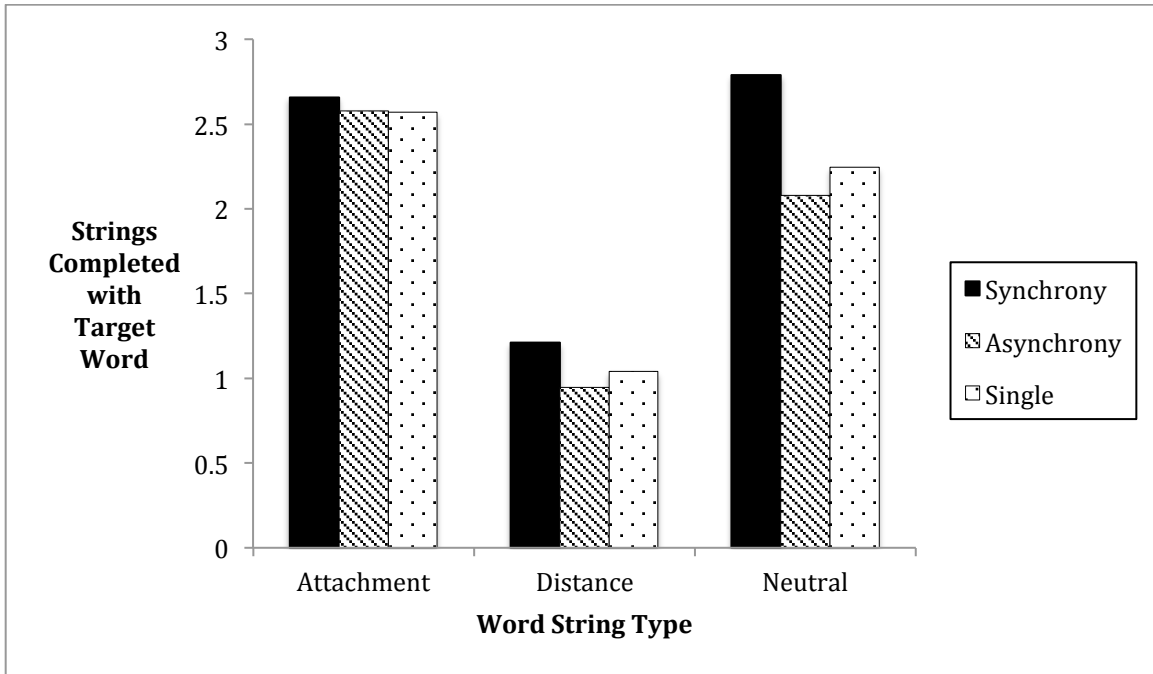
Figure 1. Means for each of the three types of Word strings broken down by Video

Condition from Experiment 1.
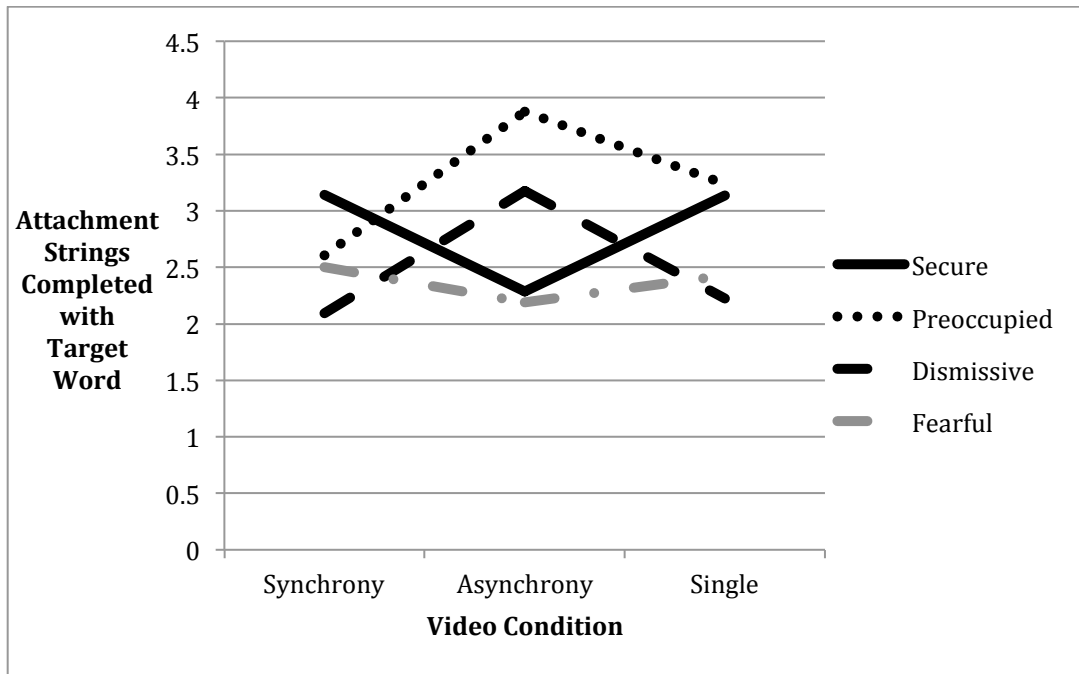
Figure 2. Marginal means for each of the four types of attachment style based on +/- 1 standard deviations from the mean on the two aspects of attachment insecurity from Experiment 1.
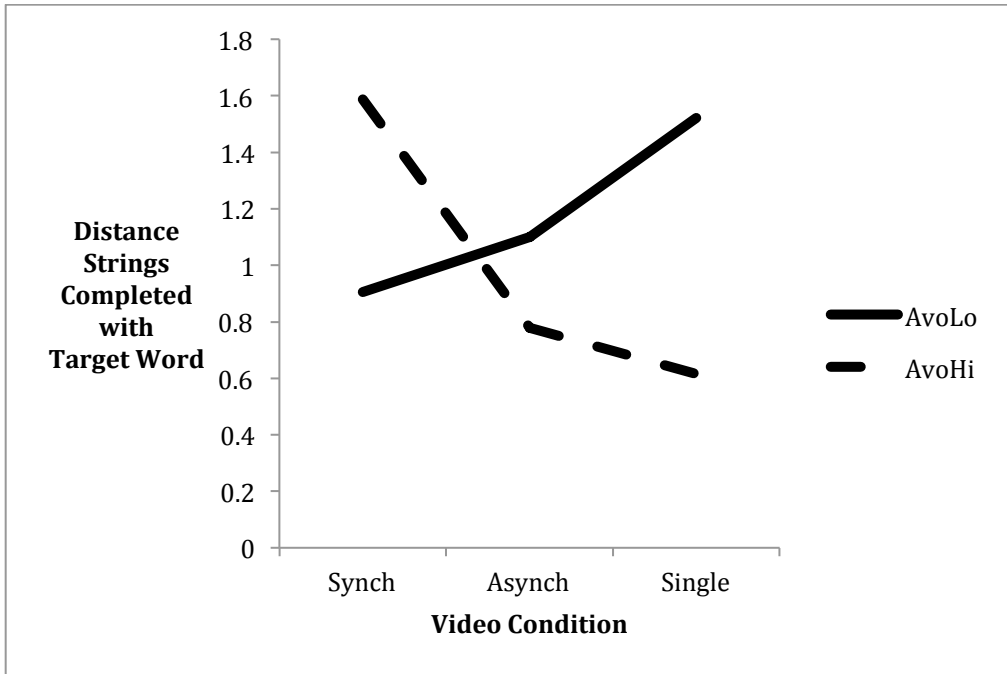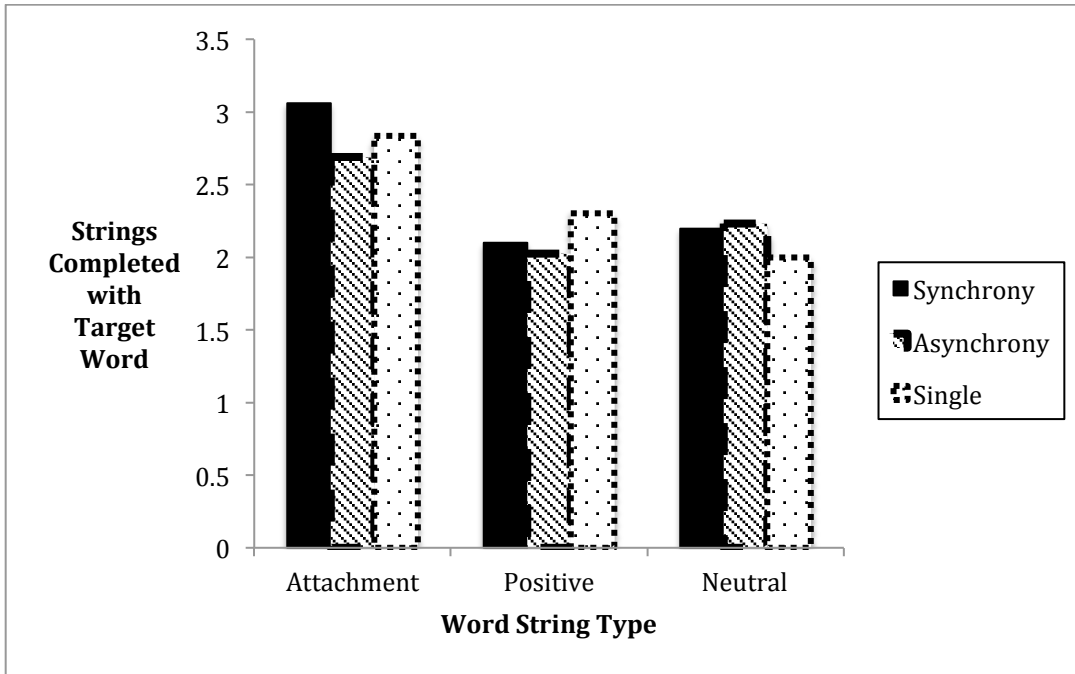
Figure 3. Estimated number of distance strings completed with target word from Avoidance +/- 1 SD from the mean from Experiment 1.

Figure 4: Means of Word Strings Completed by String Type and Video Condition from
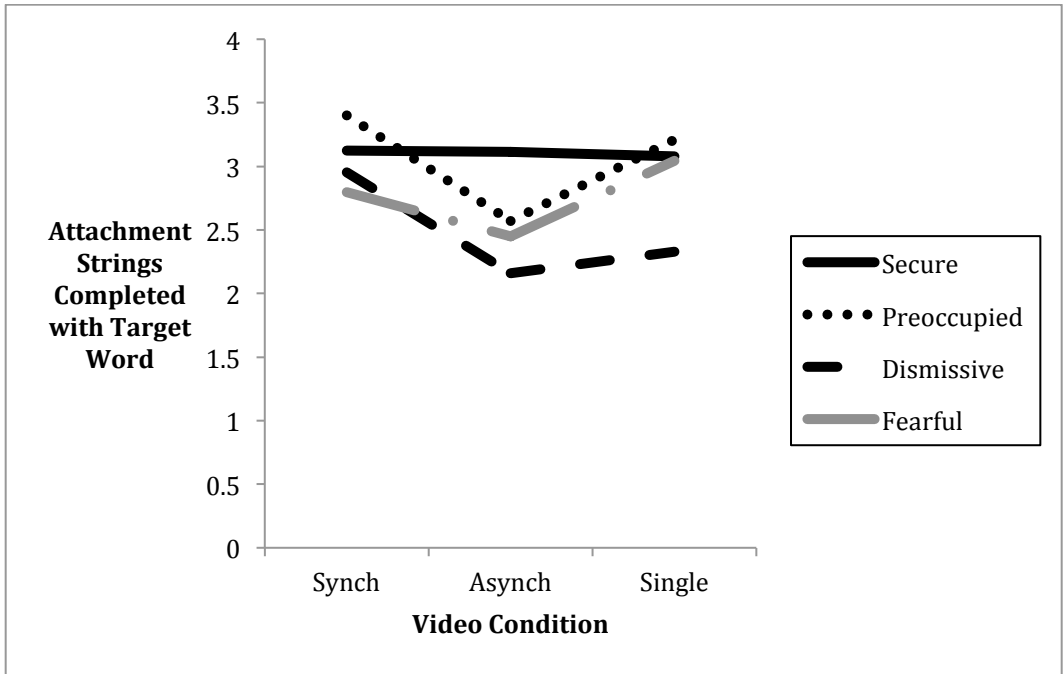
Experiment 2.

Figure 5. Estimated marginal means for attachment strings completed with target word

from Experiment 2.

APPENDIX A

WORD STRINGS INCLUDING TARGET WORD AND ALTERNATIVE

	Target word	String	Alternatives
Experiment 1			
Attachment Strings			
	Trust	T R _ S _	Trash/tryst/tress
	Cuddle	C _ _ D L E	Candle/coddle/cradle/ curdle
	Friend	_ R I E _ _	Priest/grieve/griefs/driest/ frieze/briefs/orient/criers
	Comfort	C O _ _ O R T	Comport/contort/consort
	Loving	_ O V I _ G	Moving/roving
Distance Strings			
	Anger	_ N G E _	Angel
	Reject	R E _ _ C _	Repack/reduce/relics/redact/ relock/relace/redock/reface
	Divide	_ I V _ _ E	Divine
	Abandon	A _ _ N D _ _	Asunder/agendas/amended
	Lonely	L O _ _ L Y	Lovely/loudly/lordly
Neutral Strings			
	Quiet	Q U I _ T	Quilt/quint
	Still	_ T _ L L	Stall/atoll
	Handle	H _ _ D L E	Huddle/hurdle
	Button	B _ T T O _	Bestow/bottom
	Sample	S _ M P _ E	Simple/simply/simper
Experiment 2			
Positive Strings			
	Cheer	C H _ _ R	Chair/choir
	Desire	_ E _ I R E	Rehire/rewire/retire
	Cookie	C _ O _ _ E	Choice/choose/clothe
	Indulge	_ _ _ U L G E	Divulge
	Bright	_ R I G _ T	Fright
Neutral Strings			
	Puddle	P _ _ D L E	Peddle/paddle/poodle
	Arrange	_ _ R A _ G E	Strange/derange/barrage/ inrange/uprange
	Develop	D E _ _ _ O P	Desktop/dewdrop
	Purple	P _ _ P L E	People/pimple
	Smooth	S _ O O T _	Snooty/scoots/shoots

APPENDIX B

EXPERIENCES IN CLOSE RELATIONSHIPS – SHORT FORM

Instruction: The following statements concern how you feel in romantic relationships. We are interested in how you generally experience relationships, not just in what is happening in a current relationship. Respond to each statement by indicating how much you agree or disagree with it. Mark your answer using the following rating scale:

1. It helps to turn to my romantic partner in times of need.

2. I need a lot of reassurance that I am loved by my partner.

3. I want to get close to my partner, but I keep pulling back.

4. I find that my partner(s) don't want to get as close as I would like.

5. I turn to my partner for many things, including comfort and reassurance.

6. My desire to be very close sometimes scares people away.

7. I try to avoid getting too close to my partner.

8. I do not often worry about being abandoned.

9. I usually discuss my problems and concerns with my partner.

10. I get frustrated if romantic partners are not available when I need them.

11. I am nervous when partners get too close to me.

12. I worry that romantic partners won't care about me as much as I care about them.

Scoring Information: Anxiety = 2, 4, 6, 8 (reverse), 10, 12 Avoidance = 1 (reverse), 3, 5 (reverse), 7, 9 (reverse), 11