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COLLEGE DATING COUPLES' USE OF CONFLICT MANAGEMENT DURING A
PRISONER'S DILEMMA TASK: AN EXPLORATORY STUDY

By

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College Dating Couples' use of Conflict Management during a Prisoner's Dilemma Task: An Exploratory Study

Chairperson: David Schuldberg, Ph.D.

Dating violence that occurs in young college-aged couples is unique when compared to other types of violence. Aggression occurring in these couples is often bidirectional, highly impacted by situational stressors, and perpetrated by both males and females at relatively equal rates. Most importantly, dating aggression occurs within a developmental context when individuals are attempting to balance autonomy and intimacy within their relationships. However, little is known about conflict management within dating couples or if conflict management processes differ substantially for aggressive and non-aggressive dating couples. Although there has been extensive research in marital processes in conflict, only recently have researchers argued the need for conflict management of young, dating couples to be studied in a dynamic way (Capaldi, Kim, & Shortt, 2007). For this study, a computer administered version of the iterated Prisoner's Dilemma game was used as a tool for elicitation and observation of conflict behavior of young, dating couples. Specific in-game responding including negative escalation (termed defection spirals), cooperation, and repair were examined both quantitatively and qualitatively. In addition to the Prisoner's Dilemma game, participants completed questionnaires regarding personal history, current mood, and information on their dating relationship. A cross-sectional sample of college couples ($N = 40$ couples) was used and group membership (either aggressive or non-aggressive) was determined by endorsement of items on the Revised Conflict Tactic Scales (Straus, Hamby, Boney-McCoy, & Sugarman, 1996). Findings suggest aggressive and non-aggressive couples' perceptions and approach to the Prisoner's Dilemma game differed significantly. Primary hypotheses regarding differences between groups on the use of defection, cooperation, and repair over time (Group x Time interactions) were not supported by the data. However, aggressive and non-aggressive couples differed significantly on their use of defection and cooperation responses. For example, aggressive couples used more defection responses throughout the Prisoner's Dilemma game while non-aggressive couples used more cooperative responses. Descriptive analysis of game patterns by group indicated differing patterns for aggressive and non-aggressive couples. In addition, exploratory hypotheses examining the relationship between the Prisoner's Dilemma game and aggressiveness towards one's partner were significant, thus, adding to the literature in this area. Implications of these findings and future research are discussed.

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College Dating Couples' use of Conflict Management during a Prisoner's Dilemma Task:
An Exploratory Study

Introduction

Intimate partner violence in dating relationships is an area of study that is still not well understood. Although extensive research has been conducted on prevalence rates, little is known about the dynamics of conflict in this population. Unlike marital research, where observation is commonly used to study conflict between partners, laboratory observation of dating relationships is rare. This is somewhat surprising as aggression in dating relationships appear to be somewhat different from other types of relationship aggression in that much of the aggression that occurs is mutual between the partners. In this study, the term intimate partner violence (IPV) is defined as physically aggressive acts occurring within a romantic relationship unless otherwise noted.

The focus of this study (and the following review of the literature) is on heterosexual relationships. While there is a growing literature on intimate partner violence in same-sex relationships (e.g., Burke & Follingstad, 1999; Duke & Davidson, 2009), this study emphasizes findings for heterosexual couples, as it is interested in expanding the research on processes that develop within a male-female dyadic relationship. For the purposes of this study, the terms intimate partner violence, dating violence, and dating aggression are used interchangeably.

The Prisoner's Dilemma game, a common experimental task in Behavioral Game theory, was used as a tool for elicitation and observation of conflict behavior of young dating couples. It is believed that the task provides a unique way for conflict behavior to occur (e.g., escalation, de-escalation, and/or cooperation) and that these behaviors and

patterns of behavior differ for couples who are aggressive or not aggressive. Better understanding of the processes related to how conflict unfolds in dating couples (both aggressive and non-aggressive) may better guide researchers in developing relevant theory and intervention strategies.

Dating Aggression in College Couples

Dating aggression is a common occurrence in young, college-aged couples. Individuals between the ages of 18 and 24 years of age engage in more violent and risk-taking behavior than in any other time period (Archer, 2000). This can readily be seen in statistics regarding interactions between dating partners. Prevalence estimates for heterosexual dating violence range anywhere from 21.8% to 55.8% (Katz, Kuffel, & Coblenz, 2002; Lewis & Fremouw, 2001; Magdol et al, 1997). A recent study found that IPV is highly prevalent among both male and female college students in dating relationships, with 86% of respondents reporting psychological, physical, and/or sexual IPV victimization (Próspero & Vohra-Gupta, 2007).

Widely varying prevalence rates may be due to differing definitions of what constitutes dating aggression; more conservative definitions that count only frequency of physically aggressive acts yield a smaller estimate than broader definitions of dating aggression that count frequency of physical, sexual, and psychological aggressive acts (Shorey, Cornelius, & Bell, 2008). For example, in Próspero and Vohra-Gupta's study (2007) 86% of the respondents endorsed some form of victimization in their dating relationship; however, only 50% of the sample reported experiencing physical violence from their partner. A recent review of the dating violence literature found that prevalence rates range from 21% to 45% when only examining physical aggression (Lewis &

Fremouw, 2001). For this study, a more conservative definition of dating aggression was used. Following previous research, dating violence was defined as the perpetration of an act of physical violence by at least one partner of an unmarried dyad within the context of a dating relationship (e.g., Sugarman & Hotaling, 1989).

Prevalence rates can also differ depending on how intimate partner violence is measured. When studies measure IPV through one partner's endorsement of aggression, prevalence rates are often higher than when both partners are asked and there is agreement between partners (Perry & Fromuth, 2005). For example, Perry and Fromuth (2005) found that when examining only one partner's report of aggression within the couple, 60% of the couples were considered violent. However, when examining both partners' report of aggression and looking for agreement among the partners, the authors found that fewer couples could be classified as violent with the violent sample decreasing from 60% to 30%. Perry and Fromuth argue that using couples' agreement on aggression measures is important for obtaining more accurate prevalence rates.

In addition, research has shown that males and females endorse items on aggressive measures differently. Some argue males may have a tendency to underreport their use of aggression; thus, affecting prevalence rates and making females' endorsement (and some would argue females' over-reporting) of aggressive acts more prominent in comparison (e.g., Archer, 1999; O'Leary, 2000). Males' reluctance to endorse their own aggressive behavior has often been attributed to social desirability responding (Whitaker, Haileyesus, Swahn, & Saltzman, 2007). However, there has been mixed findings on endorsement of perpetration and victimization as it relates to social desirability. For example, Sugarman and Hotaling's (1997) meta-analytic review on social desirable

responding found that gender did not moderate social desirability and partner abuse reports. More recently, Bell and Naugle (2007) found that dating, college females with higher social desirability scores were less likely to report perpetration of physical, psychological, and sexual aggression. Females with high social desirability scores were also less likely to report being victims of physical aggression. No significant correlations were found with males' social desirability scores and reported victimization or perpetration of partner aggression (Bell & Naugle, 2007).

Although some argue that the most accurate measure of aggression is found at the couple level, with couples agreeing on rate of aggression in the relationship, one significant limitation of this approach is that partners may have different views of the aggression occurring in their relationship and/or perceive behaviors differently. Only counting couples as aggressive if they agree on level and frequency of aggressive acts may miss the nuances of how aggressive couples interact and how individuals tend to approach (i.e., under-reporting and/or over-reporting) measures used to study aggressive relationships. For the present study, reports from both members of the dyad were used to determine aggressiveness in their relationship; however, agreement on level or frequency of aggressive acts was not necessary. Therefore, couples were considered aggressive if either partner endorsed physically aggressive acts occurring in their relationship.

With rates of physical violence varying anywhere from 21% to 45 % for couples, dating violence has become a serious public health concern. Prior to this time, dating violence was often considered less serious because college-aged dating couples often engage in less serious forms of aggression, such as slapping and pushing (e.g., Bookwala, Frieze, Smith, & Ryan, 1992; Straus, 2004). However, when dating violence occurs it can

create serious difficulties for individuals in the relationship. Dating violence is often lower in severity but higher in frequency, which increases the chance of harm to the individuals in the dyad (Billingham, 1987; Gray & Foshee, 1997). Research has shown that although both partners often participate in the violence that occurs in dating relationships, females have a higher risk of becoming injured from these aggressive conflicts (Archer, 2000).

For example, a study using data from the National Longitudinal Study of Adolescent Health at wave three (ages 18 to 28) found that injury was more likely when physical violence was perpetrated by men than when physical violence was perpetrated by women (Whitaker, Haileyesus, Swahn, & Saltzman, 2007). However, injury sustained during dating relationships may be more complex than once thought. Recent studies have found that males report sustaining higher rates of injury when low levels of violence occurs while women report sustaining higher rates of injury when violence increases to more severe levels (Archer, 2000; Harned, 2001). Calpaldi and Owen (2001) found (in a mixed sample of dating, cohabitating, and married couples) that both males and their female partners reported equal rates of injury. However, Calpaldi and Owen's qualitative analysis of types of injuries sustained by male and female partners indicated that female partners endorsed more severe injuries than males (e.g., pulled up the stairs by their hair, kicked in the stomach while pregnant). In addition to the increased potential for injury in aggressive dating relationships, females and males both report higher levels of depression, anxiety, and post-traumatic stress symptoms, as well as lower levels of self-esteem, when they are victims of both physical and/or psychological aggression (e.g., Clements, Ogle, & Sabourin, 2005; Harned, 2001).

Furthermore, dating relationships can have lasting effects on individuals' intimate relationships by shaping the way individuals view relationships and what constitutes appropriate behavior with an intimate partner. During young adulthood, individuals are beginning to consider longer, more stable, relationships, which has been termed the 'bonding phase' in the developmental literature (Brown, 1999). In this latter phase of relationship development, individuals begin to look for more long-term commitments and the need to regulate emotions and manage conflict become more important (Brown, 1999). When aggression occurs in a relationship it may influence the individual's views on how to establish and maintain healthy relationships; thus, aggressive relationships can impact the individual's future behavior in that relationship or future relationships with different partners.

When dating violence occurs the likelihood that the violence will occur again in the same relationship is quite high. In a sample of college students, the majority of individuals who endorsed experiencing violence in their relationships reported that physically aggressive acts occurred more than once (Katz, Kuffel, & Coldentz, 2002). A common finding in the dating aggression literature is that more severe physical violence occurs in relationships that are longer in duration, which implies that chronicity of violence can occur within dating couples (For review see Marcus & Swett, 2003). In a longitudinal study, Capaldi, Shortt, and Crosby (2003) found that levels of physical violence were stable over a three-year period for a community sample of young, dating couples (i.e., individuals with the same partner across a three year period). Additionally, a study of adolescent dating partners found that physical and psychological aggression

perpetration and victimization remained stable over a one-year span when the individual was with the same partner (Fritz & Slep, 2009).

Research is mixed on whether an individual will engage in dating violence in the future with different partners. In the Capaldi, Shortt, and Crosby (2003) study levels of violence were more likely to decrease for the sample if they changed partners during the study's three-year time period. In addition, the Fritz and Slep (2009) study examined the stability of psychological and physical aggression over a one-year time frame and found that individuals who engaged in aggression (i.e., physical or psychological) in one relationship and then changed partners during the data collection year were not significantly likely to continue to engage in aggression with their new partner.

Additional studies support findings of stability of violence across dating relationships. A recent meta-analytic review indicated that individuals who perpetrated physical violence against their partners were at greater risk of perpetrating violence with future ones (Stith, Smith, Penn, Ward, & Tritt, 2004). In the same review, individuals who were victimized in previous relationships were at greater risk of becoming victims in future relationships (Stith et al., 2004). One longitudinal study found individuals in violent dating relationships (i.e., physically violent relationships) were more likely to perpetrate aggression against their future partners; however, the authors were unclear as to if individuals partners were different or the same across the data collection span (Stappenbeck & Fromme, 2010). Studies have also found that individuals who perpetrate aggression or are victimized in dating relationships often have had these same roles in past relationships (Bookwala, Frieze, Smith, & Ryan, 1992; Gray & Foshee, 1997). Although results are mixed on whether aggression in dating relationships impacts future

relationships, it may vary depending on individuals' resiliency factors as well as contingencies established in the environment (Capaldi, Shortt, & Crosby, 2003).

Thus, dating violence that occurs in young adulthood can significantly impact the individual in a number of domains such as psychological, physical, and relational. Dating violence also has the potential to shape the behaviors and the relationships that one enters into in the future. High prevalence rates coupled with significant effects on functioning makes dating aggression a unique and important area of study.

Characteristics of Dating Violence

Dating violence appears to have several characteristics that differentiates it from other types of relationship violence such as marital violence. One such difference can be found when examining the frequency of physical acts; studies have found rates of perpetration to be relatively equal for both male and female partners in dating couples (e.g., Harned, 2001). Within the United States, Riggs and O'Leary (1996) found that approximately the same percentages of males and females (30% and 34% respectively) reported using some form of physical aggression against a partner. Cornelius, Shorey, and Beebe (2010) found in a sample of dating, college students that 36% of females reported perpetrating physical aggression against their partners while 31% of males in the sample endorsed perpetrating physical aggression in their relationships. Many studies have found equivalent results both nationally and internationally.

For example, Straus (2004) sampled from 31 universities internationally and found that while rates differed from site to site, males and females used physical aggression at relatively equal rates (e.g., Louisiana, USA site: Males 38.1%, Females 48.2%; Pusan, Korea site: Males 24.7%, Females: 39.4). Archer (2000) confirmed these

estimates through a meta-analytic review of intimate partner violence research, primarily in the United States. He found that males and females often engaged in IPV at equal rates. However, females were somewhat more likely than males to use physical aggression against their partner. Archer's meta-analysis was conducted using studies that utilized different types of relationships including dating, marital, and cohabitating relationships; however, findings that females tend to endorse perpetrating more aggressive acts against their partners than males is common in the dating violence literature (Bell & Naugle, 2007; Capaldi & Crosby, 1997; Hamby, 2009; Riggs & O'Leary, 1996; Straus, 2004, Sugarman & Hotaling, 1989). Although females tend to perpetrate slightly more physical aggression when compared to males, individuals (both male and female) in dating relationships engage in aggressive acts more equally than other types of relationships (Straus, 2004).

Another characteristic that is consistent within the IPV literature is the frequency in which individuals in dating relationships participate in bidirectional violence (Straus, 2007). Bidirectional violence (also termed symmetrical or mutual violence) is defined as both individuals of a dyad engaging in aggressive acts with one another; therefore, one partner can be both perpetrator and victim in a relationship (Bell & Naugle, 2007; Bookwala, Frieze, Smith, & Ryan, 1992). Bidirectional violence can theoretically occur during individual conflicts and/or across conflicts; however, little research has examined bidirectional violence that occurs within one conflict opting instead to study bidirectional aggression in a general sense obtaining frequency of acts and not the context for which the aggression occurs (e.g., Marcus, 2008).

Estimates over several studies have found that 45% to 68% of college students in these samples were both sustaining and initiating aggression against their dating partners (Gray & Foshee, 1997). One study found that individuals in mutually aggressive adolescent dating relationships (participants were in 6th through 12th grade) reported sustaining and initiating significantly more physically aggressive acts, severe physically aggressive acts, and more injuries occurring in their relationships when compared to adolescents in a victim-only group and a perpetrator-only group (Gray & Foshee, 1997). In a sample of dating college students that endorsed sustaining physical violence from their partners, over half (54%) could also be classified as a perpetrator of physically aggressive acts (Katz, Kuffel, & Coblenz, 2002). Bell and Naugle (2007) found in a sample of college students that both males and females (20.4% and 25.2%, respectively) endorsed being both victim and perpetrator of physical aggression in their dating relationships. Although dating aggression is thought to be milder in severity of physical acts, males and females in this study also endorsed being victims and perpetrators of severe aggression measured by the Revised Conflict Tactic Scales at relatively equal rates (10.2% and 9.9% for males and females respectively).

Magdol and colleagues (1997) found in their study of a New Zealand birth cohort sample (the majority of who were dating or cohabitating) that in the group who engaged in severe physical aggression, 41% of females who were classified as perpetrators of aggression were also classified as victims. Furthermore, in the same study, when females were victimized by their partners, they were ten times more likely to perpetrate physical aggression themselves. This finding is also similar for males. For instance, O'Leary and Slep (2003) found that for both males and females the partner's prior physical aggression

was predictive of the individual's later use of aggression against their partner. Bookwala and colleagues (1992) found that for male and female college students receiving violence from one's partner was the strongest predictor of perpetrating physical aggression in their relationships. More recently, Marcus (2008) found that in a sample of dating couples, one partner's use of physical aggression was positively associated to the other partner's use of aggression, which replicated similar results by Follette and Alexander (1992). These findings suggest that bidirectional aggression is more complex than just involving equally combative partners and hints at an escalation process that may be occurring in these relationships. In other words, examining one partner's use of aggression, as is common in intimate partner research, does not provide the whole story, and thus, for many dating couples the interaction between partners should be more closely examined.

Dating relationships in young adulthood can also be characterized as being highly impacted by situational factors that can often lead to the use of aggression in conflict. Johnson (1995) coined the term 'common couple violence' and later 'situational couple violence' to explain a form of intimate partner violence that is less serious in nature, with more mutual aggression between the couple members. Conflict appears to arise from situational influences such as stress and often dependent upon context for these couples. Johnson noted that 'situational couple violence' should be more readily seen in younger, dating populations. This type of intimate partner violence is in sharp contrast to one of Johnson's other theorized forms of relationship violence termed 'intimate terrorism.' Johnson defined this type of relationship aggression as often one-partner dominated, where more severe aggression is perpetrated, and the violence is motivated by a partner's desire for power and control over his or her partner (Johnson, 1995; Johnson & Leone,

2005). This type of relationship violence is more readily seen in community samples, crime report data, and in shelter or prison populations (Johnson & Leone, 2005).

Investigations into Johnson's theory have provided empirical support for the construct of 'situational couple violence' (Archer, 2000; Graham-Kevan & Archer, 2003; Johnson & Ferraro, 2000). Unfortunately, little research has focused on what types of situational factors can be attributed to aggression in these couples. Recently, Stith and colleagues explored situational stress factors for couples that met the criteria of situational couple violence (Stith, Amandor-Boadu, Miller, Menhusen, & Few-Demo, 2011). Through qualitative analysis of interviews with the 11 couples the authors determined that there were two distinct themes in terms of stress than often escalate to conflict: life span changes (e.g., going to school, job changes, moving, and increased seriousness in the relationship) and life circumstances (e.g., financial concerns, family or friend involvement in the relationship, and differences in living habits) (Stith et al., 2011).

Additionally, Graham-Kevan and Archer (2008) found that control may play a more important role than previously thought in young, dating couples. Their findings indicate that college-aged dating couples may use control within a stressful situation such as during conflict. This differs from the use of control seen in other intimate relationships. For example, individuals in dating relationships may use aggression as a way of controlling their partner within a conflict (e.g., using aggression to stop an argument) while individuals in other types of intimate relationships may consistently use a pattern of control both in and out of conflict (e.g., using isolation and intimidation to gain power over their partners). Thus, for these couples, the use of control (or the use of

aggressive acts to control a partner) during conflict may speak to a lack of problem solving and/or communication skills that may be developing during this period of life.

Another characteristic that is unique to young, college-aged individuals is the developmental context of their relationships. Although there is some dispute that this time in life, around the ages of 18 to 25, is a distinct developmental phase beyond the broader phase of young adulthood, many argue that the period is unique with differing characteristics than adolescence or the young adulthood phase. The term ‘emerging adulthood’ has been used to describe a period of development characterized by more responsibility, stress, uncertainty, and anxiety than late adolescence (Reifman, 2011). Arnett (2004) posits that this phase, which he believes lasts from 18 to 25 years of age, is a time of discovery and a focus on an individual’s identity. Due to the focus on experimentation, risk-taking behaviors are higher during this time and the dating period may be extended for many individuals, as their focus is less on finding long-term partners and more on identity and varying experiences (Arnett, 2004). Although some theorists do not adhere to the ‘emerging adulthood’ developmental phase, many of the issues that individuals’ struggle with during this time are similar to those described for emerging adulthood.

For example, Erikson (1963, 1968) posited in his theory of life-span development that during late adolescences and young adulthood individuals are progressing through struggles with identity and intimacy. Erikson theorized that one must successfully discover their identity before intimacy can take place. Although researchers have varying opinions on how fixed Erikson’s life-span stages may be, researchers appear to agree that balancing commitment to a romantic relationship with an individual’s need for autonomy

is paramount during this time period (Arnett, 2000; Brown, 1999; Korobov & Thorne, 2006). Shulman (2003) argues that, for late adolescent and early adult intimate relationships, emotional closeness and autonomy are important factors and play an important role not only in relationship satisfaction but how conflict unfolds. It should be noted that Shulman is defining conflict as a normative process where two partners disagree on something related to themselves or their relationship. Therefore, conflict does not necessarily, in this instance, mean the use of aggressive or violent action. Taking from Erikson's theory of development, Shulman states that because autonomy is vital for late adolescents and young adults, conflict in relationship often occurs by trying to balance getting needs met while attempting to maintain closeness with a partner. When partners are not able to balance these needs for themselves or for their relationships conflict occurs and, Shulman argues, conflict will increase in intensity over time if this balance is not reached. Thus, conflict can be a useful tool to help define a satisfying relationship and/or help to dissolve a relationship that is unbalanced (Shulman, 2003). Therefore, what happens within a conflict is dependent upon the partners and how they are able (or unable) to navigate what is best for themselves as well as what is best for their relationships.

As discussed, dating violence that occurs in young college-aged couples is unique in several ways. First, both males and females appear to engage in physical aggression at equal rates. Second, physical aggression is often mutual for these young couples in that both partners are engaging in aggressive acts toward their partner. Third, young dating couples appear to be highly impacted by situational stressors such as life changes (e.g., moving) and/or life circumstances (e.g., financial concerns) and these stressors can often

lead to conflict were aggressive acts occur. These characteristics, however, do not exist within a vacuum. Developmental context provides a better understanding of why dating aggression has different characteristics from other forms of relationship violence. With attempts to balance autonomy and intimacy, it becomes important to explore how individuals negotiate and manage conflict.

Conflict Management

In couples where violence is more situational, that is, where day-to-day stressors are the catalyst for conflict, and aggression that occurs within that conflict is more bidirectional in nature, how individuals in relationships manage conflict are important factors to examine. The term conflict management is often used to define how partners in a couple choose to cope with conflict (Straus, 1979). Straus argues that there are three ways an individual can engage in conflict management: negotiation, verbal aggression, and physical aggression (Straus, 1979). Although conflict management is a frequently used term, the way that Straus continues to define the concept of conflict management is somewhat limiting as it only takes into account each partners actions singularly and in absence of context. Others have defined coping with conflict in broader terms focusing especially on the dyad. Shulman (2003) defines an adaptive coping strategy during conflict to be attempting to balance the needs of an individual and that of the dyad. On the other hand, a maladaptive coping strategy during conflict, according to Shulman, would represent disrespect for the needs of an individual within the relationship and, in serious cases, would include violence within the dating relationship. These behaviors or strategies of conflict management appear to be better understood when interactions between partners are considered.

For example, escalation, cooperation, and repair are common behaviors that often occur within various types of conflict (e.g., marital, business management, or more broadly, conflict between countries). Within romantic relationships, escalation behavior can be defined as the use of aggressive acts to resolve a conflict where the aggressive acts increase in severity during the duration of the conflict (Stets, 1990; Winstok, 2007). Therefore, when non-aggressive negotiation or mild forms of aggressive acts (i.e., psychological aggression) do not resolve the disagreement, the partner may use more serious forms of aggression (e.g., the use of physical force) to resolve the conflict. Cooperation, also termed negotiation, during conflict can be defined as behaviors used by both partners to reach a common goal or to work together for the betterment of the couple (Shulman, 2003). Cooperation behaviors can vary from couple to couple, but often involve listening and problem solving behaviors (Shulman, 2003). Repair is a type of behavior that is aimed at decreasing negative escalation processes (Tabares & Gottman, 2003). In other words, repair is often used when negative escalation is high or as a way of preventing high escalation. Examples of repair behavior can include apologies, changing the subject during a discussion, and the use of affection (Tabares & Gottman, 2003). In the current study, escalation, cooperation, and repair strategies are explored in the context of an experimental game.

Little is known about these types of dynamics in dating couples. Due to the newness of the field, researchers have focused almost solely on risk factors and correlates of dating aggression; however, more attention needs to be invested into the processes and interactions that occur within these couples (i.e., escalation, cooperation, and repair) and how they may differ from non-aggressive couples. Research that focuses solely on theory

related to conflict management in dating relationships is rare; however, there are theories in the developmental literature and research with married and cohabitating couples that provide insight on the different ways conflict can be managed.

Conflict Management Theories in Intimate Relationships

Family Conflict Theory

One of the more traditional and widely used theories in sociology and psychology regarding intimate partner violence is conflict theory. Straus posits in his family conflict theory that conflict is a natural and inevitable occurrence in family relationships (Straus, 1979). Conflicts can occur for multiple reasons (e.g., differing goals of the members in the family, personality differences, and/or different behavioral styles) but the source, argues Straus, of conflict is that individuals want to further their own interests above the interests of the family or couple (Straus, 1979). When both members of the couple have differing needs, interest, or goals and their focus is on advancing those needs, conflict occurs. In addition, conflict theorists argue that there are several factors that can increase the likelihood that violence will occur in a relationship. Power imbalances or lack of equality between partners can increase tension within the relationship and, thus, increase the risk of violence occurring (Straus, 1977). Stressors (e.g., financial difficulties) have also been identified as factors leading to intimate partner violence (Straus, Gelles, & Steinmetz, 1980; Witt, 1987). The focus of much of Straus and his colleagues' work is on the behaviors that individuals use when conflict is present; he has termed this conflict management (Straus, 1979).

Following Dahrendorf's (1968) thoughts on conflict theory, Gelles and Straus (1979) argue that there are three stages that occur during conflict: conflict (better thought

of as differing interests for the individuals), confrontation, and change. Violence is often used to advance one's interests when there is a breakdown in conflict management; this often occurs in the confrontation stage (Gelles & Straus, 1979). Confrontation involving violence can be a powerful tool when other conflict management strategies (e.g., negotiation) are no longer effective. However, over time it can socialize the participants to aggressive tactics such that when conflict occurs partners may resort to aggression rapidly to resolve the conflict instead of using aggression as a last resort (Gelles & Straus, 1979). Straus argues that it is the processes within the relationship that can escalate, maintain, or reduce levels of aggression and not the pathology of one particular individual (Straus, 1977). However, Straus and others have focused little attention to the concepts of conflict management as a dyadic process. Instead, Straus' work focuses more on individual behaviors and not the process in which the behaviors occur; thus, limiting the scope of family conflict theory (Bell & Naugle, 2008).

Coercive Family Process Model

A behavioral theory explaining conflict management that is rooted in developmental psychology is the coercive family process model. Patterson and colleagues (Patterson 1982; Patterson, 2002; Patterson, DeBaryshe, & Ramsey, 1989) have examined aggressive children and families and how a coercive process can develop early in life and be maintained throughout adulthood eventually leading to conduct problems and antisocial behavior. He argues that examining aggressive individuals is not as illuminating as the interaction between individuals due to the fact that aggressive behavior is dyadic and bidirectional in nature. At its core, coercion theory is a model of behavioral contingencies where both the caregivers and the child "train" one another and

where the outcomes are an increase in aggressive behavior from the child and a decrease in the caregivers' effectiveness in managing the aggression (Patterson, 1982). Patterson's (2002) definition of coercion is "the contingent use of aversive behaviors of another person" (p. 25). Contingencies can be defined as the connection of the child's behavior and the caregiver's behavior. Thus, the child's behavior has some control over a caregiver's behavior and, the inverse also being true, that a caregiver's behavior has some control over a child's behavior.

Patterson (1982) argues that a child's behavior is based on the contingencies set by the child and his or her caregiver and these contingencies are maintained through behavioral mechanisms such as positive reinforcement, negative reinforcement, and punishment. For example, when a child cries because he did not get the toy he wanted and the caregiver buys the toy to stop the child from crying, the child's crying behavior has been reinforced and the probability the behavior will be used again increases. In addition, the mother's behavior of buying the toy has been reinforced, the aversive behavior has stopped (i.e., child's crying), and will more likely recur in future interactions. Furthermore, it is believed that the long-term outcome of this interaction is an increase in conflict regarding the child wanting toys while at the store. Therefore, the short-term gains (termination of conflict) also have long-term consequences (Patterson, 1982). Although contextual variables such as biological factors or societal factors can impact the child and his or her behavior, Patterson argues that the impact of such factors are mediated by the extent that the factors alter the interaction between the child and caregiver (Patterson, 2002). Therefore, Patterson's main focus is the behavior of family

members and more specifically the child's use of aggressive or coercive behavior and how this is maintained in family interactions (Patterson, 1982; Patterson, 2002).

Empirical findings supporting this theory are numerous. For example, through direct observation of mothers and their pre-school children during conflictual interactions where aversive behavior by the child ended the conflict, Snyder and Patterson (1995) found that mothers who negatively reinforced their child's aversive responses were strongly correlated with the child's aversive behavior in the home one week later. Snyder, Schrepferman, and St. Peter (1997) replicated the Snyder and Patterson (1995) study using older children and found that the frequency of conflictual interactions and the relative rates of reinforcement accounted for 44% of the variance in a model predicting conduct problems two years later. These findings indicate that relative rates of reinforcement within dyads (in this case, between caregiver and child) are a strong predictor of aggressive behavior in the future (Patterson, 2008).

Using coercion theory, Patterson and his colleagues have also found significant differences between distressed and non-distressed families with aggressive children in terms of their behavioral patterns (Patterson, DeBaryshe, & Ramsey, 1989; Snyder et al., 1994). In distressed families, a child's use of aggressive behavior can create an escalation process between a child and a family member. As the child uses aggressive behavior, the family member will increase the intensity of the situation with more aggressive behavior. In addition, distressed families are more likely to reinforce the coercive or aggressive behavior; thus, creating the probability that it will occur again. Patterson has termed the escalation of aggressive behavior between family members as coercive cycles (Patterson, DeBaryshe, & Ramsey, 1989). Coercive cycles occur when one individual uses

aggression during an interaction and the other individual maintains or exceeds the aggression of the first individual. For instance, a child yells at his/her mother, and then the mother yells back at the child in a loud voice. Then, the child increases the severity of his aggression by throwing an object and the mother responds with a more serious aggressive act by hitting the child. Patterson and colleagues (1989) argue that coercive cycles occur because the individual (whether it be mother or child in the example above) uses aggression as a way of stopping the other individual from becoming more aggressive with them.

This is a sharp distinction from non-distressed families that are less likely to reinforce aggressive behavior. Members of non-distressed families are also able to terminate the escalation process that the child is engaging in before a coercive cycle can begin. In a later study, Snyder and colleagues (1994) observed mothers and their problem and non-problem children and found that dyads with problem children engaged in higher frequency of conflict and that conflicts were longer when compared with non-problem dyads. They also found that during conflict problem dyads were more likely to escalate than non-problem dyads. In addition, findings indicated that behavioral patterns served different functions within problem and non-problem dyads. For example, non-problem dyads were more likely than problem dyads to end their conflicts after deescalation. Problem dyads were more likely to terminate a conflict after escalation. The authors argue that these differing behavioral patterns (i.e., deescalation and escalation) for problem and non-problem dyads indicate that certain behaviors worked better in the short-term for ending conflict. Furthermore, when either type of dyad (i.e., problem or

non-problem) ended their conflict after escalation, the dyads were more likely to begin the next conflict at a higher intensity (Snyder et al., 1994).

Patterson's coercion theory has more recently been applied to aggression occurring in intimate relationships. These theorists conceptualize intimate partner violence by emphasizing the examination of each partner, their characteristics, their behavior, and the interplay of their interactions (Capaldi & Crosby, 1997; Capaldi & Gorman-Smith, 2003; Fritz & Slep, 2009). Capaldi and colleagues have used coercion theory to explain the early development of aggressive behaviors from interactions with caregivers and how this influences couple interaction later in life (e.g., Capaldi & Gorman-Smith, 2003). Others have focused more on the dyadic interactions that can lead to aggression within an intimate relationship. Fritz and Slep (2009) argue that an individual's behavior is likely to elicit predictable responses from their partner, and thus, partners can create patterns of interacting that may remain relatively stable over time. When aggressive behavior is introduced into a relationship and serves some function and is reinforced, for one or both partners, that interaction pattern is likely to occur again when the partners are faced with a similar situation. Over time, the aggressive interaction pattern may become more stable due to the underlining contingencies (e.g., partners, expectations, etc.) (Capaldi & Crosby, 1997; Fritz & Slep, 2009). At this time, little research has used coercion theory to focus on the dyadic exchange during conflict management. Instead, researchers have focused on the macro-nature of coercion theory to model the development of aggressive tendencies that predict intimate partner violence (Capaldi & Crosby, 1997; Capaldi & Gorham-Smith, 2003).

Aggression models in the context of General Systems Theory

In recent years, Patterson has moved his coercive family process model into a more systems perspective to reflect a holistic view of antisocial behavior that bridges the moment-to-moment (micro theory) with the developmental nature (macro theory) of antisocial behavior (Granic & Patterson, 2006). This shift has also been seen in the intimate relationship literature where individually-based theory is given way to more dynamic theory that emphasizes interactions that occur within the dyad. This has shown to be an important step to understanding how partners cope with conflict. One theory that has gotten more renewed attention recently is general systems theory also termed dynamic systems theory.

General systems theory, as described by von Bertalanffy (1963), uses mathematics and concepts of game theory to view complex units or systems in terms of the interaction of these systems. A system can be defined as mechanisms or objects that have a goal-oriented, interconnected, relationship that also interacts within an environment. It was posited by von Bertalanffy (1968), Miller (1978) and others (e.g., Beltrami, 1993; Brauer & Nohel, 1969; Goldberg, 1986; Muarry, 1989; Peters, 1991) that everything resides within a system and that these systems have common patterns or behaviors that allow systems to be easily understood. Systems regulate themselves in an attempt at stability that has been termed homeostasis or morphostasis. The regulating mechanism within a system is termed feedback. There are two types of feedback: positive and negative. Positive feedback is an increase or escalation in activity while negative feedback dampens activity levels and helps maintain homeostasis when activity reaches maximum levels (von Bertalanffy, 1968). Morphogenesis occurs when a system

drastically changes to the point where the rules set up within the system no longer apply (Bersani & Chen, 1988).

Buckley (1967) argued that general systems theory could be applied to relationships and how they are formed, organized, and maintained. Straus and colleagues elaborated on this idea by applying general systems theory to violent relationships where families are the systems of interest (Gelles & Straus, 1979; Straus, 1973). They posited that members in a relationship are constantly gathering information about the system, comparing that information to the goals for the system, and taking corrective actions to reach or maintain a steady state or goal. This process is done through feedback loops. Therefore, violence that occurs in the family is a product of the system and not the individual parts (i.e., members of the family). Straus (1973) argued that positive feedback loops in violent families are escalated spirals of violence. However, to keep violence within acceptable limits for that specific system or family, negative feedback loops are used to dampen or maintain the violence level to keep it within acceptable limits. Straus and colleagues argue that to understand the nature of violence between family members theorists must look beyond risk factors and focus on the causal flow and feedback mechanisms of these types of families (Gelles & Straus, 1979; Straus, 1973). However, Straus and colleagues were later criticized for over complicating general systems theory in relation to family violence and that their explanation of the theory was neither parsimonious nor user-friendly (Bersani & Chen, 1988).

Giles-Sims (1983) was also an early adaptor of general systems theory as it related to violent relationships and the maintenance of violence. In her book, *Wifebeating: A Systems Theory Approach*, she outlined how general systems theory

applies to male-to-female violent relationships in six stages. She posited that the first stage of a violent relationship is the establishment of the system. During this stage, ongoing patterns of interaction are established, the groundwork is laid for boundaries, and system-governing rules are created. The second stage in Giles-Sims theory is the first incident of violence. She argued that in this stage if a positive feedback loop is established (e.g., the wife forgives the husband for violence, the wife takes no action) the likelihood of the violence occurring again increases. The third stage is the stabilization of violence, which is maintained by feedback loops. Giles-Sims stated that positive feedback to violence would escalate violence over time and establish violence as a way to manage conflict for, in this case, the husband. Corrective action within the system, negative feedback, may be able to keep violence within acceptable range for a time. However, Giles-Sims argued that if negative feedback cannot dampen the escalation of violence then a change or morphogenesis would occur within the system. In the next stage, the wife will begin to consider leaving the system. In the fifth stage, the wife will leave the system and at that point the system is considered open to environmental influences such as other survivors of violent relationships, family, friends, as well as the larger social and legal system. Giles-Sims posited that the sixth stage either involves the wife leaving the system/relationship or returning to the system or a similar system. Giles-Sims (1983) use of general systems theory received some support in relation to her work with male-to-female violence; however, her stages especially her stages focusing on conflict management have not received as much attention in the last several years.

In the last 15 years, Gottman and his colleagues have used general systems theory and then more contemporary nonlinear dynamical systems theory to help explain

couples' interactions in their research on married couples and how these processes can lead to divorce (Cook et al., 1995; Gottman, Murray, Swanson, Tyson, & Swanson, 2002; Gottman, Swanson, & Swanson, 2002). Gottman and colleagues have argued that marriage processes can be viewed as dynamic systems that change over time. One way to understand these changes is through the nonlinear mathematics discussed by von Bertalanffy (1968) and others (e.g., Beltrami, 1993; Brauer & Nohel, 1969; Goldberg, 1986; Miller, 1978; Murray, 1989; Peters, 1991) within general systems theory. How these systems change can be examined through non-linear differential equations where the variable of interest (e.g., angry facial expressions or the number of positive speaking turns) is collected for each part of the system (in this case for husbands and wives) over a certain period of time.

Gottman and colleagues theorized that each dyad has a natural steady state (positive or negative) and that the dyad is pulled toward that steady state if the state is stable. This has also been termed attractor or homeostasis set point (Cook et al., 1995; Gottman, Swanson, & Swanson, 2002). However, the steady state of the dyad can be influenced by numerous factors. To create the mathematical models a number of parameters were created based on previous research by Gottman and others (Cook et al., 1995; Gottman & Levenson, 1992; Gottman, 1999). Parameters for each partner in the dyad were calculated and termed the uninfluenced steady states. These states represent the attractors that each partner brings to the interaction and were a function of the partner's personality and the past history of the relationship.

The inertia parameters were also established, and these assessed the tendency of each partner's behavior to be predictable from that partner's immediate past behavior.

Parameters termed the influenced steady state were also estimated. These parameters were defined as where each partner's (positive or negative) state was drawn to after an interaction (Cook et al., 1995). Later models included a repair term, which was defined as a "negative interaction that is potentially triggered at a particular threshold of a partner's negativity and is effective at pushing the data in a more positive direction" (Gottman et al., 2003, p.73). The function variable in Gottman's model was the average effect of the affect (i.e., positive and negative speaker codes) on the partner over the entire interaction (Cook et al., 1995; Gottman, Swanson, & Swanson, 2002).

Using this mathematical model in conjunction with observation of marital interactions, Gottman and colleagues have added to the literature on general systems theory and dyads and how it applies to the dynamics of conflict management. They have found through their research that steady states do not have to be functional for the states to be an attractor. In addition, one dyad can have more than one steady state and the steady state that has more influence depends on the feedback from the system. Gottman and colleagues (2002) found that relationships (even non-distressed relationships) have the potential to have both a positive and negative steady state. In terms of conflict management, they found that where the couple started their interaction (i.e., whether positive or negative emotions) often determined what steady state they were more attracted to (again, whether positive or negative) (Gottman, Swanson, & Swanson, 2002). For example, if an interaction began with more negative affect conversation turns it was likely that the interaction would end with more negative affect. However, 4% of couples studied began an interaction negatively, but were able to end the interaction more positively than negatively. The authors argued that this finding indicated that repair can

occur during interactions and can be modeled (Gottman, Murray, Swanson, Tyson, & Swanson, 2002; Gottman, Swanson, & Swanson, 2002). They also found specific differences in the mathematical model for distressed couples. Distressed couples' uninfluenced steady states were more negative when compared to non-distressed couples. There was also more emotional inertia. In addition, at the beginning of interactions, the partners influence one another to become more negative (in their affect during speaking turns) than positive. Findings suggested that over time, the distressed couples lost their positive steady state altogether because of catastrophe (also known as morphogenesis); therefore, the rules that once governed their system were no longer in place. These distressed couples were more likely headed for divorce (Gottman, Swanson, & Swanson, 2002). Gottman and colleagues have used general systems theory in a way that has not been employed by other researchers exploring conflict management in intimate relationships. They have applied the theory in mathematical terms and helped to better define system components that appear important to the impact of managing conflict with couples.

Theory on conflict management has progressed over time from a more individualistic model to a more dyadic model. Even in the early development of conflict management theories there has been an understanding that dyadic processes were essential (Buckley, 1967; Straus, 1973). In the present study, a general systems theory approach is used to conceptualize and discuss couple interactions. It is important to note that coercion theory does not differ significantly from some of the core components of general systems theory. However, as others have argued (Gottman, Swanson, & Swanson, 2002; Granic & Patterson, 2006), general systems theory provides a framework

that is flexible enough to examine the complexities of aggression between individuals while giving researchers and theorists a common vocabulary in understanding these processes. In addition, a systems perspective also allows for interactional interdependency, how one partners' behavior affects the other partners behavior, which can be conceptualized and observed (Linndahl, 2001; Welsh & Shulman, 2008).

Observational Research on Couples' use of Conflict Management

Conflict management strategies are dynamic and complex involving the individuals in the dyad as well as situational factors, thus, making it difficult to study. When examining couples' behavior during conflict, behavioral observation in laboratory settings is the method used most often by researchers. There are several variations of coding systems used to discern what occurred in the observation session, but the method usually employed involves having couples discuss a problem for a specified amount of time (usually 10 to 15 minutes) (Rathus & Feindler, 2004). Discussion topics vary and are usually determined by the couple as something that is troubling to them at that time. Most couple observation research has been done with engaged, cohabitating, or married couples with few studies focusing on younger dating couples and their behaviors (Welsh & Shulman, 2008).

Gottman and his laboratory have spent decades observing how couples interact and what characteristics can lead to dissolution in marriages (Gottman, 1999; Gottman & Notarius, 2002). Gottman (1993) observed 73 married couples at two times points four years apart. He described five different conflict styles that couples engaged in based on his observations of resolution of a conflict discussion, affect, and sequences of affect. Gottman found that unstable couples approached conflict in two distinct ways

categorized as hostile and hostile/detached. Hostile couples used negative voice tone, facial expression, and affect during problem solving discussions. In addition, these couples directly engaged in conflictual conversations, were attentive listeners, but also defensive with each other. The other type of unstable couple was categorized as hostile/detached. Hostile/detached couples were often unemotionally involved with one another during conflict conversations; however, would become involved in brief episodes of verbal attacks and defensiveness where both partners participated. Hostile/detached couples also used more negative affect and less positive affect than hostile couples (Gottman, 1993).

There were also three types of couples that Gottman and colleagues defined as more stable: volatile, validating, and avoiding couples. Both the volatile and the validating couples were found to easily engage in conflict conversations and were observed openly disagreeing with one another. Volatile couples demonstrated a high level of both positive and negative affect and importance was placed on both arguing and persuasion. Validating couples used a moderate amount of both positive and negative affect. They also used verbal and nonverbal behavior to validate the other partner and displayed active listening. On the other hand, avoiding couples (also known as conflict avoiders) did not easily engage in conflict conversations or have specific strategies to resolve conflict. These couples would state their side of a topic, but would not attempt to persuade the other or provide specific solutions. Avoiding couples also displayed little positive or negative affect (Gottman, 1993).

Gottman's work has also revealed numerous patterns of interaction that can distinguish satisfied and dissatisfied couples during conflict discussions. One reliable

pattern found is that dissatisfied couples were more likely to engage in negative reciprocity (also known as negative escalation), negative behaviors by one partner were matched by the negative behaviors of the other partner, during conflict discussions (e.g., Gottman, 1994). On the other hand, satisfied couples may engage in negative reciprocity, but are able to exit these interactions by using positive affect and behaviors (Gottman, 1994). In addition, colleagues in Gottman's lab have found that satisfied couples were more likely to cooperate with one another and accept influence when solving problems (e.g., Driver, Tabares, Shapiro, Nahm, & Gottman, 2003). Another construct that has consistently discriminated between distressed and non-distressed couples is the use of repair (e.g., Gottman, 1999). Repair is a term used to describe attempts by a partner to decrease negativity in an interaction (Gottman, 1999). Repair can occur when negativity is high in an interaction or it can occur early in an interaction to prevent negativity in an interaction (Gottman, 1999; Tabares & Gottman, 2003). Findings have indicated that satisfied or non-distressed couples use repair more often than dissatisfied or distressed couples (e.g., Gottman, 1999). In the present study, negative escalation (termed defection spiral), cooperation, and repair are the main patterns of interest in this study.

Research has shown that observational research not only works well at differentiating between distressed and non-distressed couples but also aggressive and nonaggressive couples. Burman, Margolin, and John (1993) found that physically aggressive married couples could be categorized by reciprocity of hostile affect and behavior patterns that were stronger and lasted longer than nonviolent couples during reenactments of conflicts that occurred at home. In the same study, nonviolent couples also demonstrated reciprocity of affect when dealing with hostile encounters, but could

exit negative encounters quickly. Cordova and colleagues (1993) observed violent and nonviolent marital couples during conflict discussions in the laboratory with similar results as Burman and colleagues (1993). Their results suggest violent couples are without an exit strategy to allow them to de-escalate conflict. Research has also shown that within married and cohabitating couples, violent couples demonstrate more overall negative affect than nonviolent couples (Gottman & Notarius, 2002). For example, Holtzworth-Munroe and colleagues (1997) found that that violent husbands compared to nonviolent husbands were more angry, hostile, contemptuous, and domineering towards their wives while discussing a topic chosen by the wives.

Fewer studies have used observational methods to examine conflict management in dating populations. Campbell and colleagues (2010) asked couples ($n = 104$) who were involved in long-standing dating relationships to complete a daily diary questionnaire for 14-days and then were asked to participate in a videotaped couple discussion based on a conflict during the diary questionnaire period. The authors found that individuals who reported greater variability in relationship quality during the daily questionnaire were more likely to be observed engaging in destructive behaviors (e.g., responding negatively to a partner's comments, defensiveness, displaying anger towards partner, blaming, and criticizing) and displaying less positive emotion during the conflict discussion. In addition, the individuals' partners were also more likely to engage in destructive behaviors and less likely to display constructive behaviors (e.g., listening to partner, problem solving, positive comments towards partner, and accepting some responsibility for conflict) during their discussion. Campbell and colleagues argued that fluctuations in perception of relationship quality have an impact on how partners interact during conflict

and the behaviors they engage in to manage conflict. They argued that this holds true even when statistically controlling for mean relationship quality during the diary period and overall relationship quality (Campbell, Simpson, Boldry, & Rubin, 2010).

Additionally, Shulman and colleagues (2008) examined the influence that attraction has on conflict management with dating couples in the early stage of relationship development (i.e., dating less than six months). Couples ($n=35$) participated in a semi-structured interview used to determine the level of romantic preoccupation (also known as attraction) for each partner as well as a conflict discussion based on the couple's reported highest disagreement (the topic with the highest discrepancy between the partners) and were asked to come to a resolution about the topic. Six weeks later the couples completed the interview and conflict discussion again. During the conflict task behaviors were coded on five different categories: confrontation, negotiation, minimization, positive affect, and negative affect. Findings indicated that higher levels of romantic preoccupation were related to a partner's use of greater minimization during conflicts and less use of negotiation behaviors during conflict for both men and women. Similar associations were found at T2 six weeks later; however, associations were not as strong. These findings suggest that during early stages of a dating relationship minimization of problems and less problem solving may play important roles in conflict management especially when relationship preoccupation or attraction are high.

In recent years, observation of adolescent relationships has become popular among developmental researchers. However, it should be noted, preliminary qualitative research has found some differences between adolescent couples and young adult couples (Tuval-Mashiach & Shulman, 2006). For example, adolescent couples were more likely

to engage in brief, concrete, and concise conflict discussions where young adult couples engaged in more complex and more in-depth discussions. In addition, when couples were attempting to manage conflict, adolescent couples were more likely to use coercion to come to a resolution or reach a superficial agreement while young adult couples were more likely to use negotiation and compromise to reach resolution (Tuval-Mashiach & Shulman, 2006). Although developmental differences do exist between adolescent and young adult couples, observation of conflict management in these groups may provide more insight into the dynamics of conflict management of dating couples.

Shulman, Tuval-Mashiach, Levran, and Anbar (2006) observed 40 late adolescent couples during a laboratory session and explored differences on task, behavior, and emotional tone. A cluster analysis was used and three patterns of behavior emerged: downplaying behaviors (i.e., minimizing behaviors during conflict), integrative behaviors (using problem solving and negotiation during conflict), and conflictive behaviors (the use of confrontation during conflict). The authors contacted the couples at 6 different time points (i.e., 3, 6, 9, 12, 24 months) to inquire if the relationship was still intact. Findings indicated that adolescent couples that used more conflictive patterns during conflict management were significantly more likely to separate by the 3-month time point. Couples who employed a downplaying pattern during conflict were more likely to terminate their relationship by the 9-month time point. Couples who engaged in integrative behaviors were more likely to still be together at the 24-month time point. The authors argued that a couple's ability to successfully navigate conflict predicted how long and successful their dating relationship would be (Shulman, Tuval-Mashiach, Levran, & Anbar, 2006).

Another observational study examining relationship quality and late adolescent partners' interactions (ages ranged from 16 to 20 years of age) found ratings of participants and their partners during a video-recall procedure were associated with overall relationship quality (Galliher, Welsh, Rostosky, & Kawaguchi, 2004). However, Galliher and colleagues found that these findings were different for male and female partners. For example, females' perceptions of less conflict and more support from their boyfriends during discussions predicted overall relationship quality. While males' perceptions of their own supportive behavior and their ability to accept influence from their partners predicted overall relationship quality.

Fewer studies have observed conflict management in aggressive (either physically or psychologically aggressive) dating populations. Capaldi, Kim, and Shortt (2007) using data collected through the Oregon Couple Study examined relationships of young men ($n=47$) at-risk for delinquency. Data was collected at 4 time points (from ages 18 to 29) and included interactive tasks and discussions between partners. Tasks and discussions were videotaped and coded using the Family and Peer Process Code (FPPC) that codes for both content (verbal, non-verbal, physical, vocal, or compliance behaviors) and affect (positive, neutral, and negative). Interactive behavior was also categorized as affectionate touching, physical interaction (e.g., arm wrestling), and physical aggression.

At least one reported act of perpetrated physical aggression (e.g., pushed, punched, threatened with a knife or gun) occurred for approximately 30% of the sample at the first time point (males 30.5%, their partners 35.5%), approximately 30% of the sample at the second time point (males 31%, females 39.9%), approximately 20% of the sample at the third time point (males 23.5%, their partners 27.7%), and around 20% of

the sample for the fourth time point (males 18.6%, their partners 23%). Observed physical aggression was frequent at each time point. Physical aggression ranged from a slight shove to more severe aggression including poking the partner with a pencil, knocking the partner's elbow off the table, kicks, hand slaps, and hitting the partner on the head. Results indicated that females were more likely to initiate aggressive acts during observation sessions in earlier time points, but more equal levels of initiation were found for both partners at 26 years of age. The probability of reciprocation appeared relatively equal for males and females across the first two time points; however, rates were more varied in later time points. Capaldi and colleagues also found in the same study a significant positive correlation between reported and observed aggression.

Another study using the same sample as Capaldi and colleagues (2007) examined conflict styles (positive engagement, psychological aggression, and withdrawal) of stable couples over four time points and how conflict styles are associated to relationship satisfaction (Laurent, Kim, Capaldi, 2008). The authors coded two problem solving discussions (a total of 14 minutes) where each partner chose a topic of interest to their relationship (e.g., partner's jealousy, communication problems, how a partner spends his/her time). Laurent and her colleagues found that longstanding young adult relationships had particular behavioral patterns during conflict discussions, which were related to later satisfaction in relationships. The use of positive engagement (i.e., endearments, self-disclosures, positive non-verbal behavior such as a touch/hold combined with positive or neutral affect) by women was a significant predictor of both their own and partners' satisfaction at the fourth time point. The men's use of positive engagement failed to predict either his or his partner's relationship satisfaction. Female's

use of observed psychological aggression (i.e., negative interpersonal behaviors, verbal attacks, and coercion combined with neutral, disturbed, or sad affect) during conflict discussions was negatively correlated with relationship satisfaction for both partners. Observed psychological aggression used by the male partners was not correlated with relationship satisfaction for either partner. Men's use of withdrawal (i.e., closed-off body language combined with being non-responsive to partner for at least 3 seconds) predicted men's satisfaction in their relationship over all time points. Women's use of withdrawal during discussions was not predictive of relationship satisfaction at any time point. The authors argue that these findings support previous literature in the marital field of satisfied couple; however, that the use of withdrawal by males may serve an important function in conflict management and may be developmentally appropriate for young men (Laurent, Kim, & Capaldi, 2008).

Possible Limitations in Direct Observation Studies

Direct observation of couples engaged in conflict resolution has shown to be an effective way of understanding some of the dynamics that exist within the conflict process. However, there are some possible limitations that exist in couple observation. The possibility of risk when observing couples that are aggressive and the chance of distress in the laboratory that could lead to violence during the study or after the study has taken place has become a recent criticism of laboratory research with distressed or aggressive couples (Owen, Heyman, & Slep, 2006). However, Gottman and colleagues have done numerous studies with married and cohabitating couples engaged in discussion tasks with no aggression occurring during the tasks; however, one woman believed that a later violent episode with her husband was due to a discussion they had in the laboratory

earlier that day (Gottman et al., 1995). On the other hand, Capaldi, Kim, and Shortt (2007) did observe violent interactions between participants in their study using data from the Oregon Couple Study. These violent interactions included: shoving, slapping, kicks, and poking with a pencil, and hitting partners on the head.

Although the interactions that occurred in the above study are extremely rare, concern over potential risk in observational studies with aggressive individuals has sparked recent studies on the topic. For example, Owen, Heyman, and Slep (2006) observed 85 cohabitating and married couples who completed questionnaires on their relationship, discussed three conflict topics with their partner, and were interviewed regarding escalation and de-escalation moments during conflict discussions. At the end of the study, each participant's emotional state was assessed through a short questionnaire. Experimenters spoke individually with any partner that indicated any negative emotional states such as anger, depression, or upset and briefly assessed for risk and coping resources. No participant noted distress directly after the procedures. In the follow-up questionnaires that were mailed to all participants, around 90% of both men and women who responded, regardless of IPV status, viewed the study as helpful or neutral as it pertained to them personally and as the study pertained to the couple.

More recently, Clements and Holtzworth-Munroe (2009) examined the emotions of individuals in 192 married and cohabitating couples after performing various laboratory tasks (i.e., completing questionnaires (including questions regarding violence, anger, trauma, and affect disturbance), discussing relationship problems, listening to hypothetical vignettes, playing a Prisoner's Dilemma task, and completing an Empathy Accuracy paradigm) across two studies and numerous sessions. Emotional impact of the

procedures was determined by an Emotion Checklist questionnaire (designed by the experimenters) and completed separately by participants after each laboratory session. The Emotion Checklist consisted of 10 emotional states (e.g., affectionate/caring, anger/frustrated, fear/scared/afraid, happy, etc.) and an 8-point Likert-like scale for each emotion that a participant felt towards his or her partner. Couples were screened by telephone and placed into three groups: violent couples (V), distressed couples who were nonviolent (NVD), and non-distressed, non-violent couples (NDNV). They found that nonviolent, distressed (NVD) couples and violent (V) couples had the same level of negative feelings after the participation of tasks involving a discussion of couple problems. Non-violent, non-distressed (NVND) couples were more likely to have more pleasant feelings after couple discussion tasks than the two other couple groups and fewer negative feelings overall.

These findings replicated and expanded the Owen, Heyman, & Slep (2006) study that laboratory tasks are not inherently risky to undertake with couples (aggressive or non-aggressive) and, in fact, many couples find participation helpful to themselves and/or to the couple (Clements & Holtzworth-Munroe, 2009). An interesting finding in the Clements and Holtzworth-Munroe found that certain tasks were less distressing than others. For example, the Prisoner's Dilemma game task implemented in one study had fewer negative feeling for all type of couples (i.e., non-violent/distressed (NVD), violent (V), non-distressed/nonviolent (NDNV)).

One limitation that continues to be discussed in the field is how discussion sessions are structured in observational research with couples. Often researchers allow the couple to choose the topic that they would like to discuss during the coding session.

Although this provides a variety of topics and the chance for couples to discuss something meaningful to them, it also does not allow for much control over the discussion (Heyman, 2001). Therefore, some couples may discuss something that causes distress while another couples may discuss something trivial and non-distressing (Heyman, 2001). The lack of control over the discussion topic can create variability and make differences between types of couples (i.e., violent versus nonviolent) less clear (Heyman, 2001; Gottman, 2001). For instance, a common finding in marital research is that aggressive couples are often more negative, hostile, and angry towards their partners during conflict discussions when compared to non-aggressive couples (e.g., Jacobson et al., 1994; Holtzworth-Munroe et al., 2000). However, it is difficult to evaluate whether or not the increased incidence of negative behaviors observed in aggressive couples is simply because they have more issues to discuss or whether they have a more generally negative style in their relationship interactions.

A way to move beyond this difficulty is to remove the confound of relationship problems from the experimental task. One alternative, and the one taken in the current research, is to use an analogue task that taps into the negotiation elements of conflict (working together or working individually) while providing better standardization and controlled interaction such as the Prisoner's Dilemma game.

Behavioral Game Theory

One area that is beginning to receive more attention in the field of psychology is the study of behavioral game theory. Behavioral game theory, a subfield of behavioral economics, explores what individuals do in strategic interactions or when individual players have conflicting interests and examines the psychological underpinnings of these

interactions (Camerer, 2003). Game theory was derived as a way to make complicated interactions more systematic and understandable (Binmore, 1992). Here the word “game” has a complex meaning with certain requirements that must be met. The key elements of a game include players, strategies, and payoffs (Wilkinson, 2008). Players can be defined as decision-making entities that are interdependent from one another. Individuals, firms, governments, teams, and political systems have all been conceptualized as players in hypothetical games (Wilkinson, 2008). Strategies are seen as actual moves a player makes in a game. These moves can be seen as specific actions or behaviors as well as the totality of actions a player makes over the course of a game (Wilkinson, 2008). For the purposes of this study, the word “strategy” will be used as it is commonly used in behavioral game theory, referring to a specific move or action. Another key element of a game is the game’s payoffs (Binmore, 2007). Payoffs represent the differences in outcomes at the end of the game and are derived by the strategies implemented by both players (Wilkinson, 2008). Thus, games attempt to simplistically represent complex interactions and are often used to mimic real life situations, such as choosing the fastest route to a specific destination, how much to bid during an auction, how to choose a mate, and more specific to this study, what happens when individuals attempt to cooperate or compete with each other (Binmore, 2007).

It is worth noting that behavioral game theory deviates from classical game theory in several ways. Under the assumptions of classical game theory, each player is “rational” and his/her goal is to maximize the payoffs he/she will receive. Another assumption in classical game theory is that the best strategy for both players is reached instantly, with no extra time needed for learning or any other factors that may delay using the best

strategy (Wilkinson, 2008). Although these assumptions are easily met when examining hypothetical strategic interactions, it is more difficult to meet these assumptions when humans are players. Therefore, assumptions such as a player's ability to be completely rational and the player's ability to choose the best strategy instantaneously are assumptions that are often violated in behavioral game theory.

In addition, the assumption that the player will always maximize his or her payoffs at the detriment of other players is also violated, especially in games that incorporate cooperative and/or trust elements (Wilkinson, 2008). Violating these assumptions is necessary in behavioral game theory because of the complex interplay of psychological concepts within human decision-making and strategic interactions. Essentially, the purpose of behavioral game theory is not what a player's strategies *should* be in a given situation, but what strategies a player *actually employs* under empirical investigation. In behavioral game theory, the belief is that in realistic encounters people are not necessarily rational actors, and that how they deviate from rationale choice is a worthwhile and important area of study (Wilkinson, 2008).

Prisoner's Dilemma Game

One of the most used games in all types of game theory as well as in behavioral economics research is the Prisoner's Dilemma game (e.g., Flood, 1952; Rapoport & Chammah, 1965). The Prisoner's Dilemma game is a mixed-motive game that has been used theoretically as well as in experimental settings. A mixed-motive game can be defined as a game where two players have conflicting interests and can choose to either do what is best for the dyad or do what is best for a particular player (Axelrod, 1984). However, the two players are interdependent; thus, one player's decision affects the other

player and vice versa (Axelrod, 1984). Historically, the Prisoner's Dilemma was represented as a basic story of two gangsters in the 1920's that were arrested for some crime. The District Attorney does not have enough evidence to convict them unless one or both of them confesses. The District Attorney interrogates them separately and offers each of them the following:

“If you confess and your accomplice fails to confess, then you go free. If you fail to confess but your accomplice confesses, then you will be convicted and sentenced to the maximum term in jail. If you both confess, then you will both be convicted, but the maximum sentence will not be imposed. If neither confesses, you will both be framed on a tax evasion charge for which a conviction is certain” (Binmore, 2007, p.17).

The Prisoner's Dilemma game, derived from the story above, presents the players with two main choices in a given trial: a cooperative response and a defection response. The combination of the players' responses determines the outcome or payoff (See Figure 1 for example of game matrix).

For example, if both players choose the cooperative response (choosing to cooperate with each other), they receive the largest payoff collectively, but their individual payoffs are less in comparison to their other options. If both players choose to defect on one another they each get the smallest payoff individually as well as collectively. Thus, the double defection choice is the worst possible strategy for the dyad as a whole. The largest individual payoff in the Prisoner's Dilemma is when one player defects on the other while the other cooperates. The dilemma is how a player negotiates the best strategy for the dyad as well as the best individual strategy (Axelrod, 1984).

In classical game theory, the Nash equilibrium is the mathematically derived solution to a strategic situation. In other words, the Nash equilibrium is the strategy that is the best reply to the other's actions (Binmore, 1992). For each game used in game theory there is a Nash equilibrium or best strategy. For a one-trial, classical Prisoner's Dilemma game the Nash equilibrium is for both players to use the strategy of defection. Therefore, regardless of the other's action, the player will always get some positive payoff for defecting on his/her partner (Binmore, 1992).

Although the Nash equilibrium is the best strategy in classical game theory, it is not the most common strategy seen when participants play in a laboratory setting. Results show that participants do not always defect on their partner, but instead, attempt to cooperate (Binmore, 2007). However, the strategies that individual's use often depends on the type of Prisoner's Dilemma they are playing. There are three main types of Prisoner Dilemma games: the one-shot, the finite-iterated, and the infinite-iterated. If the players are engaged in a one-shot (one trial) Prisoner's Dilemma game, findings indicate that about half the players will attempt to cooperate while the other half will defect (Binmore, 2007). In this finite-iterated version, the players play for a set number of trials, a number known to both partners. Findings in the finite-interacted version of the Prisoner's Dilemma game show that participants are more likely to cooperate with each other until the last few trials, where they begin to defect (Binmore, 1992). Behavioral game theorists argue that this type of behavior is associated with fear of punishment (Binmore, 2007; Wilkinson, 2008). Essentially, the players are attempting to protect themselves from retribution of the other player by cooperating until the last trials of the game when retribution has less impact (Wilkinson, 2008).

The last type of Prisoner's Dilemma is the infinite-iterated version also known as the repeated Prisoner's Dilemma game. In this Prisoner's Dilemma, the players are not aware when the game will end, and therefore, cannot predict when retribution has less impact (Binmore, 1992). Findings indicate that in this version there are two types of strategies that are common: the cooperative spiral and the retaliation (defection) spiral where the players enter into a cycle of double cooperative responses or double defection responses until the game ends (Binmore, 1992).

An interesting aspect of the repeated Prisoner's Dilemma game is that the players can use previous knowledge to make decisions about the current trials and begin to learn that current action may help or harm them in the future depending on the reaction of their partner (Binmore, 1992). The infinite iterated Prisoner's Dilemma is the most realistic version of the game, especially as it pertains to couple conflict management. Conflict within a couple does not occur only once nor do the partners usually know that the current conflict will be the last conflict that they will ever have as the one-shot and finite versions suggest. Instead, every conflict is just one conflict of (possibly) many where partners negotiate their best course of action. In addition, partners engaged in conflict are known to use prior knowledge of other conflicts to punish partners or to attempt to make amends for past transgressions (Winstok, Eisikovits, & Gelles, 2002). The premise of this game closely aligns with the situation of romantic partners who are presented with conflict, as the partners have similar choices to make during arguments -- choose to do what is best for the dyad (to cooperate) or what is best for him or her self (to defect). This particular conflict of self versus dyad is especially vital for young adult couples who are

at the developmental stage of attempting to balance their need for autonomy and their need for intimacy (e.g., Shulman, 2003).

Patterns of in-game behavior and making meaning of that behavior has only recently become of interest to researchers in the social sciences operating within the Prisoner Dilemma game methodology/paradigm. Historically, more concern was given to the proportion of defection/cooperation responses and not to longer sequences of interaction (McClure et al., 2007). Other types of patterns have not been studied in a way that has made meaning of the behavioral game patterns over and above just naming and referring to these types of patterns. Work done with simulation software by Axelrod (1984) has provided a better understanding of game patterns and the usefulness of categorizing these strategies. However, many of the patterns found, such as “tit-for-tat” and “retaliation,” have been examined through computer simulations and not as often through experimental games.

Computer simulations differ from experimental games in that computer simulations use competing programs to learn the utility of different patterns of play (i.e., which patterns of play will have the greatest payoff in the game), while experimental games use humans or animals to learn how participants will play the Prisoner’s Dilemma game (Axelrod, 1984). It should be noted that experimental use of the Prisoner’s Dilemma game can involve human participants playing the game with each other or participants playing against an unknown confederate (such as another research assistant or a computer simulation). More researchers are now attempting to use Prisoner’s Dilemma game in experimental settings using human participants to capture and better understand game patterns and their meaning.

McCullough (2000), for example, argues that a better way to measure the dynamic process of forgiveness behaviorally in relationships is to look at a specific in-game pattern such as Axelrod's (1984) "forgiveness" pattern in the Prisoner's Dilemma game and attempt to replicate it with dyads. Exline and colleagues (2004) have also studied barriers to forgiveness with the Prisoner's Dilemma game and found that qualities such as "entitlement," measured by the Entitlement scale on the Narcissistic Personality Inventory (Raskin & Terry, 1988), is associated with fewer cooperative responses after a computer simulation partner uses a defection response. The study of forgiveness is just one area where in-game behavior patterns may shed light on these complex processes. Another area that has gained attention in the field is the Prisoner's Dilemma game and the study of aggression.

The Study of Aggression and the Prisoner's Dilemma Game

Experimentally, the use of defection responses has been linked to aggressiveness in many studies. A classic study of the Prisoner's Dilemma game looked at personality characteristics and different game behaviors (Marlowe, 1963). Using the Gough Adjective Check List, Marlowe found that players who were non-cooperators, players who used defection response repeatedly even when the other player used the cooperative response, scored significantly higher on the Need scales for aggression and autonomy. In addition, players who were cooperative, used the cooperative response through the game, scored higher on the Need scale for abasement and deference (Marlowe, 1963).

More recently, studies have also examined the link between aggressive traits or characteristics and the use of defection responses in the Prisoner's Dilemma game. Kassonov and colleagues (2002) examined the relationship between state/trait anger, as

measured by the State-Trait Anger Expression Inventory (Spielberger, 1988) and a modified Prisoner's Dilemma game. The Wartime Prisoner's Dilemma game differed from the original iterated version by having the participants imagine that they were in command of soldiers that were in conflict with each other. The participants had two choices: to wait for reinforcements or to attack. They were told that their actions were contingent on their partner's response and gains and losses were shown in how many troops killed or gained. Kassinove and colleagues found that individuals who scored higher on anger were more likely to use aggressive or defection moves in a simulated wartime Prisoner's Dilemma game. The authors also found an increase of state anger from pre-game to post-game, with a larger increase for those participants that were in the high trait anger group (Kassinove, Roth, Owen, & Fuller, 2002).

Studies of aggression with the use of the Prisoner's Dilemma game have been conducted in several different populations with positive outcomes. Parker and Herrera (1996) used a modified Prisoner's Dilemma game to examine interpersonal processes in abused and non-abused children (mean age 10.14 years old for abused children and 10.50 year old for non-abused children) with their friends. The Prisoner's Dilemma game was modified to use with children and each participant and their friend had the choice to "share" or "stomp" when presented with payoff contingencies. All dyads were in the same room and were able to freely communicate and attempt to negotiate with their partner. The authors found that abused children were more likely to use defection responses with their friends than were non-abused children. Abused children also exhibited more negative affect during the modified Prisoner's Dilemma game than non-abused children. However, more in-depth analysis of game patterns was not performed as

the authors based their analyses on a composite score of all game behavior, which included the Prisoner's Dilemma game behavior (Parker & Herrera, 1996).

In a study of adolescents with diagnoses of mood and anxiety disorders, McClure and colleagues (2007) found that adolescents with a diagnosis of a mood/anxiety disorder had different game patterns than adolescent controls. Adolescents played a finite-iterated Prisoner's Dilemma game (80 trials split into 4 rounds), but were told that they were playing against another participant when in fact they were playing against a pre-programmed computer simulation. The authors found that adolescents in the mood/anxiety disorder group were significantly more likely to cooperate after a cooperative response from the computer co-player than the control group. There were no significant differences in number of defection responses after a defection move from their co-player for either group. However, girls in the mood/anxiety disorder group reported more anger after defection responses from their co-player than did same-sex controls.

Couple Studies and the Prisoner's Dilemma Game

There have been few research studies that have explored the use of the Prisoner's Dilemma game with couples. Speers (1972) using transition probabilities examined the in-game behavior patterns in a study using 120 married couples recruited from both a clinical and community sample. Using probability procedures advocated by Rapoport and Chammah (1965), Speer examined in-game patterns for escalation/defection spiral (he termed distrust), cooperation spiral (he termed trustworthiness), and repair (he termed trust) among others (See Table 1 for transition probabilities). He found little support for these patterns based on sex, group membership (clinic or community) or interaction effects. However, Speer found that low scores on communication measures and low

scores on marital satisfaction were associated with the game pattern “trust” (the probability of cooperating after a double-defection trial). In addition, the game pattern “distrust” (the probability of a partner using the defection response after a mutual defection) was associated with low scores on marital adjustment.

Other studies have led couples to believe that they were playing Prisoner’s Dilemma against their partner when they were actually playing against another researcher or a computer simulation. Bean and Kerckhoff (1971) had 30 married couples play the Prisoner’s Dilemma game against research assistants acting as the players’ significant other. Unfortunately, results from this study were inconclusive, due to the random sequence of cooperative and defection moves made by the research assistants.

A study by Epstein and Santa-Barbara (1975) examined couples’ behavioral patterns when playing the Prisoner’s Dilemma or another mixed-motive game (i.e., Chicken) served as standard conflict situations. The purpose of the study was to see if stable patterns of responding could be reached and how they related to interpersonal perceptions. The stable in-game pattern that couples reached was used to classify couples into one of four categories: doves (stable cooperate-cooperate pattern), hawks (stable defect-defect pattern), dominant-submissive (stable defect-cooperate pattern), and mugwumps (no stable pattern). Couples who managed conflict cooperatively perceived each other as cooperative more than any other group. Couples who managed conflict in destructive manner (using more defection responses) perceived each other as competitive and partners in these couples expressed high levels of exploitative and defensive intentions coded on the Thematic Apperception Test (Epstein & Santa-Barbara, 1975).

Very few studies have used the Prisoner's Dilemma game with aggressive couples or families. However, a study examining aggressive families and Prisoner's Dilemma game behavior found that members of aggressive families were more likely to make aggressive (defection) responses than members of non-aggressive control families (McColloch, Gilbert, & Johnson, 1990). In this study, three players (i.e., mother, father, and adolescent) were playing the Prisoner's Dilemma game simultaneously and the family members were aware that they were playing each other. The authors also found that aggressive families were more likely to be angry after the Prisoner's Dilemma than control families.

Meehan (2005), in his unpublished dissertation, examined the correlates of relationship aggression and the Prisoner's Dilemma game with 79 heterosexual married or cohabitating couples. Aggressive couples were determined by the husband's use of aggression in the relationship. Participants believed they were playing their partners during the game; however, they were playing a computer program with a pre-programmed sequence of moves meant to elicit frustration from players. Meehan found that aggressive husbands were less likely than non-aggressive husbands to give cooperative responses in the game. He also found that aggressive husbands were more likely to retaliate in response to the computerized "spouse's" defection and were more likely to defect on trials that offered a large potential personal gain than non-aggressive husbands were. Meehan concluded that aggressive and nonaggressive husbands appear to have different profiles of game play.

Purpose of Current Study

Dating violence that occurs in young, college-aged couples is unique when compared to other types of violence. Aggression occurring in these couples is often bidirectional, highly impacted by situational stressors, and perpetrated by both males and females at relatively equal rates. Most importantly, dating aggression occurs within a developmental context where individuals are attempting to balance autonomy and intimacy within their relationships. However, little is known about conflict management within dating couples or if conflict management processes differ substantially for aggressive and non-aggressive dating couples. Although there has been substantial research in marital processes through conflict, only recently have researchers argued the need for conflict management of young, dating couples to be studied in a dynamic way (Capaldi, Kim, & Shortt, 2007). Therefore, one broad purpose of the current study is to expand our understanding of conflict management with aggressive and non-aggressive college-aged, dating couples.

This study compares the game behavior on the Prisoner's Dilemma game for couples that were classified as aggressive or non-aggressive. The repeated Prisoner's Dilemma game was the tool through which conflict management processes were explored and measured. This game was specifically used because it provided a controlled situational conflict task that tapped into important developmental processes for the members of the couple (i.e., choosing to do what is best for the dyad or what is best for him or her self). An additional broad purpose of the present study is to add to the Prisoner's Dilemma literature by increasing knowledge of how the Prisoner's Dilemma game is related to aggressive and conflict behaviors in a laboratory setting.

More important to the purposes of this study, and exemplified by the main hypotheses described below, is how the Prisoner's Dilemma game captures couples' behavioral processes during conflict and if these processes are similar to what we find in marital research (e.g., Gottman, 1999). Although work done with computer simulation software (e.g., Axelrod, 1984) has shown that game patterns and strategies exist and these strategies have been categorized similarly to marital research (e.g., repair, forgiveness, defection/negativity spiral, etc), little research has been done in experimental settings. Therefore, overlapping strategies were examined descriptively in the current study (See Table 1). It is believed that similar patterns between the Prisoner's Dilemma game and well-studied marital processes will help aid in the understanding of conflict management for college, dating couples as well as help develop an empirical methodology for measuring these processes.

Hypotheses

As the mean use of defection and cooperation were directly related to one another (a player's move is either a defection response or a cooperation response) Hypothesis 1a and 1b were exploring the same concept from different perspectives and are mathematically identical. Hypothesis 1a focused on the use of defection and Hypothesis 1b focused on the use of cooperation.

H1a: It was hypothesized that dyads in the aggression group would become engaged in defection spirals more over time during the game when compared to the non-aggressive group. A defection spiral was determined by examining the mean number of defection trials per round over the course of 10 rounds in the Prisoner's Dilemma game. Groups

were determined by their scores on the physical assault scale on the Revised Conflict Tactic Scales. It was predicted that there would be a Group x Time interaction.

H1b: It was predicted that couples in the non-aggressive group would use cooperation spirals more than the couples in the aggressive group over the course of 10 rounds. A cooperation spiral was defined by the number of cooperative trials over the course of 10 rounds of the Prisoner's Dilemma game. Groups were determined by their scores on the physical assault scale on the Revised Conflict Tactic Scales. It was predicted that there would be a Group x Time interaction.

H2: It was hypothesized that couples in the non-aggressive group would become engaged in repair behavior more over time when compared to couples in the aggressive group. Repair was determined by the mean number of repair trials over the course of 10 rounds in the Prisoner's Dilemma game. A repair trial was defined as the use of cooperation by one or both partners after a mutual defection trial (i.e., when both partner use defection responses in a given trial). Groups were determined by their scores on the physical assault scale on the Revised Conflict Tactic Scales. It was predicted that there would be a Group x Time interaction.

Exploratory Hypotheses

EH1: It was hypothesized that cumulative scores for the participant on the Prisoner Dilemma game would be negatively associated with the individual's reported use of physical aggression. Therefore, higher scores on the physical assault scale of the Revised Conflict Tactic Scales would be associated with lower scores (total points for the player on the Prisoner's Dilemma game).

EH2: It was predicted that defections used in the Prisoner's Dilemma game by a partner would be positively associated with his or her reported use of escalation behavior.

Defection was determined by the mean number of defection moves in the Prisoner's Dilemma game over the course of the game. Escalation behavior was defined for each participant by his or her score on the Escalating Strategies subscale of the Anger Management Scale.

EH3. It was hypothesized that within the aggression couple group, the partner who initiated the use of defection in the Prisoner's Dilemma game would generally be the partner identified as the initiator of conflict according to the self-report of initiation by the couple. Self-report initiation was defined by the responses on the item of reported initiation of physical aggression in the Initiation Questionnaire. The partner who first used the defection response in the game, regardless of trial, was considered the partner who initiated in the Prisoner's Dilemma game.

EH4: It was predicted that individuals in the aggressive couple group would experience more negative emotions after the Prisoner's Dilemma game compared to individuals in non-aggressive couple group. The physical assault scale on the Revised Conflict Tactics Scales was used to determine group distinction. The general Negative Affect (NA) scale on the PANAS-X was used to determine negative emotions for the participants before and after the game.

EH5: Patterns of game behavior were analyzed in a descriptive manner to attempt to distinguish aggressive and non-aggressive couples' dynamics of interaction as well as the game behavior patterns of distressed and non-distressed couples. The five patterns examined were: cooperation spiral, reciprocate, repair, forgive, and defection spiral. These patterns are derived from Axelrod (1997) computer simulation work with the Prisoner's Dilemma game, as well as Gottman and colleagues' (1999) work on couple dynamics. A cooperation spiral pattern was defined (somewhat differently from above) as when both players engage in mutual cooperations for three trials. A reciprocate game pattern (also known as tit for tat) was defined as when a player defects after their partner defects thereby mimicking the moves of their partner. A repair game pattern was defined as one or both players using a cooperative response after a mutual defection occurred in the previous trial. A forgive game pattern was defined as when a player cooperates after their partner used a defection response. A defection spiral pattern was defined here (again, somewhat differently from above) as the use of mutual defection responses after three trials. Aggressiveness was determined by the physical assault scale on the Revised Conflict Tactics Scale. Distress was measured by the total score on the modified Dyadic Adjustment Scale.

Methods

Participants

Potential participants were first screened to determine if they would be appropriate for the study as well as determine couple type (i.e., individuals in aggressive or non-aggressive relationships) during introductory psychology classes dedicated to research screening for multiple research projects occurring in the psychology department.

The study was introduced as a study regarding romantic dating relationships, and potential participants were asked to fill out a small packet of information if they were interested (Please see Appendix A). The packet of information consisted of a cover sheet with information about the study, two inclusion criteria questions (see below), information for contact if inclusion criteria were met, and the minor subscale of the physical assault scale on the Revised Conflict Tactic Scale (CTS-2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996). Inclusion criteria questions included (1) if the individual was currently in a dating relationship of one month or more and (2) would the individual participate in a study with their partner. Dating relationships were self-defined by the participants. Packets were gathered from potential participants individually and were scored, checked, and sorted by graduate student research assistants and undergraduate research assistants.

For reasons of confidentiality each packet also contained a code number on each page; that code number was attached to the individual's contact information, and this information was stored in a locked filing cabinet. Couple type was determined by endorsement of acts on the minor physical assault scale on the CTS-2. To be considered part of the potential aggressive couple group, an individual had to endorse at least one item on the minor scale. However, this grouping of couples was to obtain a reasonable estimation of what types of couples (i.e., aggressive or non-aggressive) were recruited and was only used for administrative purposes. Actual couple type was determined at the time of the study when both members of the dyad completed the CTS-2. To keep the graduate student research assistant blind to couple type, undergraduate research assistants were in charge of the scoring and entering of code number and couple type into a

spreadsheet. Using the spreadsheet, the primary researcher provided the code numbers of participants to the research assistants who would be contacted for scheduling. Once the minor subscale of the CTS-2 was scored and code numbers were grouped by couple type (i.e., aggressive or not aggressive) they were placed in a separate folder in a locked filing cabinet.

During the initial screening, 80 potential participants met criteria for the study (60 individuals who did not endorse physically aggressive behavior in their relationship and 20 who endorsed at least one physically aggressive act on the minor physical assault scale of the CTS-2). Due to the difficulty of recruitment through the initial screening process, an additional screening occurred the next semester. At that time, 105 potential participants met criteria for the study (57 individuals who did not endorse physically aggressive behavior in their relationship and 48 who endorsed at least one physically aggressive act on the minor physical assault scale of the CTS-2). All potential participants were called to schedule a time and date for the study as well as to determine whether the individual was still in a dating relationship and if the partner would be willing to attend. If individuals did not answer, research assistants were instructed to leave a brief voicemail message asking the individual to call back regarding interest in participating in a study he/she signed up for during Screening Day.

Before data collection, a power analysis was conducted to determine the total number of couples needed to obtain adequate power. The G*Power power calculator program (Faul, Erdfelder, Lang, & Buchner, 2007) was utilized because of its ability to estimate sample size for mixed model ANOVAs. For a 2x10 mixed-model ANOVA in

which an interaction was anticipated, a sample size of 36 couples would provide a power of 80% to detect a small effect size (Cohen's $f=.15$).

Participants were 42 dating couples, with at least one student recruited from introductory psychology classes as described above. Of the 42 couples, one couple was excluded due to their living situation (they were cohabitating). Another couple was excluded because one partner did not answer any questions on the computerized questionnaire. Of the remaining 40 couples, their ages ranged from 18-31, with a mean age of 20.38 (SD = 3.27).

All couples identified as currently being in a heterosexual relationship; however, two individuals reported their sexual orientation as bisexual. The majority of the participants reported that their relationship status was 'dating' (91.1%), while 4 individuals were engaged (5.1%), and 3 individuals reported that their relationship status was 'other' (3.8%). One individual did not report on relationship status. Relationship length ranged from 3 to 84 months, with a mean of 24.71 (SD= 17.33). The sample was largely Caucasian/Euro-American (87.5%), with 3.8% identifying as Hispanic/Latino American, 1.3% Asian American, 1.3% Native American, and 5% identifying as other. The sample consisted of 51.2% Freshman, 32.5% Sophomore, 2.5% Junior, 2.5% Senior, 2.5% Post B.A./B.S., and 8.8% identifying as other (Please see Table 2 for more detailed demographic information).

The individuals enrolled in an introductory psychology class received course credit for participating and had the opportunity to be included in a raffle drawing for a gift certificate of \$25 to an online retailer (i.e., Amazon). Individuals who were not enrolled in an introductory psychology class were only able to enter into the raffle

drawing, as no course credit was assigned to them. Participants had the choice to enter into the drawing by entering their email address on a specific webpage prior to completing the computerized questionnaires. No identifying information was connected to the participants' endorsement of items on measures. Participation was voluntary and confidential. Written consent was obtained from both partners before the study began.

Measures

Demographic Questionnaire

A demographic questionnaire was used to obtain general information about the participant and the participant's relationship with his or her partner (Appendix B). The questionnaire asked the participant's age, race/ethnicity, and year in college. Much of the information requested regarding the participant's relationship is modeled on the Straus, Hamby, Boney-McCoy, and Sugarman (1996) methods. Questions concerning the partner's gender, sexual orientation, the length of the relationship, whether the individual was cohabitating with his or her partner, and the relationship status were obtained. The demographic questionnaire was completed by both partners in a dyad.

Revised Conflict Tactics Scales

The Revised Conflict Tactics Scales (CTS2; Straus, Hamby, Boney-McCoy, and Sugarman, 1996) is a 39-item self-report questionnaire designed to assess the actions of the participants as well as the participants' partners when confronted with conflict. The Revised Conflict Tactics Scales was the primary measure used in this study for determining aggressive acts in intimate relationships. The CTS2 has been used in diverse populations within the United States as well as internationally with equal rates of aggression (i.e., physical and psychological) across populations (See Straus, Hamby,

Boney-McCoy, & Sugarman, 1996 and Straus, 2004). The measure is designed to assess strategies of managing conflict within a couple. These scales assess behavior on negotiation, psychological aggression, physical assault, injury, and sexual coercion. These scales have high internal consistency, with *alpha* coefficients ranging from .79 to .87. Furthermore, both the psychological aggression scale and the physical assault scale contain subscales of mild and severe aggression.

To determine construct validity, the authors of the CTS2 argued that their measure correlated with other variables in directions predicted based on theoretical assumptions. For example, the authors hypothesized that psychological aggression and physical assault should be highly correlated for both men and women based on the conflict-escalation theory (Straus, Hamby, Boney-McCoy, & Sugarman, 1996). The authors found that psychological aggression and physical assault were indeed highly correlated for both men ($r = .71$) and women ($r = .67$), implying adequate validity.

The Revised Conflict Tactic Scales was completed by both members of the couple. Scores on the physical assault scale was used to determine IPV status in this study. One or both partners that endorsed 2 or more acts of physical aggression on the physical assault scale were considered part of the aggressive group. Couples were considered non-aggressive if they endorsed fewer than 2 physically aggressive acts. Only two couples had one partner that endorsed one physically aggressive act, but were considered part of the non-aggressive group. In both instances, the physical aggression was in the minor range.

Dyadic Adjustment Scale

Relationship satisfaction was assessed with a modified version on the Dyadic Adjustment Scale (DAS, Spanier, 1976). The Dyadic Adjustment Scale is a commonly used measure of relationship satisfaction. The 32-item measure contains four subscales: affectional expression, dyadic cohesion, dyadic consensus, and dyadic satisfaction. A composite total score of dyadic adjustment can also be calculated with higher scores indicating better adjustment (Spanier, 1976). Most items were presented as a 6-point Likert-like scales (e.g., 1= always disagree, 5= always agree). Cronbach's *alpha* for the total score is .96 (Spanier, 1976). *Alphas* for the affectional expression, dyadic cohesion, dyadic consensus, and dyadic satisfaction subscales are .73, .90, .90, and .94, respectively.

To make the DAS more appropriate for non-cohabitating, dating couples, modifications were made to the DAS following guidelines by Watson, Hubbard, and Wiese (2000). Therefore, some text was reworded (e.g., "your partner" instead of "your mate"), and 4 items were omitted (e.g., questions about household finances, chores, in-laws, and regrets regarding marriage) (Appendix C.). Due to the highly intercorrelated nature of the subscales, the total score was used to determine level of relationship satisfaction (Watson, Hubbard, & Wiese, 2000).

The Dyadic Adjustment Scale was used as an independent variable for an exploratory analysis and the total score was used to define groups as either distressed or non-distressed. Both members of the couple completed the DAS. As this was a modified version, standardized cutoff scores were not established to distinguish distressed and non-distressed groups. Therefore, quartiles were used to determine appropriate cutoff. Male

and female participants varied in their level of distress, with females reporting more distress than males. Cutoff scores for distress were established at a score of 82 or below. Distress was determined by one or both partners with a score at or below the current study's cutoff. It should be noted that 65% of the couples in the distressed group had only one partner that was distressed.

The Anger Management Scale

The Anger Management Scale (AMS; Stith & Hamby, 2002) is a 36-item measure that assesses behaviors and cognitions that can increase or decrease anger towards a partner (Appendix D). Participants rate each statement on a 4-point Likert-like scale that ranges from strongly disagree to strongly agree. The AMS has four subscales: Escalating Strategies, Negative Attributions, Self-Awareness, and Calming Strategies. The Escalating Strategies subscale and Negative Attribution subscale assess behaviors and cognition that may lead to increased reactivity to a partner. The Self-Awareness and Calming Strategies subscales measure behaviors and cognitions that may lead to a decrease in reactivity to a partner. A total score of a participant's ability to manage anger towards their partner can also be calculated. Reliability and validity for the AMS is considered generally good. For example, the AMS total score has a Cronbach's *alpha* of .87 and the subscales' Cronbach's *alphas* range from .70 to .83. Also, construct validity for subscales in the AMS appear to correlate with measures such as the Revised Conflict Tactic Scales and the Revised Dyadic Adjustment Scale in the appropriate directions (Stith & Hamby, 2002). For this study the Escalation Strategies subscale was used for exploratory analysis. The Escalation Strategies subscale consists of items 1, 2, 3, 4, 5, 12, 13, 18, 20, 28, 29, 31, 32, 33, and 36.

Positive Affect and Negative Affect Schedule, Expanded Form

Participants' emotional states were measured with the Positive Affect and Negative Affect Schedule, Expanded Form (PANAS-X; Watson & Clark, 1994). This is a 60-item measure that provides basic emotional descriptors that participants' rate the current intensity of these emotions. Intensity is determined by a 5-point Likert-like scale (1= very slightly or not at all, 5=extremely) of how the participant is feeling at the moment. The PANAS-X includes scales assessing general dimensions of Positive (e.g., active, alert, enthusiastic, interested, etc.) and Negative affect (e.g., irritable, frightened, guilty, upset, etc.). The PANAS-X also contains 11 factor scales that tap specific types of affect (e.g., Hostility, Fatigue, Fear, etc.). Cronbach's *alpha* for the Negative Affect scale ranged from .84 to .87 in the development samples, while the Positive Affect scale ranged from .86 to .90 (Watson, Clark, & Tellegen, 1988). Similar results have been found in various other samples (Watson & Clark, 1994). The PANAS-X has also demonstrated good convergent and discriminant validity as a state measure and is sensitive to intra-individual mood fluctuations (see Watson & Clark, 1994). Only the general Negative Affect scale was used in an exploratory analysis.

Initiation of Aggression

A questionnaire was created for this research examining the participants' initiation of different types of violence for each partner in the relationship (See Appendix E), as there are no known published measures that focus specifically on initiation of violence in adult dating partners. Items target negotiation, psychological aggression, and physical aggression. Participants name themselves or their partners as the initiators of different types of aggression. An "other" option was available that participants could

choose and then give a more detailed explanation of their conflict experience. In a previous unpublished study, a similar questionnaire was used (Waldemayer, 2009) and modifications were made to the form due to inconsistent findings in this previous work. More specifically, the previous version of the Initiation Questionnaire contained items in multiple-choice format with possible answers to the items including “participant,” “partner,” “both,” or “neither” as the initiator of aggressive acts. A multiple-choice format may have limited the participants in discussing the complex nature of initiation in these types of relationships (Waldemayer, 2009). The “other” option was created to alleviate some confusion and allow the participants to explain in their own words what occurs during conflict situations.

Prisoner’s Dilemma Game

The Prisoner’s Dilemma game (e.g., Flood, 1952; Rapoport & Chammah, 1965) is a mixed-motive game that has been used in experimental and non-experimental settings. This game has been used as a model for many situations, including international conflicts, the use of scarce resources, voting behavior, “road rage,” as well as management-employee relationships, and the relationships of married couples. Thus, the definitions of cooperation and defection responses that are used have been dependent on the scenario of the particular study. In addition, the Prisoner’s Dilemma situation has been studied more often as a hypothetical tool; therefore, operational definitions for cooperation and defection beyond the mathematical definitions have not been utilized as frequently.

Determining external validity in the Prisoner’s Dilemma game depends on how defection and cooperation have been defined in particular studies, as noted above.

Historically, researchers using the Prisoner's Dilemma game were less concerned with generalizability and external correlates and more concerned with in-game behavior in the laboratory (Pruitt & Kimmel, 1977). Thus, research involving the Prisoner's Dilemma game (and game theory in general) has been criticized for lack of external validity (Schlenker & Bonoma, 1978; Pruitt & Kimmel, 1977).

However, there is a long history of using the term defection as conceptually related to "aggression" or "nastiness" towards another, in both the game theory literature as well as the sociology/psychology literature (e.g., Axelrod, 1984; Nesse, 1990; Rapport & Chammah, 1965). Also, the use of defection has been termed "violent" or "destructive" by some theorists (Rusbult & Van Lange, 2003). On the other hand, the use of the cooperation response has been defined most often as indexing or related to "compromise," "niceness," or as "prosocial" behavior towards the other member of the dyad (e.g., Axelrod, 1984; Pruitt & Kimmel, 1977; Nesse, 1990). In the present study the cooperation response was defined as related to compromising for the good of the dyad. The use of a defection response was defined as a form of working against the dyad for his or her own gain and/or engaging in conflict.

For this study an iterated (also known as repeated) Prisoner's Dilemma game was used. Therefore, the players were able to use previous knowledge to make decisions about current trials of the game. Players were also able to learn how current actions could help or harm them in the future depending on the reaction of their partner.

The Prisoner's Dilemma game used in this study was computer-administered and the software developed by an outside contractor for the purposes of this research. The program enabled the participants to first play two sample trials with the computer to help

learn the mechanisms of the game before beginning the game with participants' partners (Appendix F for screen shot of the game).

For each trial, participants were presented with a matrix (i.e., a 2x2 square) containing point values in each square (Appendix F), representing the points gained for each of four combinations of moves. Although the Prisoner's Dilemma game often uses years in prison as the utility for the game, this version instead used point values in monetary format (e.g., \$1.00). Participants were informed during the research assistant's instructions that they would not be receiving actual money at the end of the game. In each square of the matrix, points were displayed describing how many points each participant and their partner could receive for a certain combination of moves. Each player had two choices of point values; a cooperative choice that provided both players with an equal amount of points or a defection choice that provided the player and his/her partner with fewer points. However, the points each player received was contingent upon the combination of both players' choices. Therefore, if one player chooses a defection response and the partner chooses a cooperation response, the player choosing defection would get more points while the cooperating partner would receive zero points. A tally of points was kept at the bottom of the screen to allow the participants to see how much they earned/lost, their partners had earned/lost, and the couple total points after each trial. The values inside the (payoff) matrices changed during the game after each round (Please see all payoff matrices in Appendix G).

Partners' use of defection choices, cooperative choices, and repair choices (defined by the primary researcher) in the Prisoner's Dilemma game were the dependent variables for primary analyses of the study. Cooperation and defection variables were

calculated by the mean of cooperation or defection across the trials for a particular round. Means for each round were used as the within-subject factor for primary analyses. Repair was defined as the use of a cooperation response by one or both partners immediately after a mutual defection. Mean repair for each round was calculated and used as a within-subjects factor in primary analyses. Total scores generated by the couples were also used in exploratory analyses. In addition, selected transition probabilities based on Speer (1972) were used as a subsidiary variable tapping into the concepts of cooperation spirals, defection spirals, and repair.

Procedure

A detailed script was used during data collection to ensure consistency among research assistants (See Appendix H for script). Before beginning the study, participants were informed that the study was voluntary and confidential and assured that they could discontinue the study at any time without prejudice. Participants were then asked to read and sign the consent form. After the consent form was signed participants were told that they would spend the rest of the session completing a computerized questionnaire and working on a computer task with their partner. Once the members of the couple consented to the study, each partner was assigned a corresponding ID number with their partner (e.g., 7001 and 7002) by a research assistant. This ID number was entered into the computer by the research assistant at the beginning of the computerized questionnaire as well as at the beginning of the Prisoner's Dilemma game.

The individuals in the dyad were then directed to separate, adjacent rooms, each in front of a computer. All self-report measures were filled out on the computer through a survey program, Survey Systems. This software package has the highest form of online

security available, as it utilizes secure sockets layer (SSL) technology and ensures data are transmitted in encrypted form. A research assistant relayed instructions to each partner separately and the partners were asked to begin when ready. Participants were first presented with a webpage in which they could enroll in the raffle drawing and then were asked to click a link directing them to the actual survey. Participants filled out demographics questions and the PANAS-X before beginning the Prisoner's Dilemma game.

After both members of the couple completed the first set of measures (i.e., demographics and the PANAS-X), a research assistant entered the couple's testing rooms and started the Prisoner's Dilemma game on each couple member's computer. The basic components of the game were explained by a research assistant and participants were told that they were playing a computer task with their partners (See script; Appendix H). Two sample trials were also provided to help illustrate the purpose and rules of the game. It was explained to participants that the sample trials were the only trials played through a computer simulation and the rest of the game would be played interactively with the partner.

Most participants completed 100 trials of the Prisoner's Dilemma game. These 100 trials were grouped into 10 rounds of 10 trials each with a pause between each round of trials. The pause was of 5 seconds in duration and was accompanied by a screen displaying the participant's total points, the partner's total points, and the total points they had earned as a couple. However, due to a software error during data collection, 6 couples (4 couples in the aggressive group and 2 couples in the non-aggressive group) completed a Prisoner's Dilemma game with 101 trials. The extra trial took place during

the first round of the game. To correct for this error, means of defection, cooperation, and repair were calculated instead of actual counts in the within-subject analyses. Conditional transition probability measures were computed for the couple based on total trials. In addition, the total score for individual players on the Prisoner's Dilemmas game, used in an exploratory analysis, was also corrected for an exploratory analysis, with the point total in the first round pro-rated to 10 trials as needed.

After the completion of the game, each participant responded to the second set of measures. These consisted of the Revised Conflict Tactics Scale, the modified Dyadic Adjustment Scale, the Initiation questionnaire, and the PANAS-X given for a second time. After the completion of the measures, a research assistant conducted a brief exit interview with each partner in his/her testing room. The exit interview contained questions regarding the participant's thoughts about the study (Appendix I).

Once the exit interview was completed, participants were asked to complete a debriefing questionnaire that inquired about the participants' level of distress after completing the study (Appendix J). Due to the possible risk of distress that could occur with aggressive couples, a graduate-level research assistant went over the debriefing questionnaire with each participant privately in his or her testing room. A score of 4 or more on any item of the questionnaire would result in the graduate-level research assistant inquiring more fully into the participant's distress regarding that question. In addition, all participants were verbally asked about their level of upset after the completion of the study as well as their level of fear leaving with their partner.

Safety procedures were in place to ensure that if participants were distressed a clinical supervisor would be called immediately. Safety procedures were also in place if

participants engaged in aggressive behavior during the study. This procedure dictated that campus security would be called immediately if aggressive behavior was observed, and each research assistant was provided with the phone number of campus security. Neither safety procedures were needed during this study.

Once the debriefing questionnaire was completed a basic referral sheet with the names and telephone numbers of local psychological services was provided. A debriefing sheet was also provided participants containing information about the purpose of the study and the name and phone number of the primary researcher if the participants had any questions or concerns (Appendix K).

Results

Demographic Variables

Analyses were conducted to determine if there were any differences on demographic variables between individuals in the aggressive group, who endorsed two or more physical acts of aggression in their relationship (measured by the CTS2), and individuals who were in the non-aggressive group (again, based on CTS2 endorsement). There were no statistically significant differences between groups on any of the demographic variables including age, length of relationship, relationship status, ethnicity, and class status.

Descriptive Statistics

Table 3 displays the participants' minimum and maximum score, the mean score (total and subscales when appropriate), and the standard deviation for each of the measures used in the study by group.

Primary Measures

On the Revised Conflict Tactic Scales each participant responded for both themselves and their partners on how each manage conflict. From the total sample, 88.7% endorsed at least one item on the Psychological Aggressive scale, 32.5% endorsed at least one item on the Sexual Coercion scale, and 7.5% endorsed experiencing at least one instance of injury on the Injury scale. Within the aggressive group, 62.5% of participants endorsed perpetrating at least one minor physical aggressive act against their partner and 22.5% reported perpetrating at least one severe act of physical aggression against their partner (See Table 4.1). Again within the aggressive group, 62.5% of participants reported that they were victim of at least one minor physically aggressive act from their partner and 30% of participants reported being victim to at least one severe act of physical aggression from their partner (See Table 4.2). In addition, partners' endorsement of physical aggression perpetration were strongly correlated ($r(38) = .58, p < .0005$) indicating that aggression within this group was more likely bidirectional in nature. Type of aggression (i.e., male perpetrated only, female perpetrated only, or mutual violence) was also examined for the aggressive sample by examining both members report of physical aggression on the CTS2. The majority of the aggressive sample endorsed mutual aggression (37.5%). Ten percent of the sample reported female perpetrated aggression only, while the remaining 2.5 % reported male perpetrated aggression only.

Of interest on the remaining primary measures, the modified Dyadic Adjustment Scale was not significantly correlated with either participants' reported use of physical aggression on the Revised Conflict Tactic Scales or with reported partners' use of physical aggression on the CTS2. In addition, groups differed on the Anger Management

Scale (AMS). There were mean group differences on two subscales: Escalating Strategies and Negative Attributions. On the Escalating Strategies subscale, the aggressive group ($M=36.05$, $SD= 5.48$) and the non-aggressive group ($M=31.53$, $SD=4.85$) differed significantly on the use of escalation strategies during conflict ($t(76.88) = -3.91$, $p < .0005$, $Cohen's d = .89$), with the aggressive group using more escalation. Groups also differed on the Negative Attributions subscale, which measured negative cognitions that increases reactivity to an individual's partner during conflict. The aggressive group ($M= 10.6$, $SD= 3.12$) and the non-aggressive group ($M=8.23$, $SD= 1.35$) differed significantly, with the aggressive group endorsing more negative attributions towards their partners ($t(53.09) = -4.41$, $p < .0005$, $Cohen's d = .98$).

The Prisoner's Dilemma game was also explored to examine any possible relationship with the CTS2. The use of defection was significantly associated in a positive direction with reported perpetration of physical aggression ($r(78) = .37$, $p = .001$), psychological aggression ($r(78) = .253$, $p = .024$), and injury to his or her partner ($r(78) = .310$, $p = .005$). Thus, defection appears to be related to aggression against one's partner. However, the use of cooperation was not significantly associated with the use of negotiation ($r(78) = .181$, $p > .05$).

Initiation Questionnaire

The Initiation Questionnaire consisted of four questions regarding who initiates various conflict tactics in his or her relationship. On the first item participants were asked who was more likely the first to want to talk things out during a conflict. Fifty-two point five percent stated that they were the first to initiate talking it out, 37.5% stated their partner was the first to initiate talking through conflict, and 10% reported "other." From

the “other” category, participants explained that it often depended on the conflict as to who initiated talking through problems while others stated that both partners equally initiated this behavior. The second question asked participants who initiates cursing and name calling during conflict, on average 25% of the sample reported that they initiate this behavior, 17.5% reported that their partner initiates verbally aggressive behavior, while the majority of the sample (56.3%) marked “other.” From “other” responses for item two there were several themes in responding. Most participants who endorsed “other” stated that this never occurs in the relationship, two participants commented that both partners initiate name calling and cursing in the relationship depending on the argument, two participants stated there was no name calling during conflict, but they often cursed at each other, and three participants stated that any name calling or cursing during a conflict was only used jokingly.

Item three referred to the initiation of slamming doors or throwing objects. From the total sample, 10% reported that they initiated this behavior, 17.5% reported that their partner initiated this behavior, and 71.3% marked “other.” From “other” responses for item three, a majority of the responses stated that neither partner engages in this behavior, while three participants stated that both partners initiate slamming doors and throwing objects and that it depends on the conflict. The last item on the initiation questionnaire asked participants who was more likely to initiate physical force in the relationship. Of the total sample, 6.3% reported that they were more likely to initiate physical force, 7.5% reported that their partner was more likely to initiate this behavior, and 85% marked “other.” From the “other” responses there were two main themes: a majority remarked that the behavior does not occur in their relationship while five participants denied the

examples used for physical force (e.g., slapping, hitting, shoving, etc.), but stated they initiated other forms such as pushing or shoving. Twenty-three participants declined to explain their “other” response (See Table 5 for percents by group). All of the participants who declined to respond were in the aggressive group.

Debriefing Questionnaire

On the Debriefing Questionnaire participants’ scores ranged from 0 to 8 on a Likert-like scale that asked questions regarding distress/stress and/or concern occurring after the study. Overall means for the sample on each item was low (See Table 6). On the first item asking about current distress, 93.8% of the participants reported a score of 3 or below (endorsing low distress). Any participant who reported a score of 4 or more was asked at the end of the experiment specifically about his or her response and safety was briefly assessed. The second item regarding current concern over leaving with his or her partner, 95% of the total sample reported little concern with leaving with partner (scores of 3 or below). Of the 4 participants who marked a score higher than 3, two stated that they misread the question, one participant reported that she knew that they would argue about dinner plans after the study, and one participant was thinking of breaking up with his partner due to conflict occurring outside of the study. This particular participant was the only one to endorse 8 (highest) on all questions. He was debriefed by the primary investigator and denied violence or fear of violence occurring after he and his partner left the session.

Item three asked participants if they anticipated their partner being upset with him/her once they left the study. Ninety-three percent endorsed little concern about their partner being upset (a score of 3 or lower). Of the participants ($n=6$) that believed their

partner may be upset after the study, two participants stated they misread the question, four participants believed their partners would want to argue over who won the game or how he/she played the game. Of those four participants, all denied concern for violence occurring after the study. On the next item referring to current stress, 91.3% of the sample reported little stress (3 or below) and participants endorsing 4 or greater on the Likert-like scale all endorsed stress from other sources (e.g., school, exam the next day, grades, etc.) and denied stress related to the study or how the study would impact his or her relationship.

The last item asked about concern the participant might have that a conflict would occur after leaving the study, 96.3% experienced little concern about conflict. Of the three participants that believed a conflict would occur after the study, two participants stated that he/she were thinking of breaking up with his/her partner before the study, and one participant stated that conflicts often occur in his relationship. All denied concern that physical violence would occur during conflict, and all participants denied that the study specifically would lead to conflict. Aggressive and non-aggressive couples did significantly differ by mean score on two items: concern about partner being upset after the study ($t(55.37) = -2.14, p = .037, \text{Cohen's } d = .47$) and concern that conflict would occur after the study ($t(41.86) = -3.01, p = .004, \text{Cohen's } d = .66$). The aggressive couples had significantly higher mean scores on these two items than the non-aggressive couples.

Exit Interview

An exit interview was conducted by research assistants to gather information about participants' thoughts regarding the purpose of the study as well as the purpose of the Prisoner's Dilemma game. The answers were analyzed descriptively for themes in

responding. In terms of the purpose of the game, the majority of participants understood the basic premise of the game and that their choices were to cooperate or to compete with one another. Interestingly, participants were often able to articulate spontaneously how the game applied to couple relationships. One participant stated, “Finding out if we’d work together for the greater good of the couple or attempt to get what we want for ourselves...like during arguments.” Participants often discussed that the moves in the game were either sharing or being selfish (“if I had the choice would [I] choose to benefit one or both of us” or “to see which one cares more about themselves versus sharing”) and that the task was “problem solving” or “to see how well we worked with each other.”

Participants were also asked about their strategies during the game. There appeared to be a general difference in strategies between couples in the aggressive group and the non-aggressive group. Participants in the non-aggressive group often stated that their strategies were “to keep the same amount” or “wanted to make it equal” and voiced that this would be best for the couple (i.e., the couple total score). Aggressive couples were more varied in their strategies. Some began with a more competitive strategy and ended with a strategy that was more equal to the couple. For example one participant stated, “once I was ahead I started being fair, but I wanted to win.” While another participant from a different couple stated, “At first I was pressing the choice that got me the most, but then [I] saw she was lagging behind so I clicked the one that gave us the same amount of money.” Another common strategy reported in the aggressive group was to follow a partner’s actions. For example one participant stated, “[I would] see what he picked and then pick it the next round.” Another participant remarked, “clicked where collectively we would get the most money, unless he got more money in one turn and

then I would select for myself.” Another reported strategy that was popular among the aggressive group was an antagonistic response. Many participants discussed choosing the opposite choice of their partner on purpose. For example one partner reported, “I would get the most and him none. I would choose the opposite just to get to him.” Or another example, “so I waited for her to turn on me and she wouldn’t. So I clicked on the other choice (defection response) and we went back and forth for awhile battling it out.”

Aggressive and non-aggressive groups also had different reactions to their partners’ overall game behavior. Non-aggressive groups were generally pleased with their partner’s choices in the game. Many stated that they were pleased because they were “on the same page.” Others commented that their partner’s use of defection responses were humorous (“I know he was just joking around. It was funny”) or an accident (“accidentally picked B (defection response) sometimes, but he didn’t mean it”). On the other hand, aggressive couples were consistently more frustrated with their partner’s game behavior. Responses ranged from some displeasure “I didn’t like the way she played the game” and “thought he was picking B (defection response) the whole time” to frustration and anger, “Upset, when I got nothing and he got more money. I wanted to get him back,” and “frustrated me a couple times because I wanted her to choose differently,” and also “I was beginning to get annoyed when all she wanted to do was win for herself.”

Primary Statistical Analyses

Hypothesis 1a: It was hypothesized that dyads in the aggression group would become engaged in defection spirals more over time during the game when compared to the non-aggressive group.

A 2x10 between-within-subjects analysis of variance (ANOVA) was conducted. It was predicted that there would be a Group x Time interaction with couples in the aggressive group engaging in defection spirals more over time than couples in the non-aggressive group. The independent variable was couple group distinction being either aggressive or non-aggressive. The dependent variable was the mean number of defection trials per round over the 10 rounds.

Before results were examined, Box's test of Equality of Covariance Matrices was performed. The test was significant ($F(55, 4663) = 2.02, p < .0005$), and thus, equality of covariances could not be assumed. Therefore, results were examined for univariate effects only. Also, the assumption of sphericity was tested and the result significant (Mauchly's $W = .016(44), p < .0005$); therefore, the Greenhouse-Geisser correction was used. No significant Group x Time interaction was found ($F(4.88) = .729, p = .60$, partial *eta-squared* = .014) and hypothesis 1a was not supported by the data. However, there was a statistically significant main effect for Time ($F(4.88) = 3.504, p = .005$, partial *eta-squared* = .084) with mean defections decreasing over time. There was also a statistically significant between-subjects main effect for Group ($F(1) = 5.28, p = .027$, partial *eta-squared* = .112) with the aggressive group having a significantly higher mean of defections than the non-aggressive group (See Figure 2).

Transition probabilities were also examined for defection utilizing Speer's (1972) procedure. A defection spiral was defined for each partner as the probability of the use of a defection response after mutual defection (i.e., $p(D/D1D2)$). This transition probability was termed "distrust" by Speer (1972). The mean probabilities, standard deviation, and number of participants by gender and group can be found on Table 7.1. A 2x2 within-

between ANOVA was conducted to explore differences within the couples (i.e., gender) and between groups (i.e., aggressive and non-aggressive). No significant differences were found.

Hypothesis 1b: It was predicted that couples in the non-aggressive group would use cooperation spirals more than the couples in the aggressive group over the course of 10 rounds.

A 2x10 between-within-subjects ANOVA was conducted. It was predicted that there would be a Group x Time interaction with the non-aggressive group engaging in cooperation spirals more over time than the aggressive group.

As stated earlier, results for H1a and H1b were identical due to the nature of choices presented in the game. Box's test of Equality of Covariance Matrices was significant ($F(55, 4663) = 2.02, p < .0005$), and thus, equality of covariances could not be assumed. Therefore, results were examined for univariate effects only. Also, the assumption of sphericity was tested and the result significant (Mauchly's $W = .016(44), p < .0005$); therefore, the Greenhouse-Geisser correction was used. No significant Group x Time interaction was found ($F(4.88) = .729, p = .60, \text{partial } \eta^2 = .014$) and hypothesis 1b was not supported by the data. However, there was a statistically significant main effect for Time ($F(4.88) = 3.504, p = .005, \text{partial } \eta^2 = .084$) with increasing mean cooperation responses over time. There was also a statistically significant between-subjects main effect for Group ($F(1) = 5.28, p = .027, \text{partial } \eta^2 = .112$) with the non-aggressive group having a significantly higher mean of cooperations than the aggressive group (See Figure 3).

In addition, transition probabilities were also explored for cooperation. A cooperation spiral was defined for each partner as the probability of the use of a cooperation response after mutual cooperation (i.e., $p(C/C1C2)$). This transition probability was termed “trustworthiness” by Speer (1972). The mean probabilities, standard deviations, and number of participants can be found on Table 7.2. A 2x2 within-between ANOVA was conducted to explore differences. No significant differences were found.

Hypothesis 2: It was hypothesized that couples in the non-aggressive group would engage in repair behavior more over time than couples in the aggressive group.

A 2x10 between-within-subjects ANOVA was conducted. It was predicted that there would be a Group x Time interaction with the non-aggressive group using repair more than the aggressive group over time. The independent variable was couple group distinction being either aggressive or non-aggressive. The dependent variable was the mean number of repair per round over the 10 rounds. In addition, a total mean mutual defections was used as a covariate to statistically control for the effect of mutual defections on the two groups.

Again, results were first examined with Box’s test of Equality of Covariance Matrices and the test was significant ($F(55, 4663) = 3.02, p < .0005$). Equality of covariances could not be assumed, and therefore, results were examined for univariate effects only. Also, the assumption of sphericity was tested and the result significant (Mauchly’s $W = .018(44), p < .0005$); therefore, the Greenhouse-Geisser correction was used. No significant Group x Time interaction was found ($F(1, 5.09) = 1.39, p = .651$,

partial *eta-squared* = .018) and hypothesis 2 was not supported by the data. In addition, no statistical main effects were present (See Figure 4).

Furthermore, transition probabilities were calculated for the repair term. Repair was defined for each partner as the use of a cooperative response after mutual defection ($p(C/D1D2)$). Speer's (1972) defined this transition probability as "trust." The mean probabilities, standard deviations, and number of participants can be found in Table 7.3. A 2x2 within-between ANOVA was conducted to explore differences on gender and group membership. No significant differences were found.

Exploratory Hypotheses

In addition to the three primary hypotheses, several exploratory hypotheses were also tested. Power analyses were conducted a priori for all exploratory hypotheses using G*Power. Results of power analyses were discussed for each hypothesis.

EHI: It was hypothesized that cumulative scores for the participant on the Prisoner Dilemma game would be negatively associated with the individual's reported use of physical aggression.

It was predicted that there would be a negative relationship between the two variables; thus, higher scores on the physical assault scale of the Revised Conflict Tactics Scales would be associated with lower scores (total points for the player on the Prisoner's Dilemma game). Power analysis conducted for a bivariate correlation indicated that for 80% power and a predicted correlation of .30 a total sample of 84 participants would be required. However, because the sample size was 80 participants, power was somewhat under 80% (i.e., actual power calculated post hoc was 69%).

A Pearson r correlation was computed to examine this relationship. A statistically significant correlation was detected at a $p < .05$ level in the negative direction ($r(78) = -.27$). Thus, individuals who endorsed engaging in more physical aggressive tactics with his or her partner were likely to have lower individual scores on the Prisoner's Dilemma game. Exploratory hypothesis 1 was supported.

EH2: It was predicted that the number of defections used in the Prisoner's Dilemma game by an individual would be positively associated with self-reported escalation behavior.

It was predicted that a significant positive correlation would exist between the two variables. The defection was determined by the mean use of defection moves in the Prisoner's Dilemma game over the 10 rounds for each player. Escalation behavior was defined for each participant by his or her score on the Escalating Strategies subscale of the Anger Management Scale. Similarly to the previous exploratory hypothesis, this hypothesis was under 80% power. Actual power calculated post hoc was at 51% for a bivariate correlation.

A Pearson r correlation was conducted to examine the relationship between defections and self-reported escalation behavior. A statistically significant relationship was found in the expected direction ($r(78) = .222, p = .048$). Thus, as number of defections increased the level of escalation strategies also increased. Exploratory hypothesis 2 was supported by the data.

EH3: It was hypothesized that within the aggressive group, the partner who initiated the use of defection in the Prisoner's Dilemma game would generally be the partner identified as the initiator of physical aggression during conflict according to the self-

report of initiation by the couple.

Self-report initiation was defined by the responses on the item of reported initiation of physical aggression for the couple in the Initiation Questionnaire. The partner who first chose the defection move in the game, regardless of trial, determined initiation during the Prisoner's Dilemma game. A Pearson *chi square* test was proposed to examine the degree of statistical dependence between the partner who initiates game defection and the partner who initiates physical violence in the relationship. It was predicted that the individual who initiated defection in the Prisoner's Dilemma game would be the initiator of physical violence in the relationship. However, due to the lack of response on the Initiation Questionnaire as to who initiates physical aggression in the relationship ($n=11$) the above test could not be performed. Exploratory hypothesis 3 was not examined.

EH4: It was predicted that individuals in the aggressive group would experience more negative emotions after the Prisoner's Dilemma game compared to individuals in the non-aggressive group.

It was believed that a Group x Time interaction would be found with individuals in the aggressive couple group endorsing more negative emotions after the Prisoner's Dilemma game than individuals in the non-aggressive couples group. The independent variable was couple group distinction being either aggressive or non-aggressive. The dependent variable was the participant's score on the Negative Affect (NA) scale with two levels pre and post Prisoner's Dilemma game. Power analysis was performed for an ANOVA, repeated measures, within-between factors. With a small to medium effect (Cohen's $f = .20$) and 80% power a sample size of 52 participants were needed. Post hoc

analysis of actual power was 99% with medium-sized effect (Cohen's $f=.33$) and 80 participants.

A 2x2 repeated measures ANOVA was conducted to detect differences between the groups on negative emotion before and after the game. There was a statistically significant Group x Time interaction ($F(1,1) = 8.95, p = .004$, partial $\eta^2 = .103$) with the aggressive group experiencing more negative emotions over time while the non-aggressive group experienced fewer negative emotions after the game (See Figure 5). Interestingly the non-aggressive group reported more negative emotion before the game ($M=2.00, SD=.49$) than the aggressive group ($M=1.74, SD=.47$).

EH5: Patterns of game behavior were analyzed in a descriptive manner to attempt to distinguish aggressive and non-aggressive couples' dynamics of interaction as well as differences in interactions for distressed and non-distressed couples. The five patterns examined were: cooperation spirals, reciprocate, repair, forgive, and defection spirals.

Analysis of game behavior was conducted by examining each couple's pattern of play while looking specifically for the pre-determined patterns listed above (See Table 1). Each pattern was derived from Axelrod (1997) computer simulation work with the Prisoner's Dilemma game as well as Gottman and colleagues' (1999) work on couple dynamics. Patterns were defined as follows. A cooperation spiral pattern was counted when both players used a cooperative response over three trials. To have a better understanding of this pattern, if a couple continued to use cooperative responses after three trials, a new cooperation spiral was believed to begin. For example, if a couple engaged in mutual cooperation for six trials this was counted as two cooperation spirals. A reciprocate game pattern, also considered a tit-for-tat game pattern, was considered to

occur when a player mimics their partner's moves in the next round. For instance, if player 1 cooperates and player 2 defects on trial 1, for a reciprocate pattern to occur in the next trial player 1 would defect and player 2 would cooperate. In the above example, this would be counted as one reciprocate pattern and, if the pattern continued, each two trials would be counted as a discreet reciprocate pattern.

A repair game pattern was considered to occur if as a player used a cooperative response after a mutual defection (both partners used the defection response) occurred in the previous round. A forgive game pattern was defined as the use of cooperation by one player when their partner used a defection response in the previous trial. A repair pattern was not counted after a mutual defection as this was considered a repair response. A defection spiral pattern was considered to occur when both players used a defection response over three trials. If a couple continued to use defection responses after three trials, a new defection spiral was believed to begin. All patterns were examined for each couple and then tallied by group (e.g., aggressive or non-aggressive) for ease of interpretation.

Couples were first examined by aggressive versus non-aggressive groupings. Overall, both aggressive and non-aggressive couples used all five patterns or strategies in their games. However, patterns were used with differing frequency between the groups. In addition, couples in the aggressive group appeared to take more time (i.e., more trials) trying different strategies or patterns before becoming more consistent in their responding, while couples in the non-aggressive group, on average, were more consistent in their patterns from the beginning of the game.

Both aggressive and non-aggressive groups used cooperative spirals more than any other type of pattern, with non-aggressive couples using cooperation spirals more than aggressive couples (See Tables 8.1 and 8.2). In addition, both groups had the tendency to end their games more positively (used more cooperation responses). Couples who ended games negatively (one or both partners using a defection response) did not differ between groups. Repair and forgive patterns were used by both aggressive and non-aggressive couples, but each pattern was used more frequently by aggressive couples. Reciprocate patterns were used twice as often by aggressive couples than non-aggressive couples and may be a useful pattern in distinguishing the two groups. As anticipated, defection spirals were more readily used in aggressive couples than non-aggressive couples; however, not every aggressive couple engaged in defection spirals. The non-aggressive group included couples that also used defection spiral patterns. Differences between the couples appear to be in the quantity of spirals used in a given game. While the non-aggressive couples used some defection spirals scattered throughout the game, the aggressive couples engaged in prolonged spirals that could take up a majority of the game.

Couples were also analyzed on their level of distress using their score on the modified Dyadic Adjustment Scale. As stated earlier, this was a modified version and standardized cutoff scores were not established by previous literature to distinguish distressed and non-distressed groups. Therefore, quartiles were used to determine appropriate cutoff. Male and female participants varied in their level of distress, with females reporting more distress than males. Cutoff scores for distress were established at a score of 82 or below (i.e., the first quartile). Distress was determined by one or both

partners with a score at or below the current study's cutoff. For ease of interpretation, couples were divided into four groups: distressed and aggressive (DA; $n = 8$), distressed and non-aggressive (DNA; $n = 10$), non-distressed and aggressive (NDA; $n = 12$), and non-distressed and non-aggressive (NDNA; $n = 10$). Distressed and non-distressed groups as a whole engaged in similar rates of cooperation spirals with non-aggressive couples in both distressed and non-distressed groups having a higher frequency of cooperation spiral patterns (See Tables 9.1, 9.2, 9.3, & 9.4). The distressed/non-aggressive (DNA) group had the fewest repair patterns while the non-distressed/aggressive group (NDA) had the most repair patterns of the four groups. The fewest forgive patterns were found in the non-distressed/non-aggressive (NDNA) group while the most forgive patterns were found in the non-distressed/aggressive (NDA) group. Similar rates of the forgive pattern were found for both distressed groups.

Reciprocate patterns were found in all groups with the non-distressed/non-aggressive (NDNA) group having the fewest reciprocate patterns and the distressed/aggressive (DA) group engaging in the most reciprocate patterns. In terms of defection spirals, only couples in the distressed/non-aggressive (DNA) group did not engage in any defection spirals. Of the couples that did engage in defection spirals, the non-distressed/non-aggressive (NDNA) group was found to have the fewest defection spirals while the non-distressed/aggressive (NDA) group was found to have the most defection spirals of the groups.

Discussion

There is a growing trend within the intimate partner violence literature to focus on aggression that occurs in young, dating relationships. However, while many of these

studies examine correlates and risk factors related to individuals in aggressive dating relationships, fewer examine how dating couples navigate conflict and the dynamics that are involved with managing conflict for both aggressive and non-aggressive couples. In this study, couple interaction processes were explored through a general systems theory perspective using data from self-report measures and a computerized couple task meant to present participants with conflict while examining how aggressive and non-aggressive couples approach conflict strategies. More specifically, the Prisoner's Dilemma game was used as a tool to elicit conflict management strategies tapping into the developmental context (i.e., autonomy versus intimacy) important to the study of dating couples.

Participant Characteristics

Couples ranged in age from 18 to 31 years of age, were in relatively long-term relationships with their partners (mean 24.71 months), and a majority of the sample considered their relationship status as dating (91%). There were no differences between groups based on demographics. The total sample endorsed a high level of psychological aggression (88.7%), sexual coercion (32.5%), and injury (7.5%); however, similar rates have been found in other studies (Straus, 2004). Within the aggressive group physical aggression was minor in nature as is typically found in college, dating couples (e.g., Straus, 2004). Participants in the aggressive group also had relatively equal percentages of perpetration and victimization, and significantly correlated, indicating that aggression within this group was more likely to be bidirectional in nature.

Questions directly related to initiation of various conflict tactics had mixed results. While participants were able to clearly articulate the initiator of negotiation-like behavior in their relationships, it appeared more difficult for participants to determine

who initiated more aggressive tactics. As difficulty determining an initiator was anticipated, a previous version of this questionnaire (Waldemayer, 2009) was modified to include a free-response section to clarify the selection of an “other” response. Many participants used this section as intended by clarifying their response with statements such as the behavior never happened in the relationship, that the initiator of the behavior was variable depending on situation, or, commonly, that both members of the couple engaged in this behavior. However, some participants declined to elaborate in the free-response section on the item for the use of physically aggressive tactics, where over a fourth of the sample did not provide additional information.

The lack of elaboration on the physically aggressive tactics item may have several reasons. It may be related to the construction of the measure, in that the free-response section may not be the best way to gather this information. It may also be that not answering the question in more detail is related to a social desirability, and writing about initiation may feel more invasive than answering questions on the CTS2. Lack of response may also be related to the apparently bidirectional nature of these aggressive relationships, where it is difficult to describe how physically aggressive episodes begin. Because so few participants were able to identify an initiator of physical aggression, the study was limited in evaluating the possible relationship between initiating in-game defection responses and initiation of physical aggression in the relationship; thus, the exploratory hypothesis was not explored.

The aggressive and non-aggressive groups responded differently to many of the primary measures. The groups differed in the expected direction on the Anger Management Scale: aggressive couples engaged in more escalating strategies than non-

aggressive couples during conflict. Although the remaining subscales were not used in the study's analyses, it should be noted that scores on the Negative Attribution scale also differed significantly between the two groups, with aggressive couples experiencing more negative cognitions about their partners' increasing reactivity during conflict. The remaining subscales (i.e., Self-Awareness and Calming Strategies subscales) did not differ significantly between groups.

Furthermore, groups differed on level of distress after the study as measured by the study's debriefing questionnaire. While most participants in each group experienced no to low levels of distress, there were mean differences on two items of the questionnaire: concern about partner being upset after the study and concern that conflict would occur after the study. For both items, individuals in the aggressive groups had significantly higher means (i.e., endorsed more distress) than those in the non-aggressive group. Although each participant with a score of 4 or more was individually questioned by a graduate research assistant and deemed safe to leave with his or her partner, results indicate that aggressive couples were more concerned at the end of the study regarding the emotions of their partner and possible later conflict.

Interestingly, these results differ from two recent studies of couple distress and laboratory tasks/discussions that found that aggressive couples did not report any significant distress when compared to other couples (Clements & Holtzworth-Munroe, 2009; Owen, Heyman, & Slep, 2006). One possible explanation for this difference is that the method for determining distress was different for each study. While previous studies utilized emotion checklists, created by the authors, the current study asked specific questions regarding fear/stress/concern for leaving with the partner or conflict occurring

after the study. The questions in the current study's questionnaire may have been more specific and tapped into specific concerns for the participants. Future studies studying processes with aggressive couples may want to ask more specific questions regarding distress after tasks/discussion sessions to better understand the role that distress plays in laboratory studies.

Meaning Attributed to the Game

During the exit interview conducted individually with all the participants at the end of the study, individuals were asked about the perceived purpose of the game, strategies that they used during the game, and the response they had towards their partners' strategy. Overall, couples appeared to understand the basic purpose of the Prisoner's Dilemma game and could relate the game to their relationships. Most participants voiced that the difference between game responses involved being cooperative or sharing with their partner (i.e., the cooperation response) and being competitive or selfish about one's own needs (i.e., defection response). In addition, many participants reported that the game was a "problem solving" task or something that the couple needed to work together on. Participants' responses indicate that they had a good understanding of the purpose of the game and that the Prisoner's Dilemma game response choices and how they function were well known.

However, couples appeared to approach and respond to the Prisoner's Dilemma game in very different ways depending on group membership (aggressive or non-aggressive). While the majority of the non-aggressive group voiced a consistent strategy that was focused on the advancement of the couple (e.g., couple total points or equal points for both partners), members of the aggressive group did not have one clear strategy

that they used to play the game. However, there appeared to be several themes in responding to the question of strategy. These included a more competitive strategy that becomes more cooperative over time, a reciprocal strategy (also known as tit-for-tat), and antagonistic responses. Interestingly, only in the aggressive group did individuals state that they did not have a particular strategy. This may, in some ways, mimic how individuals approach conflict with partners in aggressive and non-aggressive relationship. More specifically, reported strategies within the Prisoner's Dilemma game may be analogous to how some aggressive couples confront real life conflict with few skills or strategies to manage conflict.

In addition, the answers given to how members responded to their partner's strategies throughout the game varied greatly by group. Non-aggressive couples reported more positive emotions and saw that their partners were coordinating with them and many reported being "on the same page." While individuals in the non-aggressive group did note that their partners would sometimes use the defection response they attributed it to an accident or his or her partner's playfulness. On the other hand, couples in the aggressive group expressed more negative emotions such as upset and frustration when discussing their partners' strategies. Participants in this group reported about their partner's selfishness or unfairness and often stated that it led them to retaliate.

Differences in how participant's responded to their partners' strategies are enlightening, as they may also be related to their own attributions about their partner's behavior during conflict. While individuals in non-aggressive relationships appeared to see their partner's defection responses as accidental or joking, individuals in aggressive relationships attributed more negative connotations to defection responses and saw them

as more frustrating and upsetting. As discussed above, aggressive couples also endorsed more negative attributions about their partners during conflict on the AMS when compared to non-aggressive couples. This is consistent with studies on marital quality that find the tendency to partner-blame is frequently associated with negative views of the partner, distress within the relationship, lower satisfaction, and an increased desire to terminate relationships (e.g., Katz, Arias, Beach, Brody, & Roman, 1995). However, there is little research in this area as it relates to dating relationships (Rhatigan & Nathanson, 2010).

Game Characteristics

One goal of the study was to examine how the Prisoner's Dilemma game related to measures of aggression and escalation. This was first examined through analysis of the Revised Conflict Tactic Scales subscales and how these scores were related to participants' use of defection and cooperation throughout the game. The use of defection was significantly associated, in the expected direction, with reported perpetration of physical aggression, psychological aggression, and injury to the partner. Thus, the use of defection appears to be related to aggression against one's partner. Conceptually, this makes sense, as the term defection has been used as an equivalent to "aggression" or "nastiness" towards another in both the game theory literature as well as the sociology/psychology literature (e.g., Axelrod, 1984; Nesse, 1990; Rapoport & Chammah, 1965). In addition, defection, anger, and aggression have been significantly related in previous research (Kassinove, Roth, Owen, & Fuller, 2002; Marlowe, 1963; McClure et al., 2007; McCulloch, Gilbert, & Johnson, 1990; Parker & Herrera, 1996); thus, this finding adds to the literature.

The use of cooperation was also examined to explore how it was related to the Revised Conflict Tactic Scales. More specifically, the use of cooperation was correlated with the Negotiation scale of the CTS2; however, this relationship was not significant. While the cooperation response has been defined most often as related to “compromise,” “niceness,” or working with the other member of the dyad (e.g., Axelrod, 1984; Nesse, 1990; Pruitt & Kimmel, 1977), the Negotiation scale has been constructed to measure “settling a disagreement through discussion” (Straus, Hamby, Warren, 2003, p. 24). Although related in some ways conceptually, statistically the concepts do not appear to be significantly related.

Primary Findings

The primary purpose of the current study was to examine how the Prisoner’s Dilemma game captures couples’ behavioral processes during conflict and whether these processes are similar to what we find in marital research (e.g., Gottman, 1999). This was accomplished through both the primary hypotheses, as well as through some of the exploratory ones. Hypothesis 1a and 1b examined the concepts of defection spirals and cooperation spirals by defining the spirals as the mean number of defection or cooperation responses per round over the ten rounds. Hypothesis 1a stated that the aggressive group would engage in more defection spirals over time in the game when compared to the non-aggressive group. The Group x Time interaction predicted in Hypothesis 1a was not supported by the data. However, there were statistically significant main effects for both Group and Time. Aggressive couples when compared to non-aggressive couples engaged in more defection throughout the game. Interestingly, regarding the main effect for Time, defection declined over time for both groups.

Inversely, Hypothesis 1b stated that the non-aggressive group would use cooperation spirals more over time when compared to the aggressive group. As both Hypothesis 1a and 1b were complementary and essentially identical (Mean cooperation = 1 – Mean defection). Therefore, the Group x Time interaction predicted in Hypothesis 1b was also not supported by the data. Again, there were two significant main effects present, for Group and Time. Non-aggressive couples did engage in cooperation more than aggressive couples during the game. In addition, there was a difference in cooperation over time with both groups engaging in more cooperation spirals in later rounds of the game.

Findings for Hypothesis 1a and 1b are interesting because it appears that aggressive and non-aggressive groups were approaching the game differently in some ways, and in other ways they have similar patterns. Overall, aggressive couples tend to play the game more negatively (using more defection responses), while non-aggressive couples tend to approach the game more positively (using more cooperation responses). These results are similar to other research regarding how aggressive and non-aggressive couples approach tasks or discussions. Numerous studies using observational techniques have found that aggressive couples and/or distressed couples were more likely to be negative in this way while non-aggressive couples are more likely to be positive during interactions (e.g., Campbell, Simpson, Boldry, & Rubin, 2010; Gottman, 1994; Gottman & Notarius, 2002; Holtzworth-Munroe et al., 1997). That similar findings in the present study may suggest that these couples generally approach conflict in these ways.

In addition, both groups appeared to become more cooperative over time. Although this finding was somewhat counter to what was expected, it becomes more

understandable when examining the participants' developmental context. Literature in developmental psychology posits that conflict among younger, dating couples appears to have a predetermined de-escalation point that serves as a way to preserve their relationships (Shulman, 2003; Welsh & Shulman, 2008). This same explanation is often used to describe why aggression in younger couples is often more minor than in older couples and does not necessarily escalate to more serious forms of violence (Shulman, 2003; Shulman, Tuval-Mashiach, Levran, & Anbar, 2006). Aggressive couples may begin to recognize during the game that it is no longer beneficial for them to continue to use defection responses and begin to play more collaboratively in an attempt to preserve the relationship.

Hypothesis 2 explored the concept of repair for aggressive and non-aggressive couples. It was predicted that the non-aggressive group would engage in repair more over time than the aggressive group. A mean score per round for mutual defections was used as a covariate to statistically control for the effect of mutual defections in the two groups. No significant Group x Time interaction was found for Hypothesis 2, and thus the hypothesis was not supported by the data. Furthermore, no statistical main effects were present.

This result is surprising as there is a growing literature on repair with the Prisoner's Dilemma game (Axelrod, 1984; McCullough, 2000). In addition, repair is a consistent finding in marital research as well (e.g., Burman, Margolin, & John, 1993; Gottman, 1994, 1999; Tabares & Gottman, 2003). One possible explanation for this result may be that there simply are no differences between the aggressive and non-aggressive dating couples on the use of repair or how repair is used over the course of the game. A

more likely explanation for the finding may have to do with how the repair variable was defined. Repair was defined here as a cooperation response used by either partner after a mutual defection. Because the use of defection was more likely to occur with aggressive than with non-aggressive couples and the definition of repair is based on mutual defection, it is understandable that the result was not what was expected. Although mutual defections were used as a covariate to statistically control for this, it did not change the non-significant result.

A better process to examine empirically may be not the attempted repair, but rather what occurs after a repair attempt. For example, after the use of repair did the couple return to cooperative play or did the attempt result in continued use of defection by one or both partners? It is believed that more successful repair (repair attempts that lead to more cooperative play) would be found more often in non-aggressive than aggressive groups. Gottman and colleagues have recently examined successful repair with nonlinear mathematical modeling with promising results (Gottman et al., 2003). This represents a fruitful area for future research and for further analyses of the current data set.

In addition, transition probabilities were calculated for the three main variables, defection spirals, cooperation spirals, and repair, for each partner. Transition probabilities were used to replicate the statistical procedures in Speer (1972) and to bridge the current study with past research on the Prisoner's Dilemma game and couples. The transition probabilities also help in examining smaller patterns of responding by examining how a partner responds after a given trial. Within-between analyses of variances were conducted and used to explore differences within the groups of couples (i.e., gender of partner) and

between groups (aggressive vs. non-aggressive couples). No significant differences were found for any of the ANOVAs using transition probabilities.

Findings could be taken to indicate that there are no differences between groups when using these types of probabilities to find in-game patterns. Speer (1972) also did not find significant results using this procedure with clinic and community samples of married couples. However, another explanation may be the small sample size and lack of statistical power. This is especially true for both the defection spiral and repair terms where some couples were not included in the analyses, as they did not engage in mutual defection at any point in the game. This was also a significant difficulty for Speer's study (1972). Further study is needed in this area.

Exploratory Findings

Exploratory hypotheses were utilized to learn more about the Prisoner's Dilemma game within an IPV population, as well as to explore descriptively in-game behavioral patterns and how they may relate to known marital processes. It should be noted that with a small sample size and the number of statistical tests performed the likelihood of a Type I error increases. Therefore, results from the exploratory hypotheses should be interpreted with caution. In addition, many of the exploratory hypotheses were underpowered.

The first exploratory hypothesis predicted that cumulative scores on the Prisoner's Dilemma game for a participant would be negatively associated with individual's reported use of physical aggression. Results indicated that the two variables were moderately correlated in the expected direction. Thus, individuals who endorsed engaging in more physically aggressive tactics with the partner were likely to have lower individual scores on the Prisoner's Dilemma game. The second exploratory hypothesis

explored how use of defection was related to escalation strategies during conflict. It was hypothesized that individuals who used more defection would also endorse using more escalation strategies on the Anger Management Scale. Findings indicate that the use of defection was correlated with the use of escalation during conflicts.

Both of these exploratory analyses demonstrate a relationship between the use of defection responses in the Prisoner's Dilemma game and the reported use of aggressive action during conflict. Although these findings were exploratory in nature, they support the idea that aggressive and non-aggressive couples play the game in different ways. In addition, the findings further support the conceptualization of the defection response as a type of aggressive response in the game as has been theorized by previous researchers (Axelrod, 1984; McCulloch, Gilbert, & Johnson, 1990; Nesse, 1990; Rapoport & Chammah, 1965). It should be noted, that the third exploratory hypothesis was also intended to explore the relationship between the Prisoner's Dilemma game and initiation of aggressive behavior in dating couples; however, the hypothesis was not examined due to lack of response on an initiation item on the Initiation Questionnaire as stated earlier.

Exploratory Hypothesis 4 examined the possible effect of the Prisoner's Dilemma Game on negative affect for both aggressive and non-aggressive couples. It was hypothesized that aggressive couples would report more negative emotions after the Prisoner's Dilemma game than non-aggressive couples. Thus, a Group x Time interaction effect was predicted for the PANAS-X, and this interaction term was found significant. Results indicated that the aggressive group experienced more negative emotions over time, while the non-aggressive group experienced fewer negative emotions after the game. Unexpectedly, the non-aggressive group reported more negative emotion before

the game than the aggressive group, indicating that the groups were not well equated on this variable. This finding also supports information gathered during the exit interview, where couples in the aggressive group were more likely to discuss frustration and upset in response to their partners' use of strategy in the game, while couples in the non-aggressive group were more pleased with the partners' strategies.

In-game patterns were also examined descriptively as an exploratory hypothesis. The reason for this was two fold. In-game behavior in the Prisoner's Dilemma game is often discussed theoretically or studied through computerized simulations, and less often explored in laboratory settings. Recently, researchers have argued that the future of the Prisoner's Dilemma game and especially its use in studying aggression should focus on patterns of in-game behavior (Tedeschi & Quigley, 1996). In addition, game patterns were also described because couple interactions in the Prisoner's Dilemma game have been rarely studied in the past, and not at all for young, dating couples.

Couples were first examined by aggressive versus non-aggressive groupings. Overall, both aggressive and non-aggressive couples used all five patterns or strategies (cooperation spiral, repair, forgive, reciprocate, and defection spiral) in the game. Both groups engaged in cooperative spirals more than any other type of pattern. However, similar to findings for the primary hypotheses, non-aggressive couples used cooperation spirals more than aggressive couples, and both groups had the tendency to end their games more positively (using more cooperation responses) than they began them.

Repair and forgive patterns were used more frequently by aggressive couples. This unexpected finding, may be related to a definitional issue, as both patterns are defined by use of previous defection responses. Many non-aggressive couples played an

all-cooperative game with no (or very few) defection responses. With no defection responses there was also no need for repair or forgive patterns. However, with the number of defections high for couples in the aggressive group, there was ample opportunity for repair and forgive behavior in their games. Surprisingly, most aggressive couples used these behaviors quite often. This may indicate a pattern where conflict is high, but that where there is a built in self-regulated system. Viewed from a general systems perspective this may be evidence of a negative feedback loop for aggressive couples where escalation is dampened by the use of periodic cooperation moves as a regulating mechanism (von Bertalanffy, 1968). In a broader context of mathematical steady states, Gottman and colleagues have explored the use of positivity during negative interactions that push the couple into a more positive state, and this is what, they term repair (Gottman et al., 2003).

Similar to results in the primary hypotheses, defection spirals were more readily used in aggressive couples than non-aggressive couples; however, not every aggressive couple engaged in defection spirals. Differences between the couples appear to be in the quantity of spirals used in a given game. While the non-aggressive couples used some defection spirals scattered throughout the game, the aggressive couples engaged in prolonged spirals that could take up the majority of the game. This may indicate a difficulty for some aggressive couples to leave these kinds of patterns, and, in fact, may indicate an escalation process that has no exit. Gottman and his colleagues have studied the absence of this sort of exit in conflict for some marital couples (Gottman, 1994). The inability to de-escalate conflict (i.e., having no exit strategy) is often seen in aggressive

couples and has also been found to be a predictor of divorce (Burman, Margolin, & John, 1993; Cordova, Jacobson, Gottman, & Rushe, 1993; Gottman, 1994).

Reciprocate patterns (also known as the tit-for-tat pattern in Prisoner's Dilemma game literature) were used twice as often by aggressive couples than non-aggressive couples. In addition, the back and forth use of cooperation and defection responses continued for longer periods during the game for aggressive couples compared to non-aggressive ones. This finding may resemble the mutual or bidirectional aggression that was reported in a majority of couples in the aggressive group. This pattern may be useful as distinguishing aggressive and non-aggressive dating couples in future studies.

Couples were also analyzed on their level of couple distress using their score on the Dyadic Adjustment Scale. Because a modified version of the Dyadic Adjustment Scale was used in the current study with a cutoff created specifically for this study, these groupings should be analyzed with caution. Couples were divided into four groups: distressed and aggressive (DA), distressed and non-aggressive (DNA), non-distressed and aggressive (NDA), and non-distressed and non-aggressive (NDNA). The use of cooperation spirals appeared to be explained better by use of aggression, as non-aggressive couples in both the distressed and non-distressed groups had a higher frequency of the cooperation spiral pattern. There was a similar finding with defection spirals, where aggressive couples engaged in more defection spirals regardless of distress.

The non-distressed/aggressive group engaged in repair and forgive patterns more often than any other group. The distressed/non-aggressive (DNA) group had the fewest repair patterns, while the fewest forgive patterns were found in the non-distressed/non-aggressive (NDNA) group. As stated previously, these findings lend support to the

importance that repair and forgive patterns have in keeping escalation processes regulated and in check within the couple system. In addition, reciprocate patterns were found more often in the distressed/aggressive (DA) group while the non-distressed/non-aggressive (NDNA) group had the fewest reciprocate patterns.

Limitations

Due to the limited previous research in this area, it was difficult to predict couples' use of game responses and in-game patterns of behavior. Consequently, this study was largely exploratory in nature and there is need for subsequent studies to understand more fully the relational processes of dating couples and their use of the Prisoner's Dilemma game.

As is common in exploratory research, the sample size used in the current study was limited. Although the number of couples in each group provided adequate power for the primary analyses, some exploratory analyses were underpowered. In addition, with a small sample size and the number of statistical tests performed, the likelihood of a Type I error occurring increased. Many of these limitations represent a lack of generalizability of the results beyond the specific conditions of the study. While it is limited in scope, the results do suggest specific future research to examine the generalizability of these data.

Another possible limitation of the current study was how group membership was determined. The Revised Conflict Tactic Scales was used to determine aggressiveness; however, partner agreement was not necessary for the couple to be considered in the aggressive group. Although some researchers believe that aggression should be determined at the couple level (Perry & Fromuth, 2005), only counting couples as aggressive if they were in full agreement on level and frequency would not only have

limited the size of the sample but missed the nuances of how the aggressive partners might approach (i.e., with under-reporting and/or over-reporting) measures used to study aggressive relationships. However, lack of agreement may have led to a less purely aggressive group. Additionally, the modified Dyadic Adjustment Scale determined group membership (in the distressed vs. non-distressed subgroups) when at least one partner scored in the distressed range and many couples disagreed on level of distress. A cutoff score was also created specifically for this study and may not have accurately distinguished distressed and non-distressed couples. Therefore, more distinct groups may have provided clearer group difference in game play and strategies in future work.

The understanding of initiation of physical aggression in this sample was hindered by the construction of the initiation questionnaire. Although a free-response section was intended to elicit more qualitative information from participants, it also gave participants the opportunity not to provide any information regarding initiation. The lack of response from some aggressive couples especially speaks to the complexity and possible social pressure that comes with discussing this topic. Alternate means of examining initiation such as through interviewing participants is costly, but has been promising in recent research with adolescent dating partners (Sullivan et al., 2010).

Definitional issues, especially with regard to the patterns of repair, limited the study's ability to explore these concepts as they occurred in these couples. It may be that repair and forgive patterns are too complex to be captured with in-game patterns of play. However, it is more likely that better construction of definitions, such as looking at successful repair and not just repair attempts, may capture this behavior better. In

addition, examining longer sequences of game interaction may lead to a better understanding of this process.

Implications and Future Directions

One goal of this study was to examine how the Prisoner's Dilemma game (and the different responses available to players) related to variables of aggression and escalation behavior during conflict. Results from the current study demonstrate that there is a relationship between the use of a defection response and the use of aggression against one's partner as assessed by conventional self-report. More specifically, the use of defection significantly correlated with many types of reported perpetrated aggression, including physical aggression, psychological aggression, and causing injury to one's partner. In addition, the use of defection was also positively related to reported escalation strategies. These results suggest that the theoretical definition for defection as being related to aggression has some merit in a population of dating couples. Additionally, this adds to the limited previous literature on the Prisoner's Dilemma game and its relationship with aggression.

Another goal of the study was to explore how couples participating in the study understood the Prisoner's Dilemma game. Overall, the majority of participants could explain the purpose of the study and identified the cooperative and defection responses as either helpful in having a high total score or not. More interestingly, participants were often able to frame the game within a relational and developmental context, referring to how each response could help the couple or help just the player. While the cooperative response was seen as beneficial to the couple as a whole, the defection response was seen as a player being "selfish" or harming the couple or its total score.

Although players expressed similar understandings about the game, aggressive and non-aggressive couples approached playing the game very differently. While aggressive players reported more combative strategies and expressed more frustration towards each other, the non-aggressive couples reported working more collaboratively and feeling satisfied or happy with the partner's performance. These data suggest that the Prisoner's Dilemma game can be understood as a relationship task, and many of the themes discussed regarding the game are also applicable to the larger context of relationships and conflict.

The overarching purpose of this study was to explore how the Prisoner's Dilemma game captures dating couples' interactions while engaged in a competitive or conflictual task. To this end, results suggest that aggressive and non-aggressive couples do indeed play the Prisoner's Dilemma game differently. Overall, aggressive couples appear to play more negatively, while non-aggressive couples engage in more positive play. More complex game behaviors, such as repair and forgiveness, are less well understood and the results for these constructs are not what one would anticipate. However, as these are complex processes, the in-game definitions of these patterns may need to be more complex and based on observing longer sequences of game play. However, that aggressive couples engage in more repair and forgiveness patterns suggests something about these relationships and how they are maintained. When there are more defection responses (or aggression), there are also more opportunities to mend or at least attempt to mend or maintain, the relationship.

In addition, descriptive analysis of the reciprocate pattern indicate that aggressive and non-aggressive couples appear to use this strategy differently. Aggressive couples

use the reciprocate pattern more frequently and at greater length (for longer sequences of game play), while non-aggressive couples engage in fewer reciprocate patterns and these patterns occur over fewer trials of the game. This back and forth between partners may be an even more important strategy and utilized more often than defection spirals in aggressive couples.

Although many of these patterns are similar to processes found and studied in marital research, this is just the beginning for this type of research with dating couples. Further investigation into these patterns is needed to understand their functions and how they are related to conflict management in dating relationships. One way to explore more complex patterns of in-game behavior is through an Orbital Decomposition procedure (Guastello, Hyde, & Odak, 1998), which quantitatively identifies repeated patterns in categorical time series data and is based on nonlinear dynamical systems theory. The orbital decomposition procedure has been used to examine family communication dynamics, with promising results (Pincus, 2001). A more nuanced procedure such as this may be more able to capture the complex nature of patterns of aggressive and non-aggressive couples in the Prisoner's Dilemma game.

As this was an exploratory study, the findings also have implications for further areas of study in the fields of behavioral game theory, intimate partner violence, young adult developmental psychology, and general systems theory. Many future research directions have already been discussed above. However, future investigation into similarities between conflict discussion tasks and the Prisoner's Dilemma game are needed to be able to compare these strategies for dating couples as well as other types of

couples. Similarities between the tasks may point to the usefulness of using the Prisoner's Dilemma game to access strategies in a controlled environment.

Much research is still needed to understand how the Prisoner's Dilemma game can contribute to the study of intimate partner violence. Based on the positive outcomes in this study, continued research in this area seems promising, especially, developing specifications of game patterns and applying these patterns to conflict management in dating populations. As more is learned about how dating couples manage conflict, it will only lead to better theoretical models and more successful intervention strategies.

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Table 1.
Strategies Examined in the Current Study, with associated measures

Current Terminology	Axelrod's Terminology (Axelrod, 1986)	Measure used in Primary Analyses	Transition Probabilities/ Name (Speer, 1972)	Operational Definition used in Descriptive Analysis
Cooperation Spiral	"Don't rock the boat"	Mean use of cooperation per Round	$p(C/C1C2)$ "Trustworthiness"	Both players engage in mutual cooperations for three trials.
Reciprocate	"Be provocable" or "tit for tat"	N/A	N/A	A player defects after their partner defects thereby mimicking the moves of their partner.
Repair	"Accept the apology"	Mean use of repair per Round.	$p(C/D1D2)$ "Trust"	One or both players using a cooperative response after a mutual defection occurred in the previous trial.
Forgive	"Forget"	N/A	N/A	A player cooperates after their partner used a defection response.
Defection Spiral	"Accept a rut"	Mean use of defection per Round	$p(D/D1D2)$ "Distrust"	Both players engage in mutual defections for three trials.

Table 2.
Demographics of Total Sample and by Group

	Total Sample	Non-aggressive	Aggressive
N (%)	80	40 (50)	40 (50)
Age [Mean (SD)]	20.38 (3.27)	20.40 (3.23)	20.35 (3.35)
Relationship Length [Mean (SD)]	24.71 (17.33)	26.31 (21.49)	23.10 (11.91)
Relationship Status (%)			
Dating	72 (91.1)	36 (45.6)	36 (46.8)
Engaged	4 (5.1)	2 (2.5)	2 (2.5)
Other	3 (3.8)	2 (2.5)	1 (1.3)
Ethnicity (%)			
African American	0	0	0
American Indian/Native American	1 (1.3)	0	1 (1.3)
Asian American	1 (1.3)	0	1 (1.3)
Caucasian/Euro-American	70 (88.6)	37 (46.8)	33 (41.8)
Hispanic/Latino American	3 (3.8)	1 (1.3)	2 (2.5)
Other	4 (5.1)	2 (2.5)	2 (2.5)
Class Status (%)			
Freshman	41 (51.2)	21 (26.3)	20 (25.0)
Sophomore	26 (32.5)	14 (17.5)	12 (15.0)
Junior	2 (2.5)	2 (2.5)	0
Senior	2 (2.5)	0	2 (2.5)
Post B.A./B.S	2 (2.5)	1 (1.3)	1 (1.3)
Other	7 (8.8)	2 (2.5)	5 (6.3)

Table 3.
Descriptive Statistics for the Current Sample

Measure	Minimum	Maximum	Mean	<i>SD</i>
Anger Management Scale				
Escalation Subscale	21	49	33.79	5.62
Negative Attribution Subscale	7	16	9.41	2.67
Self-awareness Subscale	11	24	18.83	2.92
Calming Strategies Subscale	8	32	19.46	4.13
Dyadic Adjustment Scale Total Score	51	107	88.11	8.52
PANAS-X				
Pre Positive Affect Scale	1.00	3.10	1.87	.49
Post Positive Affect Scale	1.00	3.20	1.81	.50
Pre Negative Affect Scale	1.10	3.70	2.70	.43
Post Negative Affect Scale	1.00	3.40	2.46	.51
CTS-2 Physical Assault Scale (Perpetration)	0	105	3.83	12.80
CTS-2 Physical Assault Scale (Victimization)	0	70	3.15	9.28

Table 4.1
Aggressive Participants' Reporting of Aggression (*n* =40)

Scale	<i>n</i> (%)	Male (%)	Female (%)
Physical Assault			
By Self	25 (62.5)	9 (20)	16 (80)
By Partner	25 (62.5)	13 (65)	12 (60)
Psychological Aggression			
By Self	40 (100)	18 (90)	19 (95)
By Partner	37 (92.5)	18 (90)	19 (95)
Sexual Coercion			
By Self	16 (40)	11 (55)	5 (25)
By Partner	14 (35)	5 (25)	4 (20)
Injury Scale			
By Self	6 (12.8)	3 (15)	3 (15)
By Partner	6 (23.8)	2 (10)	4 (20)

Table 4.2
Aggressive Participants' Responses to Physical Assault scale by severity

Scale	<i>n</i> (%)	Male (%)	Female (%)
Physical Assault			
Minor	25 (62.5)	9 (45)	16 (80)
Severe	9 (22.5)	4 (20)	5 (25)
Partner's Use of Physical Assault			
Minor	25 (62.5)	13 (65)	12 (60)
Severe	12 (30)	8 (40)	4 (20)

Table 5.
Type of Initiation of Conflict Tactics by Group

	Aggressive Group (%)	Non-aggressive Group (%)
<u>Negotiation</u>		
You	24 (60)	18 (45)
Partner	16 (40)	14 (35)
Other	0	8 (20)
<u>Verbal Aggression</u>		
You	14 (35)	6 (15)
Partner	12 (30)	2 (5)
Other	14 (35)	32 (80)
<u>Psychological Aggression</u>		
You	7 (17.5)	1 (2.5)
Partner	11 (27.5)	3 (7.5)
Other	21 (52.5)	36 (90)
<u>Physical Aggression</u>		
You	5 (12.5)	0
Partner	6 (15)	0
Other	28 (70)	40 (100)

Table 6.
Debriefing questionnaire by group

	Aggressive Group (%)	Non-aggressive Group (%)
<hr/>		
How distressed do you feel?		
Not Distressed (Score 3 or lower)	36 (90)	39 (97.5)
Distressed (Score 4 or higher)	4 (10)	1 (2.5)
Mean Score (SD)	1.03 (1.64)	.55 (1.08)
How concerned are you about leaving with your partner?		
Not Distressed (Score 3 or lower)	37 (92.5)	39 (97.5)
Distressed (Score 4 or higher)	3 (7.5)	1 (2.5)
Mean Score (SD)	.65 (1.63)	.13 (.65)
How concerned do you feel about your partner being upset after you leave?		
Not Distressed (Score 3 or lower)	35 (87.5)	39 (97.5)
Distressed (Score 4 or higher)	5 (12.5)	1 (2.5)
Mean Score (SD)	1.00 (2.08)	.23 (.97)
How stressed do you feel right now?		
Not Distressed (Score 3 or lower)	35 (87.5)	38 (95)
Distressed (Score 4 or higher)	5 (12.5)	2 (5)
Mean Score (SD)	1.10 (1.79)	.55 (1.11)
How likely do you think it is that you and your partner will have conflict when you leave today?		
Not Distressed (Score 3 or lower)	37 (92.5)	40 (100)
Distressed (Score 4 or higher)	3 (7.5)	0
Mean Score (SD)	.75 (1.39)	.08 (.27)

Table 7.1
Mean Transition Probabilities for Defection by Gender and Group

	Aggressive Group	Non-aggressive Group
Female		
N (%)	16 (80)	12 (60)
Mean (SD)	.55 (.30)	.42 (.29)
Male		
N (%)	16 (80)	12 (60)
Mean (SD)	.53 (.31)	.67 (.29)

Table 7.2
Mean Transition Probabilities for Cooperation by Gender and Group

	Aggressive Group	Non-aggressive Group
Female		
N (%)	20 (100)	20 (100)
Mean (SD)	.81 (.28)	.88 (.21)
Male		
N (%)	20 (100)	20 (100)
Mean (SD)	.85 (.14)	.91 (.18)

Table 7.3
Mean Transition Probabilities for Repair by Gender and Group

	Aggressive Group	Non-aggressive Group
Female		
N (%)	16 (80)	12 (60)
Mean (SD)	.45 (.30)	.54 (.37)
Male		
N (%)	16 (80)	12 (60)
Mean (SD)	.47 (.31)	.29 (.30)

Table 8.1
 Descriptive Strategies for Aggressive Group by Couple ($n = 20$)

	Cooperation	Repair	Forgive	Reciprocate	Defection
	23	0	14	0	0
	1	12	12	1	16
	0	18	7	23	0
	20	6	6	6	0
	32	0	3	0	0
	17	7	7	3	0
	6	12	13	10	1
	19	5	7	7	0
	24	4	3	4	1
	0	10	8	4	21
	24	1	9	1	0
	22	2	7	6	0
	32	0	2	0	0
	10	10	13	10	0
	5	11	17	10	1
	11	5	18	5	1
	33	0	0	0	0
	2	6	8	0	18
	20	3	10	5	0
	12	8	15	5	0
Mean (SD)	15.65 (10.97)	6.00(5.02)	8.95(5.01)	5.00 (5.47)	3.11 (6.84)

Table 8.2
Descriptive Strategies for Non-aggressive Group by Couple ($n=20$)

	Cooperation	Repair	Forgive	Reciprocate	Defection
	24	6	2	3	1
	30	0	6	0	0
	16	7	3	3	8
	28	0	6	0	0
	8	6	17	8	0
	25	2	3	4	0
	30	0	3	1	0
	32	0	2	0	0
	20	3	2	2	5
	26	3	4	1	0
	1	12	20	9	0
	33	0	0	0	0
	30	0	5	0	0
	0	36	7	6	0
	32	0	1	1	0
	26	2	5	1	2
	26	1	2	5	0
	25	0	7	1	0
	18	3	5	12	0
	33	0	0	0	0
Mean(SD)	23.15 (9.98)	4.05(8.17)	5.00(5.09)	2.85 (3.48)	.80 (2.07)

Table 9.1
Descriptive Strategies for Distressed/Non-aggressive Group (DNA) by Couple ($n=10$)

	Cooperation	Repair	Forgive	Reciprocate	Defection
	30	0	6	0	0
	28	0	6	0	0
	8	6	17	8	0
	25	2	3	4	0
	32	0	2	0	0
	26	3	4	1	0
	1	12	20	9	0
	26	1	2	5	0
	18	3	5	12	0
	33	0	0	0	0
Mean(SD)	22.70 (10.59)	2.70(3.80)	6.50(6.64)	3.90 (4.46)	0

Table 9.2
Descriptive Strategies for Distressed/Aggressive Group (DA) by Couple ($n=8$)

	Cooperation	Repair	Forgive	Reciprocate	Defection
	0	18	7	23	0
	20	6	6	6	0
	32	0	3	0	0
	19	5	7	7	0
	0	10	8	4	21
	24	1	9	1	0
	32	0	2	0	0
	10	10	13	10	0
Mean(SD)	17.13 (12.76)	6.25(6.25)	6.88(3.44)	6.38 (7.61)	3.00 (7.94)

Table 9.3
Descriptive Strategies for Non-distressed/Non-aggressive Group (NDNA) by Couple ($n=10$)

	Cooperation	Repair	Forgive	Reciprocate	Defection
	24	6	2	3	1
	16	7	3	3	8
	30	0	3	1	0
	20	3	2	2	5
	33	0	0	0	0
	30	0	5	0	0
	0	36	7	6	0
	32	0	1	1	0
	26	2	5	1	2
	25	0	7	1	0
Mean(SD)	23.60(9.87)	5.40 (11.07)	3.50(2.41)	1.80(1.81)	1.60(2.76)

Table 9.4
 Descriptive Strategies for Non-distressed/Aggressive Group (NDA) by Couple ($n = 12$)

	Cooperation	Repair	Forgive	Reciprocate	Defection
	23	0	14	0	0
	1	12	12	1	16
	17	7	7	3	0
	6	12	13	10	1
	24	4	3	4	1
	22	2	7	6	0
	5	11	17	10	1
	11	5	18	5	1
	33	0	0	0	0
	2	6	8	0	18
	20	3	10	5	0
	12	8	15	5	0
Mean (SD)	14.67 (10.08)	5.83(4.30)	10.33(5.53)	4.08 (3.53)	3.45 (6.73)

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Figure 1. Example of a Prisoner's Dilemma game payoff matrix

Figure 2. Hypothesis 1a: The Mean Use of Defection over the 10 Rounds of the game

Figure 3. Hypothesis 1b: The Mean Use of Cooperation over the 10 Rounds of the game

Figure 4. Hypothesis 2: The Mean Use of Repair over the 10 Rounds of the game

Figure 5. Exploratory hypothesis 4: Pre and Post PANAS-X negative affect scores for aggressive and non-aggressive couples

Figure 1.

Example of Prisoner's Dilemma game payoff matrix

		Partner Move	
		Cooperation	Defection
Your Move	Cooperation	3	0
	Defection	5	1

Figure 2.

Hypothesis 1a: The Mean Use of Defection over the 10 Rounds of the game

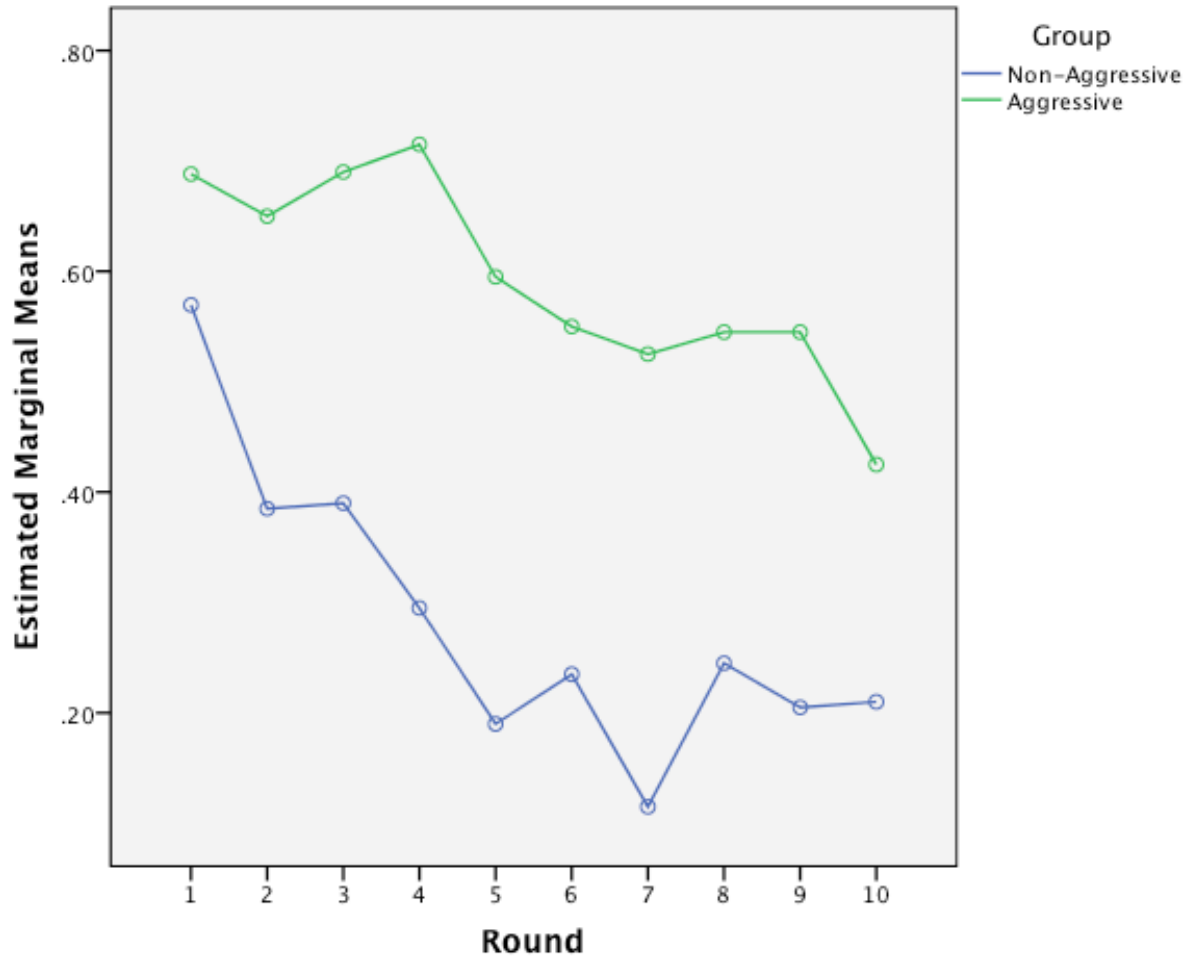


Figure 3.

Hypothesis 1b: The Mean Use of Cooperation over the 10 Rounds of the game

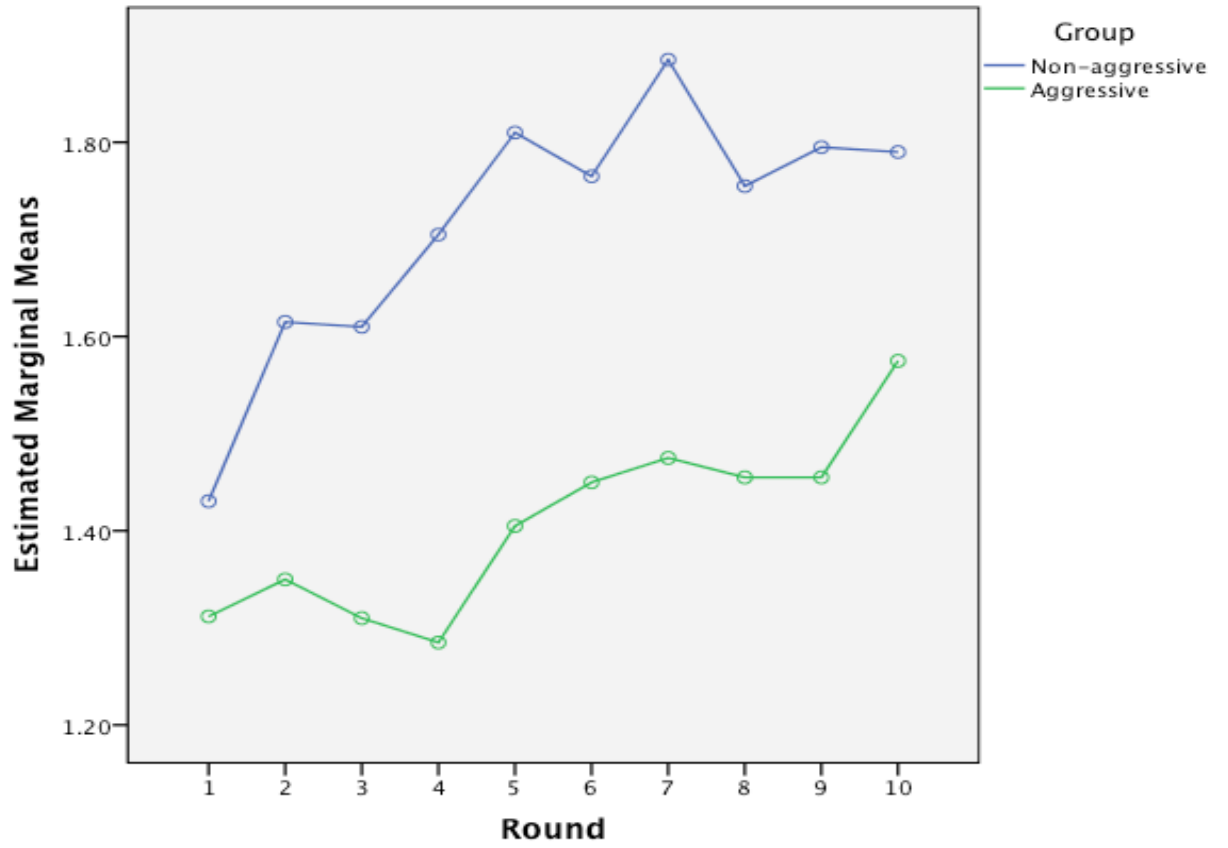


Figure 4.

Hypothesis 2: The Mean Use of Repair over the 10 Rounds of the game

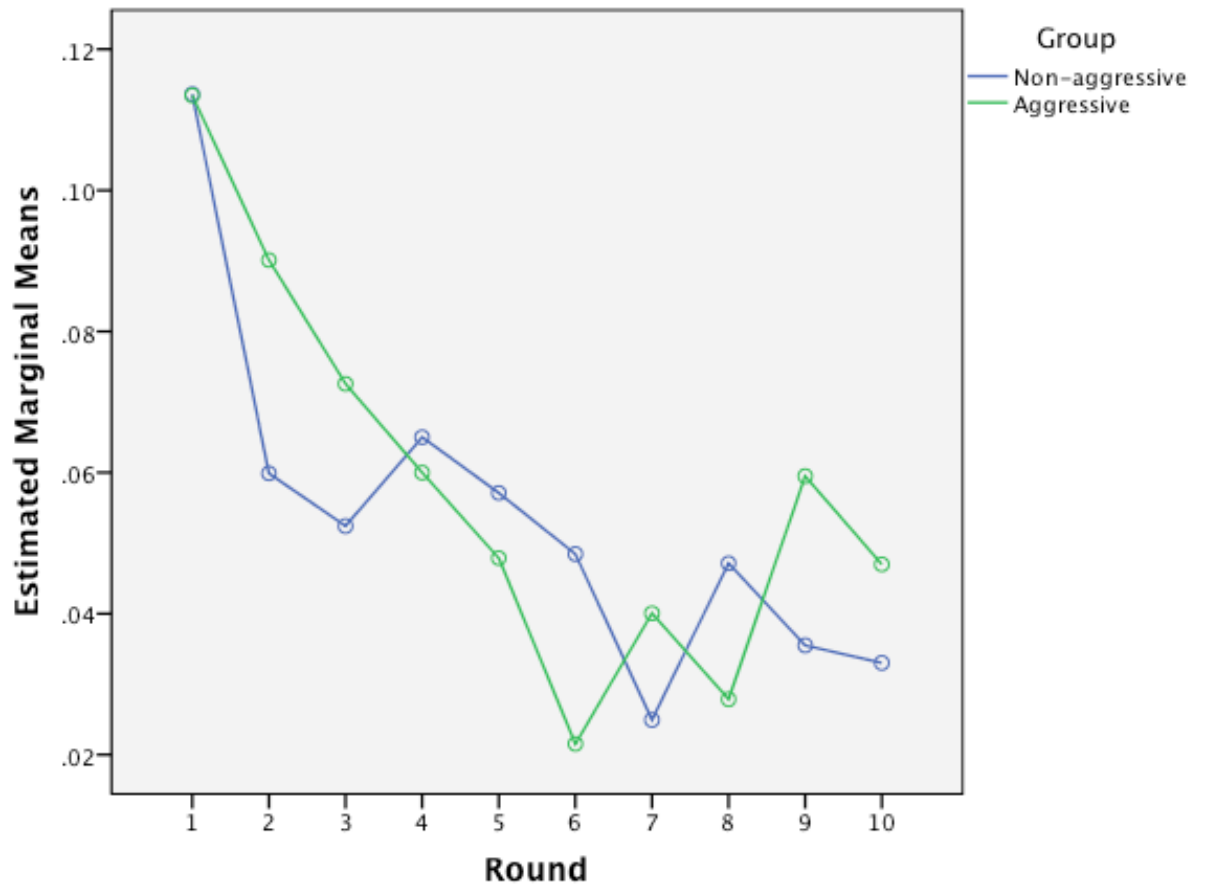
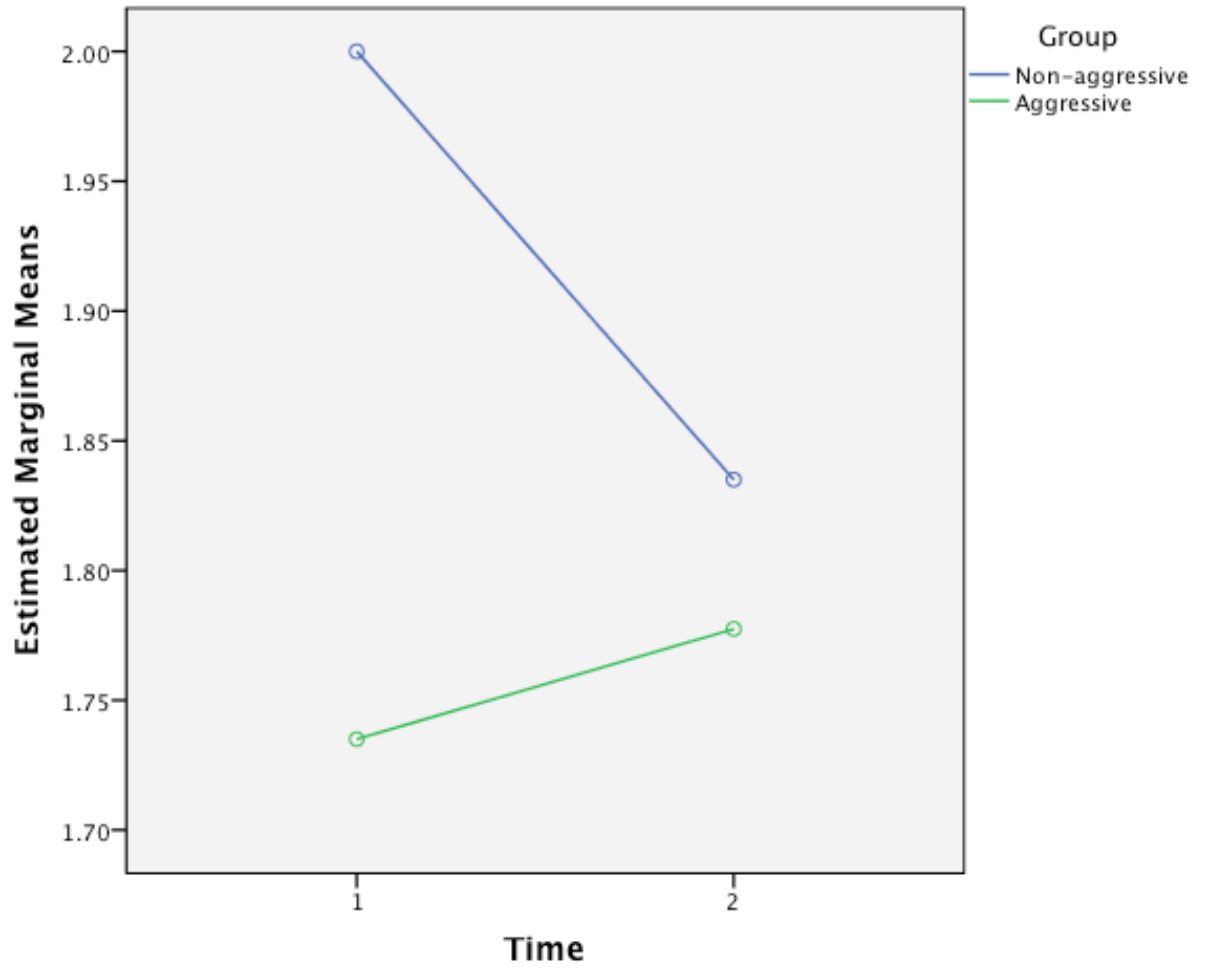


Figure 5.

Exploratory hypothesis 4: Pre and Post PANAS-X negative affect scores for aggressive and non-aggressive couples



Appendices

Appendix A. Screening day packet

Appendix B. Demographic questionnaire

Appendix C. Modified Dyadic Adjustment Scale

Appendix D. Anger Management Scales

Appendix E. Initiation of Aggression questionnaire

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Appendix G. Payoff matrices used in the Prisoner's Dilemma game

Appendix H. Script used during data collection

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Appendix J. Debriefing questionnaire

Appendix K. Debriefing form

Study on Dating Relationships

These questions are a screen for a much bigger study worth up to 4 credits and an opportunity to be in a drawing for a \$25 gift certificate. Please fill out the packet if you are interested. If you meet the requirements of the study we will contact you to schedule a day and time to participate. Your partner does not have to be a PSYX100 student (or a student at the U of M) to take part in the study.

**PLEASE TURN THE
PAGE**

Appendix A. Screening day packet (continued)

Study on Dating Relationships

Are you currently in a dating relationship of one month or more?

YES NO

If YES, would you be willing to participate in a study with **your partner**?

YES NO

If you answered **YES** to both questions, please provide your contact information:

Name:

Email:

Phone number:

PLEASE TURN THE PAGE TO ANSWER QUESTIONS

Appendix A. Screening day packet (continued)

RELATIONSHIP BEHAVIORS

No matter how well a couple gets along, there are times when they disagree, get annoyed with the other person, wants different things from each other, or just have spats or fights because they are in a bad mood, are tired, or for some other reason. Couples also have many different ways of trying to settle their differences.

Please circle how many times you did each of these things in the past year to your partner, and how many times your partner did them in the past year.

How often did this happen?

- 0 = This has never happened
- 1 = Once in the past year
- 2 = Twice in the past year
- 3 = 3-5 times in the past year
- 4 = 6-10 times in the past year
- 5 = 11-20 times in the past year
- 6 = More than 20 times in the past year

- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. I threw something at my partner that could hurt. | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. My partner did this to me. | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. I twisted my partner's arm or hair. | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. My partner did this to me. | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. I pushed or shoved my partner. | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. My partner did this to me. | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 7. I grabbed my partner. | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 8. My partner did this to me. | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 9. I slapped my partner. | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 10. My partner did this to me. | 0 | 1 | 2 | 3 | 4 | 5 | 6 |

___N ___V

From: Straus, M.A., Hamby, S., Boney-McCoy, S., & Sugarman, D. (1996). The Revised Conflict Tactics Scales (CTS2): Development and preliminary psychometric data. *Journal of Family Issues, 17*(3), 283-316.

Appendix B. Demographic questionnaire

Directions: Please answer ALL questions to the best of your ability.

1. Age: _____

2. Gender: _____

3. Sexual Orientation _____

4. What is your ethnicity?

- A. Caucasian/Euro-American
- B. African American
- C. Hispanic/ Latino American
- D. Asian American
- E. Native American
- F. Other

5. Year in College:

- A. Freshmen
- B. Sophomore
- C. Junior
- D. Senior
- E. Post B.A./B.S
- F. Other

6. Are you currently in a relationship that has lasted 1 month or more?

- Yes
- No

7. How long have you been with your partner?

8. Are you living with your partner?

- Yes
- No

9. What is the status of the relationship described:

- A. Dating
- B. Engaged
- C. Married
- D. Other

Appendix C. Modified Dyadic Adjustment Scale

Most people have disagreements in their relationships. Please indicate below the approximate extent of agreement of disagreement between you and your partner for each time on the following list.

	Always Agree	Almost Always Agree	Occasionally Disagree	Frequently Disagree	Almost Always Disagree	Always Disagree
1. Matters of Recreation	_____	_____	_____	_____	_____	_____
2. Religious Matters	_____	_____	_____	_____	_____	_____
3. Demonstrations of Affection	_____	_____	_____	_____	_____	_____
4. Friends	_____	_____	_____	_____	_____	_____
5. Sex Relations	_____	_____	_____	_____	_____	_____
6. Conventionality (correct or proper behavior)	_____	_____	_____	_____	_____	_____
7. Philosophy of life	_____	_____	_____	_____	_____	_____
8. Aims, goals, and things believed important	_____	_____	_____	_____	_____	_____
9. Amount of time spent together	_____	_____	_____	_____	_____	_____
10. Making major decisions	_____	_____	_____	_____	_____	_____
11. Leisure time, interests, and activities	_____	_____	_____	_____	_____	_____
12. Career decisions	_____	_____	_____	_____	_____	_____
	<u>All the time</u>	<u>Most of the time</u>	<u>More often than not</u>	<u>Occasionally</u>	<u>Rarely</u>	<u>Never</u>
13. How often do you discuss or have you considered terminating your relationship?	_____	_____	_____	_____	_____	_____
14. How often do you or your partner leave the house after a fight?	_____	_____	_____	_____	_____	_____
15. In general, how often do you think that things between you and your partner are going well?	_____	_____	_____	_____	_____	_____
16. Do you confide in your partner?	_____	_____	_____	_____	_____	_____

Appendix C. Modified Dyadic Adjustment Scale

	All the time	Most of the time	More often than not	Occasionally	Rarely	Never
17. How often do you and your partner quarrel?	_____	_____	_____	_____	_____	_____
18. How often do you and your partner get on each other's nerves?	_____	_____	_____	_____	_____	_____

	Every day	Almost every day	Occasionally	Rarely	Never
19. Do you kiss your partner?	_____	_____	_____	_____	_____

	All of them	Most of them	Some of them	Very few of them	None of them
20. Do you and your partner engage in outside interests together?	_____	_____	_____	_____	_____

How often would you say the following events occur between you and your partner?

	Never	Less than once a month	Once/twice a month	Once/twice a week	Once a day	More often
21. Have a stimulating exchange of ideas	_____	_____	_____	_____	_____	_____
22. Laugh together	_____	_____	_____	_____	_____	_____
23. Calmly discuss something	_____	_____	_____	_____	_____	_____
24. Work together on a project	_____	_____	_____	_____	_____	_____

These are things about which couples sometimes agree and sometimes disagree. Indicate if either item below caused differences of opinions or were problems in your relationship during the past few weeks. (Check yes or no)

	Yes	No
25. Being too tired for sex	_____	_____
26. Not showing love	_____	_____

Appendix C. Modified Dyadic Adjustment Scale

27. The dots on the following line represent different degrees of happiness in your relationship. The middle point, "happy," represents the degree of happiness of most relationships. Please circle the dot, which best describes the degree of happiness, all things considered, of your relationship.

_____
Extremely unhappy Fairly unhappy A little unhappy Happy Very happy Extremely happy
Perfect

28. Which of the following statements best describes how you feel about the future of your relationship?

- _____ I want desperately for my relationship to succeed, and would go to about any length to see that it does.
- _____ I want very much for my relationship to succeed, and will do all I can to see that it does.
- _____ I want very much for my relationship to succeed, and will do my fair share to see that it does.
- _____ It would be nice if my relationship succeeded, but I can't do much more than I am doing now to keep the relationship going.
- _____ My relationship can never succeed, and there is no more that I can do to keep the relationship going.

From: Spanier, G. (1976). Measuring dyadic adjustment: New scales for assessing the quality of marriage and similar dyads. *Journal of Marriage and Family*, 38, 15-28.

Appendix D. Anger Management Scale

	Strongly Disagree			Strongly Agree
1. When my partner picks a fight with me, I fight back.	1	2	3	4
2. When my partner won't give in, I get furious.	1	2	3	4
3. I often take what my partner says personally.	1	2	3	4
4. My partner believes I have a short fuse.	1	2	3	4
5. I feel my blood rising when I start to get mad at my partner.	1	2	3	4
6. Taking a break from my partner is a good way for me to calm down.	1	2	3	4
7. When my partner is around, I feel like a bomb waiting to explode.	1	2	3	4
8. I prefer to get out of the way when my partner hassles me.	1	2	3	4
9. It is my partner's fault when I get mad.	1	2	3	4
10. When my partner is nice to me I wonder what my partner wants.	1	2	3	4
11. No matter how angry I am. I am responsible for my behavior toward my partner.	1	2	3	4
12. When my partner provokes me, I have a right to fight back.	1	2	3	4
13. I can feel it in my body when I'm starting to get mad at my partner.	1	2	3	4
14. My partner does things just to annoy me.	1	2	3	4
15. There is nothing I can do to control my feelings when my partner hassles me.	1	2	3	4
16. My partner is rude to me unless I insist on respect.	1	2	3	4
17. My partner likes to make me mad.	1	2	3	4
18. When my partner annoys me, I blow up before I even know that I am getting angry.	1	2	3	4
19. I recognize when I am beginning to get angry at my partner.	1	2	3	4
20. I am able to remain calm and not get angry at my partner.	1	2	3	4
21. I can usually tell when I am about to lose my temper at my partner.	1	2	3	4
22. I take time out as a way to control my anger at my partner.	1	2	3	4
23. I take a deep breath and try to relax when I'm angry at my partner.	1	2	3	4

Appendix D. Anger Management Scale

24. I can set up a time-out period during an argument with my partner.	1	2	3	4
25. When I feel myself getting angry at my partner, I try to tell myself to calm down.	1	2	3	4
26. I often think of something pleasant to keep from thinking about my anger at my partner.	1	2	3	4
27. When I'm angry at my partner, I try to handle my feelings so no one gets hurt.	1	2	3	4
28. If I keep thinking about what made me mad, I get angrier.	1	2	3	4
29. When arguing with my partner, I often raise my voice.	1	2	3	4
30. I do something to take my mind off my partner when I'm angry.	1	2	3	4
31. When I'm mad at my partner, I say what I think without thinking of the consequences.	1	2	3	4
32. When my partner's voice is raised, I don't raise mine.	1	2	3	4
33. My partner thinks I am very patient.	1	2	3	4
34. I can calm myself down when I am upset with my partner.	1	2	3	4
35. When I feel myself starting to get angry at my partner, I try to stick to talking about the problem.	1	2	3	4
36. I am even-tempered with my partner.	1	2	3	4

From: Stith, S.M., & Hamby, S. L. (2002). The Anger Management Scale: Development and preliminary psychometric properties. *Violence and Victims, 17*(4), 383-402.

Appendix E. Initiation of Aggression questionnaire

Directions: Please read each question and choose the response that best describes what happens in your relationship *on average*. If neither answer is appropriate please choose *Other* and then explain in the space provided.

1. When you and your partner are presented with a conflict, who is more likely to be the first to want to talk things out?

- 1. You
- 2. Partner
- 3. Other If other, please explain-

2. When you and your partner are presented with a conflict, who is the first to curse and call the other partner names?

- 1. You
- 2. Partner
- 3. Other If other, please explain-

3. When you and your partner are in the middle of a conflict, who is the first to throw objects and slam doors?

- 1. You
- 2. Partner
- 3. Other If other, please explain-

Appendix E. Initiation of Aggression questionnaire

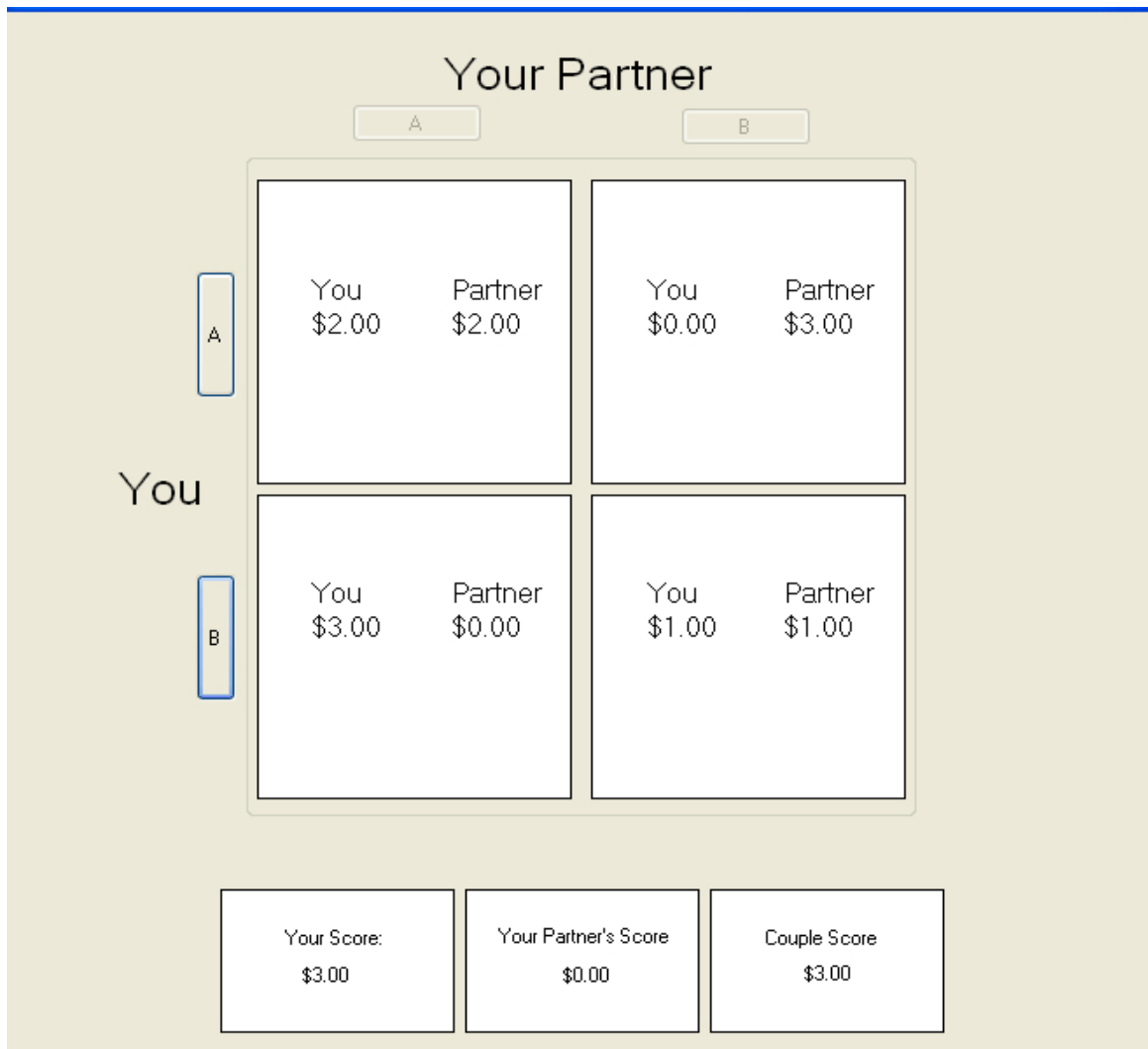
4. When you and your partner are in the middle of a conflict, who is the first to use physical force (slapping, hitting, choking, etc.)?

1. You

2. Partner

Other If other, please explain-

Appendix F. Prisoner's Dilemma game screenshot



Appendix G. Payoff matrices used in the Prisoner's Dilemma game

Round 1 and Round 6

2.00	0
3.00	1.00

Round 2 and Round 7

1.00	0
1.50	.50

Round 3 and Round 8

1.50	.50
2.00	1.00

Round 4 and Round 9

3.50	0
6.00	2.00

Appendix G. Payoff matrices used in the Prisoner's Dilemma game

Round 5 and Round 10

2.50	0
4.00	1.50

Appendix H. Script used during data collection

Script for Relationship Study

Materials that you will need for study:

Pens/Pencils
Consent Forms
Exit Interview Forms
Key to Laboratory
Map of Laboratory Rooms
Code numbers Sheet (There should only be one of these)
Debriefing Sheets
Referral Sheets
Debriefing Questionnaire

Reminder:

If any form of aggression occurs during the study the study should be stopped immediately and call security immediately. The phone number for security is [phone number]. After calling security please also call supervisors. This is not likely to happen, but it is important to know just in case. A graduate student will be there to help take care of this.

Setting Up

Please turn on all the computers that are indicated on the map. The map of computers is shown here at the end of the script. Once the computers have reached the log in screen, enter in screen name and password (Username: Password:).

*You will find the Prisoner's Dilemma Game on the desktop with the icon title:
"Waldemayer project"*

Open Internet Explorer and type in address:

You may want to bookmark this for future reference on the computers that you will be using.

Script for Consent Form

*Once participants have entered the room, please hand out consent forms and ask the participants to read the forms. Once all participants have entered their information and had a few minutes to read the consent form you should begin. While they are reading the consent form you can go around the room and fill out/stamp their PSYX100 credit sheets (not all participants will have this, as one member of the couple may be in PSYX100 and another may not). **Also, you will need to assign each individual a code number from the***

Appendix H. Script used during data collection (continued)

code sheet. The numbers need to be consecutive (e.g., 001 and 002) so we know that they are a couple. Please refer to the code sheet that the graduate student has.

“Hello and thanks for coming and participating in a study on dating relationships. My name is _____ and this is _____ and we are the research assistants for this study. (*Graduate students will need to introduce themselves as well*) I want to take a few minutes and go over the consent form that you just read.

“The purpose of this study is to examine strategies that you use with your partner when you disagree. If you chose to participate, you will be asked to enter the side rooms separately and fill out questionnaires on the computer, as well as to complete a task with your partner over the computer.

“There will be several times that the screen will prompt you to come and get a research assistant; please open your door when this happens and I will help you begin the next phase of the study.

“The study should take 1 to 1.5 hours to complete. For your participation you will receive 4 credits if you are a PSYX100 student. All participants may enter into raffle for a \$25 gift certificate at the beginning of the study.

“If at any time during the study you feel distressed, please inform one of us. At the end of the study we will also provide you with referral sheets for psychological services on campus and in the community. All information will be confidential and only the informed consent form will have your name on it. All informed consent forms will be placed in a locked filing cabinet and will not be connected to the information you fill out today. Your decision to take part in this study is voluntary and you may refuse to take part or withdraw from the study at any time. You will still receive research credits as well as the chance to enter into the drawing for the gift certificate.

“Do you have any questions? If you are willing to take part in the study please sign the form now and pass the last page with your signature up to the front.

Thank you. Let’s get started. I will now take you into one of the side rooms and provide you with instructions. As this will take a minute one of you may have to wait.

Collect the consent forms. Make sure you know the code numbers for the individuals in the couple as you will need this when you go into the rooms. Guide the participants into their rooms. Remember that males and females have specific rooms that they must go into and that the partners need to be rooms next to each other. If a same-sex couple is participating make sure that you make a note of what code numbers they are by putting a dash next to their code numbers.

Appendix H. Script used during data collection (continued)

Instructions and Script for Questionnaire

Once you enter the room, pull up the webpage with the questionnaire. You should also enter the code number for that participant (format is four digits...for example 9001).

Then read these instructions to the participant in the room:

“For the next several minutes you will each be filling out questionnaires on the computer. This first page will ask you for your email address to enter into the drawing. The drawing will take place after the study is complete, and you will be notified by email if you have won. You can choose to enter the drawing or not; it is up to you. After this page you will press continue and click the link to begin the questionnaire. After you have completed the questions on the page please click continue to move on to the next question.

“There will be a page that asks that you stop and come and get me. Please let me know when you have reached that page and I will provide instructions on the next part of the study. Also, please do not attempt to open any other web pages or programs while in this study. It could cause the questionnaire to lose data and you would need to begin the questionnaire again.

“Do you have any questions? If you have any questions at any time please let me know.

Repeat these instructions to the remaining partner.

Script for Program

*Once the participant (which ever participant is finished first) has come out and told you they have finished, go back into the room MINIMIZE the questionnaire; do **not close out the webpage**, as you will lose the participant’s data.*

When you have done this for both members of the couple, read these instructions to one of the partners:

Pull up the Prisoner’s Dilemma Game. Enter in their code number.

“Next, you and your partner will play this computer task with your partner. Let’s do some practice trials first to get you started? These practice trials will be played against the computer, but all other trials will be with your partner.

For the first practice trial:

“You can see a 2 by 2 grid, with numbers inside each of the four boxes. The two numbers inside each box refer to the amount of money that you [*Assistant: Point to amount*] and your partner [*Assistant: points to amount*] could earn on this trial. You and your partner each have two choices, A & B [*Assistant: Point*], and based on your two responses, you

Appendix H. Script used during data collection (continued)

will each receive the amount of imaginary money inside the corresponding box. This money is “tokens,” not real money.

“For example, if you click “A” and your partner clicks “B”, you would receive “X” cents (say actual cents) and your partner would receive “Y” cents. *[Assistant: Point]*

“A running tally of the amount of money you earn, your partner earns, and you earn as a couple are displayed at the bottom of the screen. *[Assistant: Point]*

“In addition, we will give you some feedback periodically on how well the two of you are doing in terms of gaining points.

“OK, why don’t you try a round against the computer for practice?”

“I will now explain the procedure to your partner. When s/he is ready to begin, we will start the game.”

[Assistant: Go to the room of the remaining partner and repeat the instructions above.]

When both partners finish the practice trials say to both partners while standing between the rooms:

“Again, please do not attempt to open any other web pages or programs while engaged with the task with your partner, as it could cause you both to start all over.

“Do either of you have any questions?”

If no, say

“Okay, then you may begin”

If yes, answer the question.

If the participant has questions about what the task is about or what it means gently say:

“Information will be provided regarding what the task was about at the end of the study.”

Once they have begun the game. Pull their doors closed so they will not be distracted.

Both partners will finish the game at the same time. Please tell one partner to wait and that you will be with them in a moment. Start script for questionnaire with the other partner.

Script for Questionnaire (Continued)

Close out of the Prisoner’s Dilemma program and open the webpage that was minimized with the questionnaire data.

Appendix H. Script used during data collection (continued)

“There are a few more things I’ll ask you to do. Please finish filling out the questionnaire; I have opened its window again for you. Remember to click continue to move on to the next question after you have responded to each one. As I mentioned earlier, please do not attempt to open any other web pages or programs, as this could cause the questionnaire to lose data and you would have to begin it again. At the end of the questionnaire you will reach a page that asks you to let me know that you are finished. Please let me know when you have reached this page. If you have any questions please let me know.

Go to the waiting partner and repeat above script. Let partner know that once he/she has finished if the individual cannot find you just to wait in their room with the door open, that you are with their partner and will provide further instruction as soon as you can.

Exit Interview Questions

Remember to bring with you a pen/pencil, and the exit interview sheet and the debriefing questionnaire when you re-enter the room.

When the participant comes out of the room, ask him/her to come back into the room with you, close out of the questionnaire webpage. Close or push the door to, as you will be asking the participant semi-personal information.

“Thanks for finishing the questionnaire. Now that you are finished with the study I am going to ask you a few questions...”

“For these next questions I am going to write down exactly what you say, so it may take a minute or two.”

*Read the instructions and questions on the worksheet and fill out the exit interview worksheet. **Remember** to put in the participant’s code number on the worksheet as well as the Debriefing Questionnaire.*

After you have finished with the exit interview please hand the participant the debriefing questionnaire for the participant to fill out and explain that a graduate student will be in shortly to conclude the study with him/her.

Assistant: Repeat the Exit Interview process with the remaining partner.

Graduate Student: Wait a few minutes and then enter the room remembering to bring the debriefing sheet and the referral sheet. You will need to check over the debriefing questionnaire and ask about distress and fear as well as conclude the study.

“Hi I’m _____. If you wouldn’t mind I would like to go over the debriefing questionnaire you just completed and I need to ask you a few questions before we end.

Appendix H. Script used during data collection (continued)

Look over the Debriefing Questionnaire. If there is a score of 4 or more please inquire about their feelings of distress as they pertain to the question.

I just want to check in with you regarding how you are feeling after participating in the study. These are questions we have to ask everyone. Are you feeling upset in any way after you have completed this study? Are you fearful in any way to be leaving with your partner?"

If the person states that they are distressed, or if they appear in any way to be distressed, or express fear of their partner your next step is to call a supervisor.

Ask the person to wait until someone can come to talk with them. If the person states that they do not want to wait, do not attempt to stop them, but let me know immediately as we may need to follow-up.

Conclusion:

“Okay, we are finished. Thanks for participating in the study. Here is information regarding the study and local referrals in the community if you are interested. These sheets are provided to everyone that participates. If you have any questions about the study please contact Kristen Waldemayer who is listed on the information sheet. Thanks again and have a great day.

Appendix I. Exit interview form

Exit Interview Questions

Please read instructions: "We're interested in finding out about your thoughts regarding the task you just went through. There are no right or wrong answers, we'd just like to hear from you about what you were thinking."

1. What did you think was going on during the task that you just did with your partner?
2. What do you think the task was about? What do you think was the purpose of this study?
3. Did you have any particular strategy or strategies you used?
4. What reactions did you have to your partner's approach to the game?
5. In general, what do you think was being studied?

Appendix K. Debriefing form

Debriefing Form

Title: College Dating Couples use of Conflict Management during a Prisoner's Dilemma

Task: An Exploratory Study

Thank you for participating in this research study. The current study examines strategies that individuals use when in conflict with their partners. Of particular interest in this study was how couples who engage in various levels of aggressive behavior would act when given a task to complete. It is believed that more aggressive couples will have different task behaviors than non-aggressive couples. It is also believed that the task will, in some ways, be similar to behaviors that happen during conflicts in participants' everyday life. Recognizing the complex nature of the variables that influence conflict behavior used in dating couples can help researchers and clinicians better understand the possible use of aggression in these relationships, to help couples improve their relationships, and to develop relevant intervention strategies.

If at any time you have questions about the current research or feel distressed about the questions asked here today please feel free to contact the primary researcher, Kristen Waldemayer at [phone number]. If you would like the results of this study they can be provided for you once the study is completed.

Thank you again for your participation!