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To the Graduate Council:

I am submitting herewith a thesis written by Sara Rachel Elkins entitled "Electronic Diary Assessment of the Temporal Association Between Angry Affect and Intimate Partner Violence." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Psychology.

Todd M. Moore, Major Professor

We have read this thesis and recommend its acceptance:

Deborah L. Rhatigan, James K. McNulty

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Intimate Partner Violence

A Thesis
Presented for the
Master of Arts
Degree
The University of Tennessee, Knoxville

Sara Rachel Elkins
December 2009

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Abstract

The proposed project examined the temporal association between three forms of angry affect and dating violence among a sample of college students using electronic daily diary assessment methodology. It was hypothesized that the odds of dating violence would be greater on days of angry affect relative to days of no angry affect. It was also hypothesized that relevant distal variables would moderate this association, although examination of the direction of such effects was exploratory in nature.

Participants were 184 men and women attending a large university in Tennessee. Participants completed a baseline survey packet assessing distal variables. They were also trained to answer daily surveys indicating whether angry affect (irritable, angry, and hostile) and dating violence occurred (verbal, physical and sexual) on the prior day and whether the angry affect immediately preceded seeing their partner. Surveys were completed daily for a period of two months.

Results indicated that younger age, shorter length of relationship, lower relationship satisfaction, greater psychopathology, greater past perpetration of IPV, and more favorable attitudes toward violence were associated with greater odds of IPV. In addition, findings revealed that an increase in proximal irritable affect was associated with greater odds of verbal and sexual aggression, while an increase in proximal angry affect was associated with greater odds of verbal and physical aggression. Most notably, our results demonstrated that the risk for violence increased exponentially as the amount of irritable or angry affect increased by each one-unit increment. This study also assessed the impact of a number of distal factors on the relationship between angry affect and IPV. Positive moderators included length of relationship, drug use, antisocial personality, borderline personality, and

perpetration of past physical and sexual violence. Negative moderators included age, alcohol use, PTSD symptomatology, and perpetration of past verbal violence.

These data are the first to provide evidence for the temporal relationship between angry affect and dating violence, as well as the role of distal variables on this relationship. These data have implications for the creation of relevant intervention programs targeting specific distal and proximal variables that increase risk for IPV in dating violence populations.

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Introduction

Overview of the Project

Partner violence by men and women results in overwhelming negative outcomes including physical injury, psychological problems, and homicide. Efforts to develop preventive and intervention strategies have focused on various background or distal variables (e.g., personality traits, prior exposure to violence, psychopathology) associated with an increased likelihood of partner violence perpetration. Only recently have researchers begun to examine proximal risk factors (i.e., substance use, negative affect) for partner violence, noting that these factors often interact with distal risk factors to increase the risk for partner violence. However, such studies have assessed proximal variables by measuring general behavior patterns. Because this type of methodology provides no direct evidence of the variables present in the moments leading to partner conflict and violence, it may prematurely suggest a temporal connection between proximal variables and partner violence. To address these limitations, it would be important to examine proximal variables in the minutes or hours preceding interactions among intimate partners to determine whether such variables are temporally linked to partner violence.

The present study is interested in one such critical proximal variable, angry affect, and its role in predicting partner violence perpetration. While several studies have suggested a relationship between angry affect and partner violence perpetration, there are no known studies assessing the temporal association between these variables. Recent advances in experience sampling technology fortunately allow for more precise assessments of proximal factors that lead to partner violence and allow researchers to obtain temporal information in the natural environment while minimizing retrospective recall bias.

Therefore, the overall goal of this research was to conduct a prospective, longitudinal study examining the temporal association between angry affect and partner violence in the context of college dating relationships. The specific aim of the project was to test the extent to which three forms of proximally-measured anger (i.e., irritable, hostile, angry) are temporally linked to the onset of verbal, physical, and sexual violence in these relationships. Undergraduate college students provide an important population for study because of the high rates of partner violence seen in this age range. Thus, college students may be considered an at-risk population whose dating relationships may benefit if effective preventative and intervention strategies can be implemented.

The following sections will summarize the available research examining the relationship between angry affect and partner violence, describe theoretical explanations for the relationship between anger and partner violence, discuss the methodological rationale for utilization of electronic diary assessments to assess temporal relationships, and conclude with a rationale and overview of the current study aiming to examine the role of anger arousal in the perpetration of partner violence.

Partner Violence

Intimate partner violence has been defined as “violence by current or former husbands, unmarried domestic partners, and other intimate partners” (Golding, 1999), and includes verbal, physical, and sexual forms. It is reported that between 33% and 37% of men have physically aggressed against their female partners (Sugarman & Hotaling, 1989; White & Koss, 1991) and about 35% of women have perpetrated violence against their male partners (White & Koss, 1991). In addition, recent data from the National Violence against Women Survey indicated that 4.5% of surveyed women had been raped and 20.4% had

experienced physical assault by a current or former partner at least once in their lifetime (Tjaden & Thoennes, 2000). Estimates indicating that the age group with the highest probability of partner violence victimization is 16-24 year olds emphasize the importance of addressing partner violence within this age group (Bureau of Justice Statistics, 2001). In fact, a recent study examining individuals in this age range reported that 29% of undergraduate students had physically assaulted a dating partner in the previous 12 months (Straus, 2004a).

Partner violence results in a multitude of serious consequences including physical injury, psychological and social problems, and homicide (see Hines & Malley-Morrison, 2001; Plichta, 2004; Schumacher, Kohn, Slep, & Heyman, 2001 for reviews). In a recent study examining the costs of partner violence in general, direct costs of medical and mental health care exceeded \$8.3 billion annually, which included \$461 million for stalking, \$460 million for rape, \$6.2 billion for physical assault, and \$1.2 billion in the value of lost lives (Max et al., 2004). In addition, victims of severe partner violence lose almost 8 million days of paid work (equivalent to more than 32,000 full-time jobs) and nearly 5.6 million days of household productivity annually (CDC, 2003).

In terms of physical health related consequences, women who have experienced partner violence tend to report higher rates of arthritis, migraines, chronic pain, and gastrointestinal disorders (Coker, Smith, Bethea, King, & McKeown, 2000), and in women who experience partner rape, higher rates of vaginal pain, anal bleeding, sexually transmitted diseases, and sterility (see Bennice & Resick, 2003 for review). In addition, while a recent meta-analysis reported that women and men demonstrate similar rates of physical aggression in their relationships, men are more likely to cause injury to their partners than are women (Archer, 2000). For example, several studies have shown that female victims of partner violence are more likely than male victims to require medical attention and to utilize mental

health and justice system services (Morse, 1995; Tjaden & Thoennes, 2000). Morse (1995) also demonstrated that while both men and women participated equally in minor physical violence, men were more likely than women to repeatedly assault their partner over the course of a year. Additionally, men are more likely to be the perpetrators of partner homicide (Daly & Wilson, 1988, 1999; Dobash & Dobash, 1979).

In addition to physical health consequences, victims of partner violence also experience adverse psychological and interpersonal consequences such as depression, anxiety, posttraumatic stress disorder, low self-esteem, substance abuse, and suicide or self-harm behaviors (Collins et al., 1997; Golding, 1999; Holtzworth-Munroe et al., 1997; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993; Ruback & Thompson, 2001). Additionally, Finkelhor and Yllo (1985) found that within their sample of marital rape victims, many women avoided intimacy and sex, feared repeated assault, and reported extreme difficulty trusting men in general, in some cases even decades later. Partner violence has also been associated with child abuse and emotional and behavioral problems in children (see O'Keefe, 1994 for review).

Theoretical Explanations for Partner Violence

Various theoretical models have been employed to explain the causes of partner violence. Partner violence perpetration has been explained in the context of factors specific to the individual, such as the acceptance of rape or physical violence (Finkelhor & Yllo, 1985), psychopathology (e.g., antisocial and aggressive traits; Murphy & O'Farrell, 1996), substance use (Bushman, 1997; Ito, Miller, & Pollock, 1996; Leonard, 1993; Moore & Stuart, 2005), and faulty social information processing in regard to partner behavior (Holtzworth-Munroe, 1991). Other theories suggest that partner violence is a learned response to stress

that is modeled through observation and experience (Capaldi & Clark, 1998; Dutton, 1988), and is mediated by one's cognitive perceptions, attributions, and expectations (Dutton, 1995). Various developmental theories emphasize the importance of early relationship experiences, noting that child maltreatment and poor parenting practices set the stage for violence in later intimate relationships (Foo & Margolin, 1995; Kosterman, Graham, Hawkins, Catalano, & Herrenkohl, 2001; Riggs & O'Leary, 1996). Other psychosocial theories of partner violence include frustration-aggression, social conflict, and exchange theories (see Dutton, 1995 for review). For example, Berkowitz (1989) described a reformulation of the original frustration-aggression hypothesis (Dollard, Doob, Miller, Mowrer & Sears, 1939), adding the mediating role of the arousal of negative affect on the relationship between frustration and fight-or-flight behavior. Social conflict theories assert that violence occurs when other means of achieving individual or group interests fail due to faulty conflict management, skills, or alternatives (see Feldman & Ridley, 1995 for review). In contrast, exchange theories postulate that violence occurs if the costs of being violent do not outweigh the rewards (Gelles, 1983). Other investigators have emphasized societal and historical conditions in theories of partner violence, such as resource and feminist theories. Resource theories suggest that violent individuals don't possess the necessary physical and psychological resources (e.g., economic variables, prestige, force, likeability), and therefore, resort to violence (Goode, 1971). Feminist explanations for the occurrence of partner violence emphasize men's need for dominance over women as well as the presence of societal norms that have historically sanctioned violence against women (Dobash & Dobash, 1979; Yllo, 1993).

Although such theories have been influential in the development of violence intervention programs, they have also been criticized for their focus on single-factor explanations of partner violence (Dutton, 2007; Feldman & Ridley, 1995) or for lack of

empirical support. In addition, current reviews suggest that interventions modeled after these theories have had little success in reducing violence recidivism. For example, Babcock, Green, and Robie (2003) conducted a meta-analysis of 22 batterer intervention studies which included samples of batterers as well as a comparison group (e.g., program dropouts, nonequivalent controls, and participants randomly assigned to no treatment). They found that the overall effect size (d) was .18 for the efficacy of batterer intervention programs (less than .20 equals a small effect size, based on the recommendations of Cohen, 1988). According to the authors, this finding suggested that women were only 5% less likely to be re-assaulted by a partner who participated in a court-ordered batterer intervention program than by a partner who was arrested but did not receive batterer intervention. This review clearly indicates the need to develop more effective batterer intervention programs, and particularly, interventions that address the individual needs of partner-violent men and women. In fact, some researchers have proposed theories related to various subtypes of men who perpetrate IPV with a different etiology or background variables for each subtype (Holtzworth-Munroe, Meehan, Herron, Rehman, & Stuart, 2000, 2003; Holtzworth-Munroe & Stuart, 1994). Women have been largely understudied in the literature on partner violence, so it is unknown whether there may also be subtypes or background variables that apply to partner violent women.

No single theory of partner violence can apply to all violent individuals, and researchers agree that the causes of partner violence are multifactorial (e.g., Dutton, 1995; Holtzworth-Monroe & Stuart, 1994; Leonard, 1993; O'Farrell, Fals-Stewart, Murphy, & Murphy, 2003). Thus, it may be that a more complete explanation requires examination of both intraindividual and interpersonal factors to better understand and prevent partner violence (e.g., O'Neil & Harway, 1999; Whitaker et al. 2006).

Of relevance to the current study, Leonard and colleagues proposed a multifactorial model that emphasizes the roles of distal and proximal factors as influences of partner violence. Leonard (1993) notes that the “key element of this heuristic model involves an understanding of the interactional context within which marital violence occurs” (p. 256-7). Distal influences are classified as relatively stable over time for both partners and provide the context in which relationship conflict may arise. A number of review papers have clearly demonstrated distal risk factors for partner violence such as age (being younger), various Axis I and II pathology (e.g., alcohol and drug abuse, borderline and antisocial personality disorder), relationship dissatisfaction, and attitudes supporting violence (see Holtzworth-Munroe et al., 1997; Schumacher et al., 1997, 2001 for reviews). Proximal risk factors, however, are episodic and time limited (e.g., anger, acute substance intoxication, problem-solving skills, acute stress, location, presence of third parties), and can have direct effects on the likelihood of violence during conflict. According to Leonard’s model, distal influences in combination with proximal factors produce partner violence when in the context of conflict situations. The model emphasizes the critical importance of the interaction between distal and proximal factors as well as the behavior of each partner in the culmination of partner violence (see also Leonard, 2001; Leonard & Senchak, 1996). Although studying all possible proximal factors would be ideal, the current study aimed to examine what I believe to be one of the most critical proximal factors, angry affect, in predicting partner violence, and to determine the extent to which distal factors, in conjunction with proximal anger, increase the odds of partner violence perpetration.

Defining the Construct of Anger

Anger is a complex construct that has historically been defined along a number of specific indices such as physiological arousal (e.g., Ax, 1953), subjective labeling of internal states (e.g., Bandura, 1973; Spielberger et al., 1983), and social constructivism (Averill, 1982). However, these separate definitions fail to capture the myriad of events that occur during the experience of anger, and more recent conceptualizations of anger define the construct as multidimensional, consisting of physiological (sympathetic nervous system arousal, hormone and neurotransmitter functioning), emotional (subjective awareness and labeling of angry feelings), cognitive (automatic thoughts, irrational beliefs, images), and behavioral (facial expressions, posture, tone of voice, muscle tension) aspects (Berkowitz, 1993; Deffenbacher, 1994; Eckhardt & Deffenbacher, 1995; Kassinove & Sukhodolsky, 1995).

Conceptualizations of anger have delineated two forms of anger, state anger, which is an episode of anger occurring during a distinct period of time, and trait anger, which has been conceptualized as a tendency to frequently experience anger in a variety of situations and has been conceptualized as an aspect of an individual's personality (e.g., Spielberger, Jacobs, Russell, & Crane, 1983; Spielberger, Krasner, & Solomon, 1988; Spielberger, Reheiser, & Sydeman, 1995). Studies suggest that individuals high in trait anger are more likely to experience more frequent and intense momentary anger across a wide variety of situations, have stronger tendencies to respond to provocation with physical and verbal hostility, and rely on fewer constructive coping skills (Deffenbacher, 1992; Spielberger, Krasner & Solomon, 1988; Spielberger and Sydeman, 1994).

Closely related to the concept of anger, historical research has defined the construct of *hostility* as primarily an attitudinal or cognitive construct that involves “a devaluation of the

worth and motives of others, an expectation that others are likely sources of wrongdoing, a relational view of being in opposition toward others, and a desire to inflict harm or see others harmed” (Smith, 1994, p. 26). However, more recent research on hostility has suggested that this construct includes angry emotional states and expressive behavior in addition to negative attitudes, cynical beliefs, and attributions (Barefoot, 1992; Barefoot & Lipkus, 1994).

Researchers have historically considered the constructs of anger and hostility as independent, although there is data to support that the constructs may be functionally related. For example, Suarez and Williams (1989) reported that participants high in trait hostility exhibited significantly higher blood pressure and heart rate when presented with an anger-arousing laboratory task than those with low rates of trait hostility. More recently, Fredrickson et al. (2000) reported that participants high in interview-reported hostility had elevated and longer-lasting blood pressure reactivity following lab based anger induction. In addition, several studies have utilized a combined angry/hostile affect category, thus incorporating the two affects in coding observational interactions (e.g., Faber & Burns, 1996; Sanders, Dadds, Johnston, & Cash, 1992). For example, Sanders et al., (1992) utilized an angry-hostile affect category that coded facial expression (“mocking, sneering, angry, or disgusted expression or demonstrative looking away”), voice characteristics (“cold, tense, impatient, tough, piercing, staccato, accusing, sarcastic, outraged, mad, or offensive, tone; screaming; or a scornful laugh”), and body posture (“clenched hands; abrupt cutting-off gestures; passive aggressive blocking-off of the other person; or tense or impatient movement of hands and feet”). Other researchers have discussed the relation of anger and hostility by utilizing the acronym “AHA! Syndrome” (Spielberger et al., 1985) to refer to the relationships between anger, hostility, and aggression. In this model, anger refers to an affective state that can range in intensity, while hostility is conceptualized as including both

angry emotions and a “complex set of attitudes that motivate aggressive behaviors directed toward destroying objects or injuring other people” (Spielberger, Jacobs, Russell, & Crane, 1983, p. 16). Still others have questioned the overlap between the cognitive components of anger and hostility and have suggested that what researchers currently define as “hostility” may actually be the cognitive component of anger (Eckhardt, Barbour, & Stuart, 1997).

Irritation or irritability is a third important concept in understanding the complex construct of anger. For example, Spielberger et al., (1983) note that the intensity of the anger experience is an important delineation of types of anger and define anger as, “an emotional state that consists of feelings that vary in intensity, from mild irritation or annoyance to intense fury and rage” (p. 16). Thus, irritability or irritation can be classified as a milder form of anger. Irritable affect has also been defined in the literature as a feeling state characterized by reduced control over temper which usually results in irascible verbal or behavioral outbursts, although the mood may be present without observed manifestation” (Snaith & Taylor, 1985). The notion of multiple dimensions of irritability is noted in the *Oxford English Dictionary* (Simpson & Weiner, 1989) definition, which addresses the psychological, physical, and physiological components of irritability. The psychological component of irritability is defined as “the quality or state of being easily annoyed or excited to anger or impatience.” Other authors have describes irritability as “a negative affect which can evoke anger” (Kennedy, 1992), while still others note that irritability and anger share psychological, physiological, and behavioral features, but that anger also incorporates cognitive features not yet delineated in definitions of irritability (Novaco, 1985).

As a measure of the emotional component of the anger experience, Watson, Clark, and Tellegen (1988) have delineated a form of angry affect that includes the concepts of irritability, anger, and hostility, as measured by the PANAS-X Hostility Scale (Watson &

Clark, 1994). The authors note that each affect can be measured either as a trait (i.e., consistent angry emotional reactivity) or a state (i.e., momentary anger arousal; Watson & Clark, 1994). Numerous studies have been conducted to understand the production of angry affect, in general. For example, researchers have conducted analyses of the neural circuitry of the brain to determine the neural regions involved in the emotional experience of anger. In a study by Denson, Pedersen, Ronquillo, and Nandy (2009), the authors found that activity in the dorsal anterior cingulate cortex was significantly associated with self-reported angry affect (subjective report of anger) and individual differences in general aggression as compared to displaced aggression. The correlates of angry affect are numerous and include Neuroticism (Martin, Watson, & Wan, 2001), Borderline Personality Disorder (e.g., Gunderson & Sabo, 1993), hypermasculinity and exposure to male gender role violations (Parrot & Zeichner, 2008), cardiovascular reactivity to stress (Faber & Burns, 1996; Krantz & Manuck, 1984; Suarez & Williams, 1989), hostile/reactive aggression (Berkowitz, 1993) and partner violence (see Eckhardt, Barbour, & Stuart, 1997; Schumacher, Feldbau-Kohn, Smith-Slep, & Heyman, 2001 for reviews).

Because the current research on anger emphasizes the multidimensionality of the construct, it is important to utilize measures that address the various components of the anger experience. We believe, and discuss in the following section, that the multidimensional focus on three forms of angry affect (irritable, angry, and hostile) as delineated by Watson et al., (1988) is an effective tool for addressing the complex nature of anger and its relationship with various proximal and distal factors.

Anger and General Aggression

A number of empirical and theoretical explanations have been proposed to account for the role of anger in the occurrence of aggression. According to Beck, (1999) aggression can be conceptualized as a particular style of cognitive processing known as “primal thinking,” which through adverse childhood experiences, creates a tendency for certain individuals to experience situations egocentrically. Thus, following some event, an aggressive individual perceives the event as a threat to the self, which leads to distress and the perception that the event is a violation of an important personal rule. This belief of the event as a rule violation can serve to further activate memories of prior rule violations, which may increase pre-existing angry arousal. Thus, this model states that anger may lead to aggression through a complex set of cognitions that moderate the relationship. However, this model has been criticized for its lack of a clear description of how contexts are associated with a particular cognitive processing style or the intermediate cognitive processes in which angry arousal leads to aggressive behavior (Norlander & Eckhardt, 2005).

On the other hand, Berkowitz’s cognitive neoassociationistic model (1993, 2001) has received much support in the research literature, proposing a relationship between negative affect, resulting angry feelings, and aggression. This model assumes that associative networks connect specific feelings with specific thoughts and memories, as well as certain kinds of behavioral and physiological reactions, and that activation of any part of the network serves to activate all associated parts and produce either a tendency toward a “fight” or “flight” response. Central to this model is the notion that a wide variety of negative affective states can produce anger and aggression. Consistent with this model, a number of researchers have demonstrated the effects of temperature on partner violence, such that unpleasantly hot

or cold temperatures can create negative affect, which activates anger and aggressive behavioral responses through an associative network (Anderson, 1989; Berkowitz, 2001; Rotton & Cohn, 2000).

Both general (e.g., Beck, 1999; Berkowitz, 1993, 2001) and integrative models of aggression (e.g., Anderson & Bushman, 2002) suggest that anger may play an important role in predicting aggressive behavior, although the relationship may not necessarily be causal. For example, Anderson and Bushman (2002) postulated that anger may impact aggression in three ways. First, anger may reduce taboos against aggression by justifying aggression or by interrupting natural cognitive processes to suppress aggression (see Eckhardt & Dye, 2000 for review). For example, violent men in marital couples induced to feel angry in a laboratory task utilized fewer anger reducing thoughts than nonviolent comparison husbands with similar levels of anger, suggesting that this process may be especially likely at increased levels of anger arousal (Eckhardt, Barbour, & Davison, 1998). Second, research demonstrates that each occurrence of anger serves as an information cue and prime for aggressive scripts by keeping individuals focused on aggressive motivations over time. This theory has been supported in a number of investigations examining social information processing in maritally violent men (Eckhardt et al., 1998; Holtzworth-Munroe & Hutchinson, 1993). Finally, studies have suggested that “anger energizes behavior” by increasing levels of arousal. Zillmann’s (1979) excitation-transfer model has demonstrated that individuals experiencing heightened physiological arousal from one source will transfer that arousal to an associated second source and, thus, misattribute the cause of the arousal to the second source. If the current situation is related to conflict or anger, prior arousal can contribute to higher levels of anger than if there was no prior arousal. For example, in a study by Bryant and Zillmann (1978), the authors placed students in different levels of

excitation, based on three levels of arousing films, and the students were then either provoked or not provoked by a guest lecturer. Students were subsequently given the chance to prevent the guest lecturer's appointment to a higher position. The authors found that when students who were still aroused from prior stimulation were provoked, they opposed the guest lecturer's promotion more strongly than students who were equally provoked but experienced lower levels of arousal (less arousing films). The authors concluded that arousal appeared to intensify feelings of annoyance and anger, which contributed to their decision to deny the guest lecturer the higher position. Similarly, in regard to IPV, when partners enter a conflict situation with already increased levels of physiological arousal, perhaps from life stressors, their arousal may be misattributed to their partner and thus, motivate an aggressive response. Indeed, much current literature supports the notion that financial and social stressors and partner conflict are risk factors for partner violence perpetration (e.g., Kessler, Molnar, Feurer, & Appelbaum, 2001; O'Leary, Barling, Arias, Rosenbaum, Malone, & Tyree, 1989).

The Anger/Partner Violence Relationship

There has been much recent interest in the construct of anger as a meaningful correlate or predictor of partner violence, and numerous empirical studies and reviews have reported an apparent relationship between the two constructs. For example, a review paper by Eckhardt, Barbour, and Stuart (1997) reported that 18 studies utilizing self-report accounts of the anger experience indicated that for maritally violent men, anger "(a) mediates the relationship between alcohol and marital aggression, (b) interacts with marital satisfaction in the prediction of marital aggression, (c) is associated with emotionally volatile personality characteristics, (d) is associated with insecure attachment styles, and (e) differentiates self-referred from court-referred batterers" (p. 353).

In a more recent review of the literature on anger and partner violence, Schumacher, Feldbau-Kohn, Smith Slep, and Heyman (2001) examined the results from both clinical and community based studies on the effects of state and trait anger on marital violence. The authors reported that in all five clinical studies reviewed, court-involved men displaying physical aggression obtained higher scores on various measures of anger and hostility. For example, Beasley and Stoltenberg (1992) indicated that these men displayed higher rates of state anger and trait anger than non-male physical aggression men or relationship-distressed men as measured by the State-Trait Anger Inventory (Spielberger et al., 1983). Similarly, Maiuro, Cahn, and Vitaliano (1986) found that anger and hostility as measured by the Buss-Durkee Hostility Inventory (BDHI; Buss & Durkee, 1957) was significantly higher for maritally violent men on both overt (behavioral) and covert (internal emotional experience) factors. In a community based sample, Barbour, Eckhardt, Davison, and Kassinove (1998) found that repeated or severe male physical aggression men reported higher state anger and trait anger, as well as more behavioral expressions of anger and less use of anger control strategies than did non-male physical aggression men/relationship-distressed men or non-male physical aggression men/relationship-satisfied men, respectively.

In a recent meta-analytic review of the research on anger and hostility, Norlander and Eckhardt (2005) reviewed the results from thirty three studies and reported that perpetrators of partner violence consistently displayed or reported moderately higher levels of anger and hostility than nonviolent men across self-report, observational, and spouse-specific measures. In addition, when comparing subtypes of partner violence perpetrators, men within the moderate to high IPV severity subtype reported significantly higher levels of anger and hostility than those in the low to moderate IPV severity subtype.

Studies of dating violence have also indicated a relationship between anger and partner violence. For example, Leonard and Senchak (1993) found that men's reports of anger and hostility were significantly related to reports of premarital physical aggression ($r = 0.29$) in a sample of couples applying for marriage licenses. In addition, Eckhardt, Jamison, and Watts (2002) found that within their college-age dating sample, men who reported a history of physical aggression toward a dating partner scored significantly higher on STAXI Trait Anger, Anger In, and Anger Out scales and lower on STAXI Anger Control. In addition, the authors reported that physically violent men also utilized more aggressive verbalizations during an anger induction procedure (anger-arousing articulated thoughts in simulated situations (ATSS) procedure; Davison, Robins, & Johnson, 1983) than did nonviolent men, although the number of angry verbalizations did not differ between the two groups.

Anger has also been cited as one of the reasons women display violence in intimate relationships (Hines & Malley-Morrison, 2001; Stuart, Moore, Coop-Gordon, Hellmuth, Ramsey, & Kahler, 2006). For example, Stuart et al. (2006) reported that among their sample of women arrested for domestic violence and court-referred to violence intervention programs, self-defense, provocation by their partner, retaliation for prior abuse, and the desire to display anger were the most common reported motives for women's use of violence in their relationships. In fact, data from the Reasons for Violence Scale utilized in this study indicated that women reported that they engaged in violence "to show anger" in almost 40% of violent episodes. However, Holtzworth-Munroe and Clements (2007) have discussed that female anger and hostility has been largely understudied in the research on partner violence due to the potential misuse of data demonstrating wife violence in marital interactions. For example, some authors fear that such data might lead to allegations that wives provoke, and

thus deserve, the abuse they receive from their husbands (Holtzworth-Munroe, 2005; Holtzworth-Munroe & Clements, 2007).

Other studies examining angry affect as a risk factor for violence suggest that violent men are more likely to report feelings of anger and contempt in response to hypothetical couple conflict vignettes as compared to non-violent men (Dutton & Browning, 1988) and are more likely to express this negative affect during observed conflict discussions (Burman, John, & Margolin, 1992; Jacobson et al., 1994; Margolin, John, & Gleberman, 1988). Women have also reported engaging in violence in response to feelings of frustration and anger (Emery & Lloyd, 1994; Follingstad, Wright, Lloyd, & Sebastian, 1991). A study by Margolin, John, and Gleberman (1988) compared the affective reactions of physically aggressive, verbally aggressive, withdrawing, and nondistressed/nonaggressive couples participating in 10-minute discussions of (couple-specific) problematic topics. Compared to verbally aggressive and withdrawing husbands, physically aggressive husbands exhibited a greater number of negative behaviors and reported greater negative affect (sadness, fear, anger, and feeling attacked) and physiological arousal in response to conflict discussions. Moreover, both nondistressed/nonaggressive wives and husbands reported significantly less negative affect, more positive affect, and lower levels of physiological arousal than did any of the other three conflict groups. Similarly, in a study by Jacobson et al. (1994), the authors utilized the Specific Affect Coding System (SPAFF; Gottman, McCoy, Coan, & Collier, 1996) to code observations of nonviolent arguments within the laboratory setting. The authors found that both maritally violent husbands and wives displayed more angry affect than those in the maritally distressed but nonviolent group, and that maritally violent husbands and wives displayed comparable levels of verbal aggression.

Some authors have suggested that excessive angry affect increases relationship distress and inhibits successful problem-solving (Gottman, 1979; Forgatch, 1989; Patterson, 1982), because angry, critical comments tend to elicit predictable negative responses from the partner. These authors postulate that the persistent use of anger in relational interactions may escalate partners' feelings of hostility and limit the range of available behaviors for each member of the couple in successfully resolving interpersonal conflict (Gottman, 1991; Gottman & Levenson, 1986).

Overall, this pattern of results clearly suggests that elevated anger and hostility may be distinguishing features of partner violence perpetrators, but the functional and contextual relationships between these variables remains unknown. Importantly, while these studies suggest a relationship between angry affect and partner violence, most have attempted to link these two variables through retrospective measurement of the anger experience, and have failed to capture the temporal, or day-to-day, association between anger and partner violence.

Temporal Studies Examining the Relationship between Anger and Partner Violence

To date, there have been only three studies examining the temporal sequencing of negative affect (including anger) and negative partner interactions. Utilizing a daily diary method, Schulz, Cowan, Cowan, and Brennan (2004) asked 42 couples to complete questionnaires at the end of the workday to report their negative emotional arousal and the perceived pace of their workday, and another questionnaire at bedtime to report their subsequent partner interactions. They found that workdays producing more end-of-the-day negative affect were linked with angrier behavior for women and more withdrawn behavior for men when later interacting with their partner. In this study, angry relationship behaviors were drawn from the Angry Marital Behavior Scale and were defined as "expressions of

angry, critical, or unkind behavior (e.g., “I yelled at my partner”; “I was mean to my partner”).” Although this study was the first to test the hypothesis that “short-term emotional spillover” may contribute to conflictual marital interactions, it appears to confound the relationship by combining the constructs of anger and aggression. In addition, this pattern was only evaluated over a three day period, and these days were not always consecutive, which does not allow for the evaluation of within-subject variation of anger on partner interactions and potential violence. Additionally, questionnaires were returned by mail, which calls into question whether or not surveys were completed in compliance (on the day of the experience), or whether retrospective bias may have played a role in partner’s reports of negative emotionality, workday experience, and marital interactions.

In another study utilizing a daily diary approach, Umberson, Anderson, Williams, and Chen (2003) evaluated the effects of stress and negative emotion on subsequent relationship dynamics for men with a history of domestic violence and a nonviolent comparison group. The men completed daily questionnaires about sources of stress (relational or nonrelational), perceived level of personal control, emotion state (measured using Affect Balance Scale, Bradburn, 1969 and PANAS, Watson, Tellegen, & Clark, 1988) and negative relationship dynamics (“arguing,” and “not getting along”) for 7 to 14 days. The authors found that compared to nonviolent men, violent men exhibited a tendency to decrease their arguing (measured the next day) in response to experiencing negative emotion and relational stress. The authors explained this finding as consistent with the literature on masculinity which suggests that men tend to repress or deny their emotions, in an attempt to reduce anxiety and arousal. Although this study provides an important step in understanding the temporal relationship between emotional arousal and subsequent negative partner behaviors, it does not provide a temporal connection between emotion and partner violence. Additionally, these

authors used a total negative affect score from summed items rather than measuring the effects of specific emotions on partner behaviors, so it is unclear what types of negative emotion (anger, anxiety, depression, etc) may or may not be causally related to subsequent partner behaviors. Furthermore, the authors chose to evaluate how stress and emotion state affect relationship behaviors the next day rather than on the same day of reported emotion state.

In a third study by McNulty and Hellmuth (2008), the authors utilized a daily diary approach with newlywed couples, to examine whether emotion regulation might play a role in the perpetration of partner violence. In this study, couples completed daily reports of their negative affect (anxious, tense, relaxed, and irritated) for seven days and responses were summed to create a daily negative affect score. Partner violence was measured by partners' endorsement of their own and partners' behaviors over the past year. The authors found that emotion regulation, as measured by variability in negative affect, was significantly associated with violence for couples who reported IPV perpetration over the past year. More specifically, they found that variability in negative affect was positively correlated with IPV perpetrated by husbands with wives who also reported having perpetrated IPV during the past year. This research clearly indicates a temporal connection between affect and IPV, and emphasizes the importance of measuring affect over time. However, this study did not examine affect in the context of ongoing partner violence, but rather, utilized partner reports of past violence. Thus, future studies should prospectively address the temporal role of affect on subsequent relationship behaviors and partner violence. Additionally, although this study indicates that negative affect may play a prominent role in either the production or maintenance of partner violence, it is unclear which types of negative affects may be most important in interventions aimed to reduce partner violence.

Rationale for the Proposed Study and Hypotheses

Partner violence remains an important health concern related to a multitude of negative consequences. Although risk factors for partner violence have been well documented among married couples (see Holtzworth-Monroe et al., 1997; Schumacher, Feldbau-Kohn, Smith Slep, & Heyman, 2001 for reviews), current empirical evidence suggests that these risk factors may also be appropriate for understanding the mechanisms behind dating violence (see Follingstad, Bradley, Laughlin, & Burke, 1999; Lewis & Fremouw, 2001 for reviews). Partner violence in dating relationships was previously assumed to be insignificant or extremely rare (e.g., Clark, Beckett, Wells, & Dungee-Anderson, 1994; Lane & Gwartney-Gibbs, 1985; Marshall & Rose, 1987), but current research reports high prevalence rates for the occurrence of dating violence (Lewis & Fremouw, 2001; Neufeld, McNamara, & Ertl, 1999) and suggests that the effects of violence may extend beyond the realms of the marital relationship. Such research indicates that verbal abuse in dating couples is a strong predictor of the first incident of physical abuse in marriage, and therefore, it seems imperative to assess factors that are associated with relationship conflict in younger dating couples.

The high prevalence rates and negative consequences of partner violence have fueled efforts toward identifying predictors of partner violence. While studies indicate that angry affect is related to negative marital interactions, no study has examined the temporal sequence or moment-to-moment events related to angry affect and dating violence. In addition, most research on anger and aggression has not supported a simple linear relationship between the two constructs, as aggression does not always occur within the context of angry affect (e.g., Murphy & Eckhardt, 2005; Norlander & Eckhardt, 2005). Thus, it may also be useful to examine distal factors (psychopathology, attitudes toward violence,

demographic variables) in combination with proximal factors to evaluate for whom specific types of anger problems might be most relevant.

Leonard's Multifactorial Model (1993) provides an appropriate heuristic for understanding the complex relationships between proximal and distal factors in the perpetration of partner violence. Although much of his work has focused on the role of substance use as a proximal risk factor for partner violence, his model also includes other proximal influences such as "transitory affective (irritability) states" (Leonard, 1993, pp. 257). In addition, Anderson and Bushman provide an important integrative model of the role of anger "in the moment" in the perpetration of aggression, explaining that anger can increase the risk for aggression by impacting a number of other factors (e.g., interrupting cognitive processes, serving as an information cue to prime aggressive scripts, and increasing levels of arousal). We believe that the integration of these two models may provide a framework for examining and understanding the role of proximal angry affect in violence perpetration.

Few studies have tested the combined effects of distal and proximal factors that may increase or decrease the risk for partner violence perpetration. In fact, at this time, only two studies have prospectively assessed the temporal sequencing of proximal variables in combination with relatively stable distal variables that may increase or decrease the risk for partner violence (Fals-Stewart, 2003; Fals-Stewart et al., 2003). However, these studies focused only on the link between the proximal variable of substance use and partner violence, without examining other critical proximal variables. Moreover, despite the significant contributions of prior temporal studies in this area, Fals-Stewart (2003) emphasized that the use of written diaries made it impossible to accurately assess compliance and eliminate potential retrospective recall bias. Fals-Stewart also stated that it is unknown whether these findings hold in other participant populations, and that future research should address the

relationships among proximal and distal predictors of violence in other samples (e.g., among females and non-clinical samples).

Therefore, the proposed project aimed to examine the temporal association between angry affect and dating violence perpetration among a sample of college students using electronic daily diary assessment methodology. The present study tested two specific hypotheses and examined one exploratory empirical question:

1. Consistent with past research, distal variables (demographics, psychopathology, past violence, attitudes toward violence) would be associated with the onset of verbal, physical, and sexual partner violence in the context of a dating relationship. Specifically, it was predicted that participants who were younger, reported less satisfaction with their current intimate relationship, displayed greater psychopathology and higher rates of past violence, and held more supportive attitudes toward violence, would report increased levels of partner violence.
2. Proximal angry affect (irritable, angry, and hostile affect) would be associated with the onset of verbal, physical, and sexual partner violence in the context of a dating relationship. It was hypothesized that the odds of partner violence would be greater on days in which angry affect was elevated prior to seeing the partner compared to days of no angry affect.
3. Because this is the first study to utilize electronic daily diaries to assess the temporal link between angry affect and IPV, we did not have a theoretical or empirical basis from which to make specific predictions related to the moderating effects of distal factors on the association between angry affect and IPV. It was expected that these exploratory analyses might provide important information to guide future theory and research.

Method

Phase 1

Participants. Phase 1 included 1,162 male and female undergraduate students recruited from the University of Tennessee Department of Psychology online subject pool. Inclusion criteria for Phase 1 required that participants; a) were at least 18 years old, b) were in a romantic relationship of at least one month's duration, and c) had a minimum of 2 days of face-to-face contact each week with their partner.

Measures. A Demographics Questionnaire was administered to gather participant information, including age, gender, relationship status, duration of the relationship, and ethnicity. Distal variables were assessed via the following measures:

The Relationship Assessment Scale (RAS; Hendrick, 1988) is a 7-item self-report inventory that assesses various aspects of happiness in intimate relationships. Responses are made on a 5-point Likert scale, where higher scores indicate greater relationship satisfaction. The RAS has been used in both married and dating couples and has demonstrated strong discriminative and predictive validity in distinguishing between dating couples who do and do not terminate their relationship (Hendrick, 1988). Studies comparing Dyadic Adjustment Scale (DAS) scores to RAS scores in clinical populations suggest good criterion-related validity (correlation coefficients = .80 and .88; Hendrick, 1988, 1998, respectively), and test-retest reliability of .85 (Hendrick, 1998). Previous research also indicates good internal consistency for this measure (alpha = .86, Hendrick, 1988). Internal consistency estimates for the current study demonstrated a coefficient alpha of .81.

The Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, De La Fuente, & Grant, 1993) is a 10-item self-report measure used to screen for hazardous drinking. The AUDIT assesses quantity and frequency of drinking behavior, intensity of

drinking behavior, symptoms of dependence and tolerance, and alcohol-related problems. Individual items are summed to create a total score, and higher scores indicate more hazardous drinking. The AUDIT has demonstrated excellent construct and criterion validity which has been established in a variety of settings and with various subject populations (Reinert & Allen, 2007), and a recent literature review indicates that the AUDIT is superior to other alcohol screening instruments (Reinert & Allen, 2002). A number of studies have also reported high internal consistency for the AUDIT, with recent studies demonstrating a median reliability coefficient of 0.83, with a range of 0.75 to 0.97 (Reinert & Allen, 2007). Internal consistency estimates for the current study produced a coefficient alpha of .86.

The Drug Use Disorders Identification Test (DUDIT; Stuart et al., 2003a, b; 2004) is a 14-item self-report measure which is used to screen for hazardous drug use. The DUDIT, modeled after the Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993), assesses the quantity and frequency of drug use, symptoms of dependence and tolerance, and drug-related negative consequences. The DUDIT assesses for use of the following substances: cannabis, cocaine, hallucinogens, stimulants, sedatives/hypnotics/ anxiolytics, opiates, and “other” substances (e.g., nitrous oxide). Individual items are summed to create a total score, and higher scores indicate more hazardous drug use (scores range from 0 to 56). The DUDIT has demonstrated good internal consistency in previous studies (alpha = .83; Stuart et al., 2003b). Internal consistency estimates for the current study produced a coefficient alpha of .76.

The Borderline Personality and Antisocial Personality subscales of the revised Personality Diagnostic Questionnaire-4 (PDQ-4+; Hyler et al., 1994) were administered to assess for symptoms corresponding to the DSM-IV criteria for each disorder. PDQ-4+ item responses are presented in a true-false format and individual items are summed by disorder,

as well as by total score, providing an index of overall personality disturbance. Most of the studies examining the psychometric properties of the PDQ have been conducted with older versions of this measure. Studies suggest high sensitivity and specificity using the PDQ total score, ranging from .62 to .75 and .89 to .91, respectively (Hyer, Skodol, Kellman, Oldham, & Rosnick, 1990). Additionally, a number of studies suggest that the PDQ demonstrates good test-retest reliability, internal consistency, external validity, and criterion validity (see Bagby & Farvolden, 2004; Fossati et al., 1998 for reviews). Internal consistency estimates for the current study demonstrated modest coefficient alphas of .63 (Borderline Personality) and .59 (Antisocial Personality). As will be seen in the results section, these low reliabilities did not appear to pose a problem detecting effects.

The Posttraumatic Stress Disorder Checklist (PCL-C; Weathers et al., 1991, 1993) is a 17-item self report measure used to assess symptoms consistent with PTSD, based on DSM-IV diagnostic criteria. A five point scale is used for responses (1= not at all, 5 = extremely) and participants are asked to rate the degree to which they have been bothered by each symptom over the past 30 days. The PCL has demonstrated high internal consistency, with reported coefficient alphas of .94, .85, .85, and .87 for the PCL total, re-experiencing, avoidance, and hyperarousal scores, respectively, as well as test-retest reliability (.92, .88, and .68 at various time intervals; Ruggiero, Del Ben, Scotti, & Rabalais, 2003). Internal consistency estimates for the current study produced a coefficient alpha of .93. The scale has also shown convergent and discriminant validity as demonstrated by strong correlations between PCL total scores and several other established measures of PTSD (CAPS: Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; IES and MS-C: Ruggiero, Del Ben, Scotti, & Rabalais, 2003).

The Revised Conflict Tactics Scale (CTS2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996) was used to assess negative relationship tactics to resolve conflict in the 6 months prior to the study. The 78-item CTS2 contains five subscales: Negotiation, Psychological Aggression, Physical Assault, Sexual Coercion, and Injury. For each item, respondents rate their own behavior and their partner's behavior, although only reports of partner violence perpetration were included in the present study (participants' report of their own behavior). Responses are rated on an 8-point scale using the following response choices: 1 time in the past six months, 2 times in the past six months, 3-5 times in the past six months, 6-10 times in the past six months, 11-20 times in the past six months, more than 20 times in the past six months, not in the past six months but it did happen before, and this has never happened. The CTS2 is the most commonly used scale for assessing partner violence (Straus et al., 1996) and has demonstrated moderate to excellent reliability and validity across numerous studies and populations (e.g., Straus, 2004b, 2004c). Internal consistency estimates for the current study produced coefficient alphas of .77 (Psychological Abuse Perpetration), .78 (Physical Assault Perpetration), and .28 (Sexual Coercion Perpetration). Efforts were taken to improve the internal consistency of the Sexual Coercion scale by item analysis, but removal of items did not improve the coefficient alpha above .40. As will be shown in the results, the low internal consistency for this measure did not appear to negatively impact our findings.

Attitudes toward partner violence were assessed using the Intimate Violence subscale of the Velicer Attitudes toward Violence Scale (VATVS; Velicer, Huckel, & Hansen, 1989). The Intimate Violence subscale consists of 12 items assessing attitudes specific to the acceptability of partner violence and responses range from 1 (not true) to 7 (very true). The Intimate Violence subscale of the VATVS has demonstrated moderate to high internal

consistency (alpha = .74, Velicer, Huckel, & Hansen, 1989; alpha = .79-.90, Anderson, Benjamin, Wood, & Bonacci, 2006) and possesses good construct, predictive, and discriminant validity (Anderson et al., 2006). Internal consistency for the current study demonstrated a coefficient alpha of .97.

Procedure. Participants signed up for the study via the UT online participation website and answered several questions to determine their age, relationship status, and willingness to participate in the study. Eligible participants (at least 18 years old, in a marital or dating relationship of at least one month, with a minimum of 2 days of face-to-face contact each week with their partner) were emailed a link to a survey packet on SurveyMonkey.com (which uses encryption technology to maintain participant confidentiality) to learn more about the study and determine their willingness to participate. Interested students were asked to complete an online informed consent form which described the study and a packet of questionnaires which included the measures described above.

Following the completion of these measures, participants were asked in SurveyMonkey about their interest in participating in Phase 2 of the study. Interested participants were asked to provide their name, email address, and phone number to allow a researcher to contact them to schedule a time to meet at the lab in the Psychology Department. These participants were contacted by researchers via email to participate in Phase 2 of the study.

Phase 2

Participants. Participants were 146 female and 38 male undergraduate psychology students from the University of Tennessee-Knoxville who were currently in a dating or marital relationship and agreed to participate in Phase 2 (an additional 4 students agreed to

participate but did not return their devices at completion of the study). Participants reported a mean (SD) age of 19.4 years (2.7) and an average relationship length of 19.7 months (19.8). The sample was comprised of individuals from the following ethnic backgrounds: 81.5% Caucasian, 9.8% African-American, 1.6% Hispanic, 1.6% Asian-American, and 3.3% who defined themselves as “other.” Independent samples t-tests were conducted to compare the 188 participants who agreed to participate in phase 2 of the study and the 974 participants who chose to only participate in phase 1 of the study. Analyses revealed significant group differences on the following variables: income, such that individuals participating only in phase 1 of the study had a higher family income than those who participated in both phases, $t(1058) = 2.827, p = .005$, AUDIT total score, such that individuals participating in only phase 1 of the study had greater endorsement of alcohol consumption and associated problems, $t(1049) = 2.773, p = .006$, and PDQ-4+ Antisocial total score, such that individuals participating only in phase 1 of the study reported fewer symptoms of antisociality than those individuals participating in both phases of the study.

Measures. Electronic Diary Assessments: The Hostility Subscale (i.e., irritable, angry, hostile) from the revised version of the Positive and Negative Affect Schedule (PANAS-X, Watson & Clark, 1994) was used to assess daily anger. The PANAS-X is a 60-item expanded version of the PANAS (Watson, Clark, & Tellegen, 1988) that assesses negative and positive affect states with responses ranging from 1 (very slightly) to 5 (extremely) (Watson & Clark, 1994). The PANAS-X possesses good psychometric properties with internal consistency reliabilities (Cronbach alpha's) of .89 for the Positive Affect Scale and .85 for the Negative Affect Scale, as well as evidence of convergent and discriminant validity (Watson et al., 1988). In addition, these authors have demonstrated that the PANAS-X also correlates adequately with symptom measures of distress, such as the Beck Depression

Inventory (BDI-2; Beck, Steer, & Brown, 1996) and the State Trait Anxiety Inventory (STAI; Spielberger, Gorusch, & Lushene, 1983). For the proposed study, we included only the following adjectives from the PANAS-X Hostility Scale: irritable, angry, and hostile, in an attempt to measure the emotional, cognitive, and behavioral components of angry affect. Participants were asked once daily to rate their level of each affect just before the first face-to-face interaction with their partner.

Daily diary questions regarding negative relationship behaviors were adapted from the Revised Conflict Tactics Scale (CTS-2; Straus et al., 1996). The psychometric properties of the CTS-2 have been previously described. Negative relationship behaviors included three items assessing the perpetration of verbal violence (insulted partner, yelled at partner, threatened partner), five items assessing perpetration of physical violence (grabbed, pushed, or shoved partner, kicked partner, slapped or hit partner, threw something at partner, twisted partner's arm or pulled his or her hair), and four items assessing the perpetration of sexual violence (argued/pressured partner to have sex, insisted on sex when partner did not want to, used threats to make partner have sex, used some degree of physical force to make partner have sex).

Procedure. In phase 2, participants attended a lab session to receive training in completing daily electronic diary entries. Participants were first provided with a description of the study and provided informed consent to participate. Following informed consent, participants were trained in the use of the Palm Z22 handheld computer. Each participant designated a time to complete their survey (when privacy was ensured) and an alarm was programmed so that they would be prompted at this time each day to respond to the electronic questionnaire. Participants were trained in the use of the charger, stylus, and password functions, and were instructed to refrain from entering personal information on the device.

Participants were then instructed on how to answer the electronic diary questions regarding affect and negative behaviors (i.e., response options, scrolling, notepad functions). In the questionnaire, participants first provided information regarding whether face-to-face contact occurred with their partner on the previous day. If no contact occurred, the survey's logic function automatically ended the session since IPV is not possible without fact-to-face contact. If contact did occur, participants were asked to indicate their affect before seeing their partner. Participants were also prompted to report whether partner violence perpetration occurred on the previous day, which type of violence occurred (e.g., yelling, pushing, slapping, forced sex, etc.). At the end of the training meeting, participants were provided with credit for the completion of baseline measures/training.

During phase 2, participants were prompted to complete these daily surveys over a two-month period. To ensure compliance in completion of daily surveys, participants were informed that they would receive an email from research staff once every two weeks to check on their progress and invite them to express any problems or concerns.

Follow-up Session

Participants. Participants included 184 of the original 188 participants who agreed to participate in the Daily Diary portion of the study. Four participants failed to return their electronic diary devices at completion of the study, and were excluded from analyses.

Procedure. At the end of the two-month period, participants were invited by email to return to the lab to download their diary entries. Their data was transferred to a stand-alone password-protected computer specifically used for receiving downloaded participant information. Daily compliance (reporting about previous day) was met when a survey was completed before midnight. Compliance rates were calculated and participants were

debriefed regarding their participation in the study. Participants were paid \$20 for returning the palm-top computer at the end of the study and another \$10 if they completed at least 85% of the daily entries on the intended day.

Results

Primary Statistical Analytic Method

The daily temporal relationship between angry affect and intimate partner violence was examined using a two-level hierarchical generalized linear model analysis using HLM 6 (Raudenbush, Bryk, & Congdon, 2004). In these analyses, intimate partner violence on a given day was the dependent measure and participant angry affect (irritable, angry, hostile) on the same day was the independent variable. Data analyses provided odds ratios (OR) indicating the extent to which increases in angry affect (before interacting with partner) were associated with greater odds of partner violence on the same day. We also examined the extent to which relevant distal factors influenced the temporal association between angry affect and intimate partner violence, including relationship satisfaction, antisocial personality traits and other psychopathology, attitudes toward violence, and reported past verbal, physical, and sexual aggression towards an intimate partner.

Values of the dependent measure, IPV, were either 0 (no IPV) or 1 (IPV), so a Bernoulli sampling distribution and logit link function were utilized in all HGLM models. Partner violence and angry affect were nested within participants and treated as Level 1 variables. Consistent with prior research (i.e., Fals-Stewart, 2003), partner violence and angry affect were only utilized in analyses if the angry affect preceded the first act of partner violence on a given day. The independent variable, angry affect, was analyzed on a continuous 1-5 scale so that incremental change in angry affect could be analyzed in predicting the occurrence of partner violence. Distal predictors of IPV (listed above) were treated as Level 2 variables. In analysis, several distal predictors, including prior drug use (skewness 3.73, kurtosis 18.12), attitudes toward violence (skewness 6.13, kurtosis 38.59), and each of the three past violence subscales (verbal: skewness 3.09, kurtosis 12.07; physical:

skewness 9.55, kurtosis 111.98; sexual: skewness 3.47, kurtosis 11.84) were logarithmically transformed (natural log) to account for positively skewed distributions (after log transformation, drug use: skewness 1.49, kurtosis 1.02; attitudes toward violence: skewness 4.61, kurtosis 23.50; verbal: skewness 0.167, kurtosis -0.845; physical: skewness 2.33, kurtosis 5.29; sexual: skewness 2.13, kurtosis 3.45).

Demographic Information

As noted above, the sample included 146 female and 38 male participants with an average age of 19.4 years ($SD = 2.7$). Of the participants, 57.1% were freshman, 22.8% sophomores, 10.9% juniors, 5.4% seniors, and 1.6% were defined as post-baccalaureate or graduate student. Consistent with regional demographics, the sample was comprised of the following ethnicities: 81.5% Caucasian, 9.8% African American, 1.6% Hispanic/Latino, 1.6% Asian-American, and 3.3% who defined themselves as “other.” Regarding religious demographics, 83.7% of the present sample were Christian, 1.1% Jewish, 0.5% Muslim, and 11.4% endorsed “other.” Socioeconomically, 30.4% reported annual family incomes under \$50,000, 28.8% reported incomes between \$50,000-100,000, 21.7% reported incomes between \$100,000-150,000, 10.9% reported incomes between \$150,000-200,000, and 4.9% reported incomes greater than \$200,000. Regarding sexual orientation, 93.5% of the present sample endorsed a heterosexual orientation, 1.6% endorsed a gay/lesbian orientation, and 2.7% endorsed a bisexual orientation. The average length of relationship was 19.7 months ($SD = 19.8$).

Descriptive Statistics

Data was collected from 184 male and female participants over a 2-month period. The overall average compliance rate was 75% for daily electronic diaries (8,280 diaries out of 11,040 possible diaries). Of these, 7,775 days (93.9%) involved face-to-face contact with partners, and these data were used in all HLM analyses. Results depicted in Table 1 reveal that 44% of the sample reported perpetrating at least one act of verbal aggression during the study period (185 acts; range = 0-11 acts) and 15.2% reported at least one act of physical violence toward their partners (51 acts; range = 0-5 acts) over the 60 days. Consistent with the extant violence literature, rates of perpetrated sexual coercion were much lower (4% reported at least one act of sexual violence, 12 acts total; range = 0- 2 acts). Data for specific forms of angry affect (Range = 1-5) reveal that the mean (standard deviation) for irritable affect was 1.39 (.77), angry affect was 1.17 (.61), and hostile affect was 1.13 (.51). Participants' reported rates of angry affect before seeing their partner indicate that on more than 25% of study days, participants endorsed feelings of irritability, on almost 10% of days, participants endorsed feelings of anger, and on 7% of days, participants endorsed feelings of hostility (greater than baseline affect level of 1, or no anger).

Correlations among the independent variables are presented in Table 2. Among demographic variables, men in the study were younger, endorsed more antisocial personality symptomatology and alcohol use, and reported more past perpetration of sexual coercion toward intimate partners. Gender was not significantly correlated with any of the other distal variables. Older age was positively correlated with longer length of current relationship and with endorsement of greater borderline personality symptomatology. Shorter length of current relationship was negatively correlated to alcohol use, but was positively correlated with past verbal aggression. Relationship satisfaction was negatively correlated with all

psychopathology and past violence variables. Significant correlations emerged among measures of psychopathology including antisocial personality, borderline personality, PTSD symptomatology, and alcohol and drug use. Interestingly, among psychopathology variables, borderline personality was highly correlated with PTSD symptomatology ($r = .68$). Consistent with prior research, measures of psychopathology were also moderately correlated with past perpetration of partner violence (see Schumacher et al., 2001 for review).

The Relationship between Partner Violence and Distal Variables

The first step in our analyses examined the extent to which relevant distal factors were associated with daily reports of violence. The results of the HGLM examination of the relationship between distal variables and the occurrence of verbal, physical, and sexual IPV for the entire sample are presented in Tables 3 and 4. Bivariate associations were computed by entering each distal variable into the model separately without controlling for similar distal variables (e.g., PTSD symptomatology was entered into the model without controlling for Antisocial personality, Borderline personality, alcohol and drug use). As shown in Table 3, results indicate that male participants were 2.2 ($1/.45 = 2.2$) times more likely to perpetrate sexual coercion relative to female participants, and younger age was associated with significantly greater odds of verbal and physical aggression. Results also indicate that individuals in shorter-length relationships were more likely to engage in sexual coercion than those in longer term relationships and those in less satisfying relationships were more likely to perpetrate daily verbal, physical and sexual forms of violence toward partners than individuals who reported greater relationship satisfaction. Among psychopathology variables, higher levels of PTSD symptomatology were associated with significantly greater odds of verbal and physical aggression while higher levels of Borderline personality were associated

with greater odds of verbal aggression. Higher levels of antisocial personality symptomatology were associated with significantly greater odds of all forms of IPV. Interestingly, alcohol and drug use were not associated with verbal and physical aggression, but alcohol use was negatively correlated with sexual coercion, such that individuals reporting greater alcohol use displayed less sexual coercion than those reporting greater alcohol use. Not surprisingly, higher levels of verbal and physical aggression prior to the study were associated with greater odds of perpetrating verbal and physical aggression during the study. Additionally, higher levels of sexual coercion prior to the study were associated with greater odds of all three forms of violence during the study. In regard to attitudes toward violence, more favorable attitudes toward violence were associated with greater odds of physical and sexual aggression.

In addition to bivariate analyses, multivariate analyses were conducted to obtain a more conservative test of the relationship between distal variables and the occurrence of verbal, physical, and sexual violence. Prior to multivariate analyses, distal variables were organized into three categories based on correlations obtained in the current study and previous literature suggesting some overlapping characteristics between variables. Categories were as follows: demographics, which included gender, age, length of relationship, and relationship satisfaction; psychopathology, which included alcohol use, drug use, antisocial personality, borderline personality, and PTSD symptomatology; and past violence experience and beliefs, which included past verbal, physical, and sexual aggression and attitudes toward violence. Multivariate associations were computed by entering all distal variables (within the same category) into the model simultaneously in order to control for variance explained by similar distal variables. As shown in Table 4, results indicate that when accounting for other demographic variables, women were approximately 2 and 3.5

times more likely to engage in verbal and physical aggression than men, respectively, while men were almost 2.5 times more likely to engage in sexual coercion than women. Younger individuals were 1.3 times more likely to engage in physical aggression and almost 2 times more likely to engage in sexual aggression than were older individuals, and a trend emerged for verbal aggression. Participants in relationships of shorter duration were more likely to engage in sexual coercion (OR -1.03) than those in longer-length relationships and those who reported less relationship satisfaction were more likely to engage in verbal, physical, and sexual forms of violence (OR -1.14, -1.14, and -1.19, respectively). Among psychopathology variables, individuals with greater antisocial and PTSD symptomatology were more likely to engage in sexual coercion (OR 1.30 and 1.04, respectively), but surprisingly, individuals who reported greater drug use were less likely to engage in physical assault (OR -1.41 and -1.56) than those with less drug use. Among past violence variables and beliefs about violence, individuals who reported past verbal aggression were more than 2 and 1.7 times more likely to perpetrate current verbal and physical aggression than individuals who did not report past violence, although this relationship was not found for sexual coercion. Individuals who reported perpetrating greater past sexual coercion were 1.3 and 2.5 times more likely to perpetrate current physical and sexual aggression, respectively. Attitudes toward violence were not significantly associated with any form of violence.

The Relationship between Proximal Angry Affect and Partner Violence

The second step in our analyses examined the extent to which daily reports of angry affect were associated with daily reports of verbal, physical, and sexual forms of partner violence (Table 5). Bivariate associations were computed by entering each affect variable (irritable, angry, hostile) into the model separately without controlling for each of the other

proximal variables (i.e., irritable was entered into the model without controlling for angry or hostile affect). When reporting our results for proximal x IPV associations, we used unit specific estimates (with robust standard error). As can be seen in Table 5, results for the sample reveal consistently significant temporal associations between angry affect and all forms of IPV. Specifically, analyses show that each 1-point increase in irritable affect (as rated on a 1-5 point scale) results in a 96% increase in the likelihood of perpetrating verbal aggression, with a maximum increase of 1376% (OR = $1.96^4 = 14.76$, for four units of change; see Figueiras & Cadarso-Suárez, 2001). That is, the odds of verbal aggression are 14.76 times higher on days in which individuals report an irritability score of 5 relative to a day they report a score of 1. Similarly, with each 1-point increase in irritable affect, the likelihood of perpetrating physical aggression increases by 69% (max 716%, OR 8.16) and the likelihood of perpetrating sexual coercion increases by 92% (max 1259%, OR 13.59). For angry affect, each 1-point increase results in a 111% (max 1882%, OR 19.82) increase in the likelihood of perpetrating verbal aggression, a 108% (max 1772%, OR 18.82) increase in the likelihood of perpetrating physical violence, and a 65% (max 641%, OR 7.41) increase in the likelihood of perpetrating sexual violence. For hostile affect, each 1-point increase results in a 119% (max 2200%, OR 23.00) increase in the likelihood of perpetrating verbal aggression, a 98% (max 1437%, OR 15.37) increase in the likelihood of perpetrating physical aggression, and an 81% (max 973%, OR 10.73) increase in the likelihood of perpetrating sexual coercion.

Multivariate associations were computed by entering all three proximal angry affect variables into the model simultaneously to measure the effect of each specific affect (irritable, angry, hostile) on IPV when the other affects had been partialled out. As shown in Table 5, irritability was significantly associated with verbal aggression and sexual coercion and anger

was significantly associated with both verbal and physical aggression. Specifically, analyses indicate that each 1-point increase in irritable affect results in a 41% (max 295%, OR 3.95) increase in the likelihood of perpetrating verbal aggression and a 158% (max 4331%, OR 44.31) increase in the likelihood of perpetrating sexual coercion. Additionally, analyses indicate that each 1-point increase in angry affect results in a 71% (max 755%, OR 8.55) increase in the likelihood of perpetrating verbal aggression and 117% (max 2117%, OR 22.17) increase in the likelihood of perpetrating physical aggression. Hostile affect was not significantly associated with any form of partner violence.

The Role of Distal Variables in Moderating the Relationship between Angry Affect and Partner Violence

Bivariate Analyses

The final step in our analyses examined the extent to which distal factors moderated any associations between daily reports of angry affect and partner violence (See Tables 6-11). Moderating effects were examined first by entering each distal variable in the angry affect x IPV model separately (not controlling for other angry affects or distal variables). For example, the moderating effect of gender on the relationship between irritable affect and verbal aggression was examined without controlling for angry and hostile affects or other demographic distal variables (age, length of relationship, relationship satisfaction). As shown in Tables 6-8, age positively moderated the relationship between irritable affect and verbal aggression, such that each unit decrease in age (one year) resulted in a 12% increase in the odds ratio for the relationship between irritable affect and IPV. Length of relationship positively moderated this relationship, such that each unit increase in length (one month) resulted in a 1% increase in the odds ratio for the relationship between irritable affect and

IPV. Each one point decrease in PTSD symptomatology resulted in a 5% to 14% increase in the odds ratio for the relationship between the three forms of affect and sexual coercion.

Alcohol use negatively moderated the relationship between irritable affect and physical and sexual forms of aggression, such that for those reporting alcohol use (dichotomous drink vs. no drink variable), the odds of the relationships between irritable affect and physical and sexual aggression decreased by 6% and 35%, respectively. Similarly, for those reporting alcohol use, the odds of the relationships between hostile affect and verbal and physical forms of aggression decreased by 4% and 12%, respectively.

Past verbal aggression positively moderated the relationship between irritable affect and physical aggression, such that for individuals reporting prior verbal violence (dichotomous violence vs. no violence variable), the odds of the relationship between irritable affect and physical aggression increased by 40%. There was a trend for the moderating effect of past verbal aggression on the relationship between irritable affect and sexual coercion, such that for individuals reporting prior verbal violence (dichotomous violence vs. no violence variable), the odds of the relationship between irritable affect and sexual coercion increased by 288%. Similarly, past physical assault positively moderated the relationship between angry affect and both physical and sexual forms of aggression, such that for individuals reporting prior physical violence, the odds of the relationship between angry affect and physical and sexual aggression increased by 30% and 35%, respectively.

Multivariate Analyses

Multivariate analyses were computed by entering each proximal angry affect and categorical distal variable into the model while controlling for other affects and categorical distal variables in order to account for shared variance among affect variables and among

distal variables and provide a more conservative test of moderation. Additionally, after computing moderation effects of demographic variables on the relationships between angry affect and violence, significant associations were considered in subsequent analyses of psychopathology and past violence/attitudes toward violence variables. Specifically, because significant moderating effects were found for age and length of relationship on the relationship between all three forms of angry affect and verbal aggression, subsequent models (e.g., psychopathology and past violence/attitudes toward violence) controlled for age and length of relationship in addition to other distal variables. The results from these analyses are presented in Tables 9-11.

Demographics

Within the demographics category, age and length of relationship emerged as significant moderators of the relationship between all three forms of affect and verbal aggression. Specifically, age negatively moderated the relationship between irritable, angry, and hostile affect and verbal aggression such that each unit decrease in age resulted in a 23% to 25% increase in the odds ratio for the relationship between these affects and verbal aggression. Length of relationship positively moderated the relationship between irritable, angry, and hostile affect and verbal aggression, such that each unit increase in length (one month) resulted in a 2% increase in the odds ratio for the relationship between all three affects and verbal aggression. Analyses on the moderating effects of demographic variables could only be conducted for verbal aggression when including all four demographic variables within the model (could not compute for physical and sexual aggression). Because we suspected that gender effects might be confounding our results, we decided to remove gender from the model and rerun our analyses for physical and sexual aggression. Only one additional significant finding emerged, such that length of relationship positively moderated

the relationship between irritable affect and physical aggression, such that each unit increase in length (one month) resulted in a 2% increase in the odds ratio for the relationship between irritable affect and physical aggression.

Psychopathology

A number of significant moderators also emerged within the psychopathology category. Surprisingly, alcohol use negatively moderated the relationship between irritable, angry, and hostile affect and physical aggression, such that for those reporting alcohol use, the odds of the relationship between all three forms of affect and physical aggression decreased between 9% and 43%. Similarly, for those reporting alcohol use, the odds of the relationship between hostile affect and verbal aggression decreased by 11%. In contrast, drug use positively moderated the relationship between angry and hostile affect and physical aggression, such that for those reporting drug use (dichotomous drug vs. no drug variable), the odds of the relationship between angry and hostile affect and physical aggression increased by 89% and 233%, respectively. In addition, antisocial personality positively moderated the relationships between angry and hostile affect and verbal aggression, such that each one point increase in antisocial symptomatology resulted in a 38% to 58% increase in the odds ratio for the relationship between angry and hostile affect and verbal aggression, respectively. Similarly, with each one point increase in antisocial symptomatology, there was a 24% to 85% increase in the odds ratio for the relationship between irritable and hostile affect and physical aggression, respectively. Borderline personality positively moderated the relationship between angry affect and physical assault, such that each one point increase in borderline symptomatology resulted in a 34% increase in the odds ratio for the relationship between angry affect and physical aggression, while PTSD symptomatology negatively

moderated the relationship between hostile affect and physical assault, such that each one point increase in PTSD symptomatology resulted in a 8% decrease in the odds ratio for the relationship between hostile affect and physical aggression.

Past IPV and Attitudes toward IPV

Several moderators also emerged within the past IPV and attitudes toward IPV category, presenting several discrepancies among types of past violence. Past physical assault positively moderated the relationship between angry affect and physical assault during the study, such that for individuals reporting prior physical violence, the odds of the relationship between angry affect and physical aggression increased by 81%. Past sexual coercion positively moderated the relationship between irritable affect and physical assault during the study, such that for individuals reporting prior sexual coercion, the odds of the relationship between irritable affect and physical aggression increased by 45%. However, several negative moderators emerged including past verbal aggression and attitudes toward violence. Specifically, past verbal aggression negatively moderated the relationship between both irritable and hostile affect and verbal aggression, such that for individuals reporting prior verbal aggression, the odds of the relationship between irritable and hostile affect and verbal aggression decreased by 28% and 79%. Also similarly surprising was the finding that more positive attitudes toward violence predicted a weaker relationship between irritable affect and physical assault, such that for individuals reporting more favorable attitudes toward violence, the odds of the relationship between irritable affect and physical aggression decreased by 9900%.

Discussion

The overall aim of this study was to examine the daily conditional association between angry affect and intimate partner violence. While prospective data have suggested that angry (e.g., Norlander & Eckhardt, 2005) and hostile affect (e.g., Leonard & Senchak, 1996) are risk factors for IPV, the current study significantly extends this research by testing a temporal relationship for the acute effects of angry affect preceding discrete episodes of partner violence through the use of prospective electronic diary assessments.

The first specific aim of the study was to replicate previous research by examining the role of various distal factors in the prediction of partner violence (e.g., Holtzworth-Munroe et al., 1997; Schumacher et al., 1997, 2001; Stith et al., 2004; Stuart et al., 2006). Consistent with the stated hypotheses, results from bivariate and multivariate (controlling for other distal variables within each category) main effect analyses revealed that a number of distal factors were significantly associated with increased risk for IPV, including younger age, shorter length of relationship, lower relationship satisfaction, greater psychopathology, greater past perpetration of IPV, and more favorable attitudes toward violence.

The second aim of the study was to investigate three forms of angry affect as proximal antecedents that predict whether or not partners engage in violence over the course of their relationship. As predicted, findings showed that irritability was significantly temporally associated with verbal aggression and sexual coercion and that anger was significantly associated with both verbal and physical aggression. Importantly, our results demonstrated that the likelihood for violence increased exponentially as the amount of angry or irritable affect increased by each one unit increment.

In addition to investigating the main effects of angry affect and distal factors on partner violence, this study is the first to assess the extent to which numerous distal factors

moderated the association between angry affect and IPV. Consistent with our third stated hypothesis and Leonard's Multifactorial Model (1993) of intimate partner violence, results showed that several distal factors influenced the temporal association between angry affect and partner violence. Bivariate results revealed that age, length of relationship, PTSD symptomatology, alcohol use, and past verbal and physical aggression interacted with the three forms of angry affect to predict greater odds of IPV. Perhaps more importantly, multivariate analyses controlling for each of the other affects and distal variables revealed that a number of distal variables moderated the association between angry affect and partner violence. Positive moderators of the relationship between angry affect and partner violence included length of relationship, drug use, antisocial personality, borderline personality, and perpetration of past physical and sexual violence. Negative moderators of the relationship included age, alcohol use, PTSD symptomatology, and perpetration of past verbal violence. These findings provide empirical support to the position that intimate partner violence likely stems not only from factors relevant to immediate interactions between partners (i.e., angry affect), but also that stable background variables may impact the strength of some of these associations.

Clinical Implications

The primary clinical implication of these findings relates to the potential benefit to practice and policy regarding intervention programs to prevent dating violence. According to recent research, about half of states with imposed guidelines for intervention programs specifically forbid anger-focused interventions (Norlander & Eckhardt, 2005; Healey, Smith, & O'Sullivan, 1998). For example, the Illinois Coalition against Domestic Violence (2009) states that IPV intervention programs "are NOT and should not be Anger Management

programs. An Abuser does not have a problem with anger; the Abuser has a problem with the use of Power and Control over the Victim” (para. 2). The Alabama Counsel Against Domestic Violence (2009) similarly states that “men who batter use anger, alcohol/drug use, and stress as excuses for their abusive behaviors” (para. 5). The Caddo Parish District Attorney’s Office of Louisiana (2009) states that “domestic violence is not an anger problem, it is a learned behavior. Domestic violence abusers do not have an anger problem; they are experts at “anger management.” Domestic violence abusers know when and how to control their outbursts and violence” (para.3). Policies such as these have deemphasized the role of anger in IPV perpetration without empirical results to support such conclusions. The present empirical investigation clearly indicates that anger and hostility are important risk factors in IPV perpetration and lends support to continued collaborative efforts by researchers, practitioners, and policy makers to better understand the role of anger in the treatment and prevention of IPV. However, it is also important to note that as stated by the Illinois Coalition on Domestic Violence, power and control may also be relevant issues in understanding the confluence of factors that lead to IPV, although these variables were not assessed in the present investigation.

These findings also emphasize the relevance of distal factors such as age, relationship satisfaction, psychopathology, and drug use in the implementation of various approaches designed to reduce or prevent IPV. For example, by creating treatment programs that target young adult dating couples, we may more effectively prevent marital violence which can be even more detrimental than dating violence with additional concerns related to available resources, children, and beliefs about divorce, that impact the decision to stay or leave an abusive relationship (e.g., Rhatigan & Street, 2005). Additionally, when a partner chooses not to leave a violent relationship, it is possible that treatment implementing a focus on

improving relationship satisfaction may be beneficial in reducing subsequent partner violence. These results also suggest that individuals with greater borderline and antisocial symptomatology may be at greater risk for perpetrating violence when experiencing angry affect and may benefit from interventions designed to address these personality issues in addition to anger regulation skills. Consistent with other research on substance use and IPV, our results suggest that individuals who report drug use may be more likely to perpetrate violence than nonusers, and may benefit from combined intervention and prevention programs that highlight this risk factor and target both risk factors simultaneously (e.g., O'Farrell, Murphy, Neavins, & Van Hutton, 2000; Stuart et al., 2002, 2003).

Theoretical and Empirical Implications

Fals-Stewart and Stappenbeck's (2003) multiple threshold model of IPV may provide a useful explanation of several of the effects that emerged in our analyses (e.g., why lower alcohol use, less PTSD symptomatology, less past verbal violence, and less favorable attitudes toward violence increase the risk for violence on a day of angry affect). Although the multiple threshold model emphasizes the main and interactive effects of distal factors and alcohol use on the risk for aggression, it can be similarly applied to the relationship of distal factors on angry affect and the risk for aggression. In particular, their model suggests that partner violence occurs when various factors increase aggressive motivations over inhibitions for a given individual (Fals-Stewart et al., 2005). Although some individuals may never reach their personal threshold for violence, others may reach their threshold primarily by distal factors (e.g., personality characteristics, psychopathology), while others may reach their threshold only when distal factors in combination with angry affect in the moment of a partner interaction lowers inhibitions and increases motivation for aggression. Our findings

suggest that individuals with greater alcohol use, greater reported past verbal aggression, and more favorable attitudes toward violence demonstrate a weaker angry affect/IPV temporal association perhaps because these individuals demonstrate higher baseline levels of aggression-supporting attitudes and tendencies and behavioral disinhibition, and may therefore reach the threshold for violence without the addition of angry affect. The finding that greater PTSD symptomatology predicted a weaker relationship between specific forms of angry affect and partner violence also fits with the multiple threshold model of IPV, as these individuals characteristically demonstrate higher levels of baseline psychological arousal, and therefore, may reach their threshold for violence without the addition of angry affect in a partner conflict situation. However, we did not obtain this negative moderation effect for antisociality, which would have been expected based on the multiple threshold model. Specifically, these results are in contrast to findings reported by Fals-Stewart et al. (2005) who reported that greater antisociality decreased the odds of non-severe violence on a drinking day. In other words, antisocial individuals may not require the potential inhibiting or cognitive impairment effects of alcohol to reach their threshold for IPV. However, it may be that the opposite is true for angry affect, in that antisociality increases the ease with which individuals are incited to anger and therefore become violent.

A primary research implication of this study involves the examination of the temporal association between negative affect and partner violence over longer study periods. We obtained relatively high prevalence rates for verbal and physical violence over a two month period (44% and 15%, respectively). Thus, we believe that future research in this area should involve examinations of these relationships over longer study periods to better sample the nature of the onset of IPV in dating couples, and across multiple dating partners in order to reduce the risk for revictimization. Longer studies might also examine within-person

variability in anger and IPV to determine whether changes in average levels of anger over time might be associated with IPV (what happens on a particular day depending on how the person deviates from their own mean anger) and therefore, allow for more specific interventions to reduce anger and IPV. Similarly, we could examine whether changes in distal factors (e.g., alcohol and drug use, relationship satisfaction) over time might influence the anger/IPV association. For example, we could examine whether interventions designed to decrease alcohol use decrease the association between anger and IPV over time, or whether interventions designed to improve relationship satisfaction decrease the association between anger and IPV over time. While this study examined one important proximal risk factor for IPV, it is likely that testing combinations of proximal factors may better predict IPV than individual proximal factors. For instance, we have comparable data from approximately 50 partners of these participants that have not been analyzed. Such data could test the role of partner angry affect as well as the role of co-occurring angry affect (both partners) on IPV perpetration and victimization. Moreover, we have data examining the proximal effects of both substance use and anger and plan to assess the complex relationships between these variables and IPV, as well as potential moderating effects of relevant distal variables on this relationship.

Strengths and Limitations

In conclusion, the present study makes an important contribution to the understanding of distal and proximal risk factors related to intimate partner perpetration and in particular, by extending the research on the temporal association between angry affect and IPV. A notable strength of the study was the utilization of handheld computers (palm pilots) to assess the contribution of angry affect to the risk for partner violence in the context of partner

interactions. The use of such technology allowed us to address prior research limitations related to compliance of research subjects and retrospective reporting of affect and relationship behaviors. High prevalence rates of physical aggression (15% of the sample reported engaging in at least one act of physical aggression) were obtained in only a 2-month period which may suggest that individuals may more accurately report the amount of violence perpetrated when providing daily reports rather than a one-time assessment of violent behaviors.

While the present study contributes to the existing literature on risk factors for IPV, a few notable limitations may qualify the results. First, results demonstrate that both irritable and angry negative affect were better predictors of IPV than was hostile negative affect. It is possible that the term “hostility” is harder for individuals to define, to differentiate from irritability and anger, or is less typically used to express angry negative emotion. Consistent with review papers suggesting the similarities between irritation, anger, and hostility (e.g., Eckhardt, Barbour, & Stuart, 1997; Norlander & Eckhardt, 2005), it is also possible that hostility may not be a unique construct once we control for the variance accounted for by irritability and anger. Future research might focus only on irritability and anger, or might examine other similar affects such as furious or hateful.

Second, we did not analyze partner data to corroborate participant reports of IPV, so the results are limited by the accuracy of the participants’ reports. Further studies in this area would benefit from analyses of partners’ perpetration of IPV to determine what distal or relational variables might further explain this temporal relationship. Third, while we asked participants to report angry affect just before seeing their partner, we did not examine whether there had been phone contact between partners prior to face-to-face contact or whether a participant was already upset with their partner for some prior problem that could

have occurred one or more days earlier. Thus, we cannot say with certainty that the angry affect experienced before seeing the partner was due to factors related or unrelated to the partner. Future studies might control for this by asking participants to indicate whether their anger was related to something their partner had done previously, or whether it was unrelated to their partner's actions (e.g., stress or work-related). In addition, although we did not utilize diagnostic interviews to verify participants' report of psychopathology, future studies examining the moderating effects of these variables would benefit from such data.

A final limitation may be related to the impact of gender as a potential moderating variable in the relationship between the specific forms of angry affect and IPV. Simple bivariate and multivariate analyses of the relationship between gender and IPV revealed that women were more likely to engage in verbal and physical aggression than men, while men were more likely to engage in sexual coercion than women. However, because our models would not compute the test of gender as a moderator of the relationship between angry affect and IPV, we suspect that gender may play an interactive role in this relationship and is likely an important variable for further analyses. In addition, although our findings are notable in light of research on female-perpetrated violence, future studies should strive to include a larger male sample to better evaluate the potential gender effects.

At present, there is abundant literature demonstrating the harmful consequences of IPV and indicating the high prevalence of this public health issue worldwide. This study is the first to prospectively examine a significant moment-to-moment contextual factor (angry affect) in increasing the risk for partner violence. Despite the limitations described above, the results of this study lend strong support for a temporal relationship between angry affect and partner violence. Results also indicate that the relationship between angry affect and violence may not always be direct, such that distal factors also play an important role in the violence

onset and recidivism. With continued efforts, researchers and clinicians may make significant strides toward helping couples reduce the proximal antecedents that likely lead to IPV as well as changeable distal factors that may be evaluated and targeted in multifactorial interventions to reduce IPV.

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Appendix

Appendix: Tables

Table 1

Descriptive statistics for IPV

IPV Perpetration	Prevalence %	Frequency (# of Acts/Days)	Mean # of Acts/Days Per Perpetrator/User
Verbal Aggression	44	185	2.3
Physical Assault	15.2	51	1.8
Sexual Coercion	4.3	12	1.5

Table 2

Correlations among distal variables

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Gender	—												
2. Age	-.19**	—											
3. Length of relationship	-.02	.47**	—										
4. Relationship satisfaction	.08	.06	.06	—									
5. Alcohol use	-.22**	-.05	-.15*	-.26**	—								
6. Drug use	-.11	.06	-.04	-.25**	.49**	—							
7. Antisocial personality	-.25**	-.03	-.08	-.31**	.39**	.40**	—						
8. Borderline personality	-.01	.16*	-.06	-.30**	.28**	.30**	.33**	—					
9. PTSD symptomatology	-.05	.08	-.06	-.30**	.29**	.32**	.38**	.68**	—				
10. Past verbal aggression	.05	-.08	.17*	-.41**	.18**	.16*	.28**	.29**	.25**	—			
11. Past physical assault	.10	-.11	.08	-.31**	.03	.12	.14*	.27**	.26**	.48**	—		
12. Past sexual coercion	-.17**	.03	.01	-.19**	.19**	.15*	.38**	.31**	.28**	.33**	.23**	—	
13. Attitudes toward violence	.04	-.02	.11	-.06	-.01	-.04	.01	.00	.00	.13	.20**	.15*	—

+ p<.10, *p<.05, **p<.01, ***p<.001

Table 3

Bivariate between-person associations between distal factors and daily IPV

Distal Factors	Verbal Aggression		Physical Assault		Sexual Coercion	
	t	Odds Ratio	t	Odds Ratio	t	Odds Ratio
Gender	1.78+	1.60	1.47	1.89	-2.93**	-2.22
Age	-2.60*	-1.10	-6.29***	-1.45	.14	1.01
Length of Relationship	.47	1.00	-.54	1.00	-10.58***	-1.04
Relationship Satisfaction	-5.65***	-1.15	-4.55***	-1.16	-4.78***	-1.16
Alcohol Use	1.49	1.03	-.30	-1.01	-2.53*	-1.06
Drug Use	.42	1.06	.55	1.10	1.21	1.25
Antisocial Personality	2.02*	1.18	2.98**	1.31	4.47***	1.57
Borderline Personality	2.63*	1.16	1.63	1.14	-1.46	-1.12
PTSD Symptomatology	3.51**	1.03	3.86***	1.03	1.04	1.01
Past Verbal Aggression	12.49***	2.12	6.73***	1.88	.08	1.01
Past Physical Assault	5.54***	1.66	4.87***	1.63	-.75	-1.05
Past Sexual Coercion	2.41*	1.25	3.64***	1.58	6.10***	2.28
Attitudes Toward Violence	.65	1.34	3.63***	2.17	5.43***	3.11

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Calculated using robust standard error population averaged estimates

Drug Use, Past Violence, and Attitudes Toward Violence variables have been log transformed

Table 4

Multivariate between-person associations between distal factors and daily IPV

Distal Factors	Verbal Aggression		Physical Assault		Sexual Coercion	
	t	Odds Ratio	t	Odds Ratio	t	Odds Ratio
Gender	2.35*	1.91	3.07**	3.50	-2.93**	-2.44
Age	-1.71+	-1.09	-4.04***	-1.28	-9.17***	-1.96
Length of Relationship	1.39	1.01	.84	1.01	-5.19***	-1.03
Relationship Satisfaction	-5.09***	-1.14	-3.55**	-1.14	-4.23***	-1.19
Alcohol Use	1.37	1.03	1.04	1.02	-.39	-1.01
Drug Use	-1.36	-1.27	-1.99*	-1.41	-1.89+	-1.56
Antisocial Personality	-.10	-1.01	.85	1.09	2.82**	1.30
Borderline Personality	1.11	1.12	1.26	1.17	-.95	-1.08
PTSD Symptomatology	1.27	1.02	.69	1.01	3.12**	1.04
Past Verbal Aggression	11.76***	2.19	4.85***	1.69	-.71	-1.16
Past Physical Assault	.71	1.08	1.15	1.14	-.06	-1.01
Past Sexual Coercion	.19	1.02	3.11**	1.39	5.60***	2.49
Attitudes Toward Violence	-.63	-1.35	.93	1.33	-.92	-1.43

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Note. --- indicates model would not converge if variable included.

Calculated using robust standard error population averaged estimates

Drug Use, Past Violence, and ATV variables have been log transformed

Table 5

Bivariate and multivariate within-person associations between daily proximal factors and IPV

Bivariate Tests						
Proximal factors	Verbal Aggression		Physical Assault		Sexual Coercion	
	<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio
Irritable Affect	6.43***	1.96	3.61***	1.69	2.43*	1.92
Angry Affect	7.17***	2.11	6.10***	2.08	2.08*	1.65
Hostile Affect	5.06***	2.19	3.85***	1.98	2.40*	1.81
Multivariate Tests						
Proximal Factors	Verbal Aggression		Physical Assault		Sexual Coercion	
	<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio
Irritable Affect	2.43*	1.41	-.14	.97	2.82**	2.58
Angry Affect	2.94**	1.71	7.10***	2.17	-.59	-1.20
Hostile Affect	.47	1.10	.55	1.14	.62	1.16

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 6

Bivariate moderating effect of demographic variables on the relationship between proximal angry affect and daily IPV

Distal Factors	Proximal Factor	Verbal Aggression		Physical Assault		Sexual Coercion	
		<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio
Gender	Irritable affect	.57	1.14	.55	1.28	.30	1.26
	Angry affect	-.32	-1.11	---	---	---	---
	Hostile affect	-.02	-1.01	---	---	---	---
Age	Irritable affect	-2.18*	1.12	.05	1.01	---	---
	Angry affect	-1.16	-1.08	.33	1.03	---	---
	Hostile affect	-1.48	-1.18	.03	1.00	---	---
Length of relationship	Irritable affect	1.98*	1.01	1.56	1.01	1.24	1.05
	Angry affect	1.56	1.01	.64	1.00	1.26	1.03
	Hostile affect	.91	1.01	.22	1.00	1.29	1.03
Relationship satisfaction	Irritable affect	-1.11	-1.02	-.22	-1.01	-.80	-1.04
	Angry affect	-.80	-1.02	-.82	-1.03	-.99	-1.06
	Hostile affect	-.92	-1.03	-.96	-1.05	-.40	-1.03

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Note. --- indicates model would not converge if variable included.

Note. Values were calculated using robust standard error unit-specific estimates.

Table 7

Bivariate moderating effect of psychopathology on the relationship between proximal angry affect and daily IPV

Distal Factors	Proximal Factor	Verbal Aggression		Physical Assault		Sexual Coercion	
		<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio
Alcohol use	Irritable affect	-1.29	-1.02	-2.06*	-1.06	-1.98*	-1.35
	Angry affect	-.29	-1.01	-1.64	-1.04	-1.58	-1.18
	Hostile affect	-2.01*	-1.04	-2.31*	-1.12	---	---
Drug use	Irritable affect	1.26	1.16	1.69+	1.30	.53	1.16
	Angry affect	.51	1.07	1.95+	1.32	1.47	1.46
	Hostile affect	.78	1.17	1.50	1.40	1.05	1.40
Antisocial personality	Irritable affect	1.00	1.09	1.40	1.10	-.69	-1.18
	Angry affect	1.54	1.12	.42	1.03	---	---
	Hostile affect	1.37	1.19	-.63	-1.05	---	---
Borderline personality	Irritable affect	.91	1.05	.81	1.07	-.76	-1.41
	Angry affect	-.07	.00	1.36	1.14	.63	1.09
	Hostile affect	.06	1.01	.68	1.09	.28	1.04
PTSD symptomatology	Irritable affect	1.50	1.01	1.19	1.01	-2.96**	-1.10
	Angry affect	.08	1.00	1.61	1.01	-2.19*	-1.05
	Hostile affect	.03	1.00	-.46	-1.01	-2.50*	-1.14

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Note. --- indicates model would not converge if variable included.

Note. Values were calculated using robust standard error unit-specific estimates.

Note. Drug Use variable has been log transformed.

Table 8

Bivariate moderating effect of attitudes towards violence/past violence on the relationship between proximal angry affect and daily IPV

Distal Factors	Proximal Factors	Verbal Aggression		Physical Assault		Sexual Coercion	
		<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio
Past verbal aggression	Irritable affect	.40	1.03	2.93**	1.40	1.86+	3.88
	Angry affect	.44	1.04	1.89+	1.30	1.49	1.26
	Hostile affect	-.43	-1.08	1.05	1.25	1.58	1.32
Past physical assault	Irritable affect	.36	1.04	1.81+	1.22	.57	1.19
	Angry affect	1.34	1.12	2.17*	1.30	1.97*	1.35
	Hostile affect	1.30	1.16	1.70+	1.28	1.86+	1.37
Past sexual coercion	Irritable affect	.62	1.06	.80	1.10	-.06	-1.02
	Angry affect	-.04	.00	-.07	-1.01	---	---
	Hostile affect	.26	1.06	-.90	-1.35	---	---
Attitudes toward violence	Irritable affect	-1.28	-1.72	-.84	-2.17	-.15	-1.11
	Angry affect	.89	1.27	-.60	-1.09	-.59	-1.14
	Hostile affect	-.69	-1.72	-1.25	-3.57	1.07	2.02

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Note. --- indicates model would not converge if variable included.

Note. Values were calculated using robust standard error unit-specific estimates

Note. Past Violence and ATV variables have been log transformed

Table 9

Multivariate moderating effect of demographic variables on the relationship between proximal angry affect and daily IPV

Distal Factors	Proximal Factor	Verbal Aggression		Physical Assault		Sexual Coercion	
		<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio
Gender	Irritable affect	-0.06	-1.02	---	---	---	---
	Angry affect	-.66	-1.30	---	---	---	---
	Hostile affect	-.13	-1.05	---	---	---	---
Age	Irritable affect	-3.41**	-1.23	0.50	-1.05	---	---
	Angry affect	-2.72**	-1.23	0.20	-1.49	---	---
	Hostile affect	-2.05*	-1.25	0.95	1.09	---	---
Length of relationship	Irritable affect	4.67***	1.02	2.80**	1.02	---	---
	Angry affect	3.24**	1.02	0.57	1.02	---	---
	Hostile affect	2.02*	1.02	0.22	1.00	---	---
Relationship satisfaction	Irritable affect	.00	-1.01	0.81	1.02	---	---
	Angry affect	-.84	-1.03	0.65	-1.11	---	---
	Hostile affect	-1.16	-1.04	0.65	-1.04	---	---

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Note. --- indicates model would not converge if variable included.

Note. Values were calculated using robust standard error unit-specific estimates

Note. Computed models for Physical Assault with only Age, Length of Relationship, and Relationship Satisfaction, as model would not run with Gender included. Sexual Coercion models could not be computed even when removing Gender from model.

Table 10

Multivariate moderating effect of psychopathology on the relationship between proximal angry affect and daily IPV

Distal Factors	Proximal Factor	Verbal Aggression		Physical Assault		Sexual Coercion	
		<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio
Alcohol use	Irritable affect	-1.38	-1.02	-2.12*	-1.09	---	---
	Angry affect	-1.19	-1.04	-2.45*	-1.09	---	---
	Hostile affect	-3.82***	-1.11	-3.59**	-1.43	---	---
Drug use	Irritable affect	1.20	1.25	1.52	1.52	---	---
	Angry affect	1.12	1.28	2.95**	1.89	---	---
	Hostile affect	.76	1.31	2.16*	3.33	---	---
Antisocial personality	Irritable affect	-1.04	-1.11	2.12*	1.24	---	---
	Angry affect	2.18*	1.38	1.16	1.16	---	---
	Hostile affect	2.58*	1.58	2.94**	1.85	---	---
Borderline personality	Irritable affect	.17	1.01	.56	1.08	---	---
	Angry affect	1.18	1.16	2.17*	1.34	---	---
	Hostile affect	1.29	1.22	1.95+	1.46	---	---
PTSD symptomatology	Irritable affect	.79	1.01	-.35	-1.01	---	---
	Angry affect	-1.84+	-1.03	-1.05	-1.02	---	---
	Hostile affect	-1.49	-1.03	-3.26**	-1.08	---	---

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Note. --- indicates model would not converge if variable included.

Note. Values were calculated using robust standard error unit-specific estimates

Note. Model controlled for Age and Length of Relationship on Verbal Aggression

Note. Drug Use variable has been log transformed

Table 11

Multivariate moderating effect of attitudes towards violence/past violence on the relationship between proximal angry affect and daily IPV

Distal Factors	Proximal Factors	Verbal Aggression		Physical Assault		Sexual Coercion	
		<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio	<i>t</i>	Odds Ratio
Past verbal aggression	Irritable affect	-2.60*	-1.28	1.53	1.25	---	---
	Angry affect	-1.02	-1.18	-.46	-1.11	---	---
	Hostile affect	-2.07*	-1.79	---	---	---	---
Past physical assault	Irritable affect	-.15	-1.02	.88	1.18	---	---
	Angry affect	.48	1.08	3.16**	1.81	---	---
	Hostile affect	.75	1.15	---	---	---	---
Past sexual coercion	Irritable affect	1.23	1.14	3.07**	1.45	---	---
	Angry affect	1.05	1.14	1.52	1.24	---	---
	Hostile affect	.88	1.19	---	---	---	---
Attitudes toward violence	Irritable affect	-1.78+	-2.78	-2.34*	-100.00	---	---
	Angry affect	1.14	1.55	.28	1.04	---	---
	Hostile affect	-1.87+	-7.69	---	---	---	---

+ $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Note. --- indicates model would not converge if variable included.

Note. Values were calculated using robust standard error unit-specific estimates

Note. Model controlled for Age and Length of Relationship on Verbal Aggression

Note. Past Violence and ATV variables have been log transformed

Vita

Sara Rachel Elkins received a Bachelor of Arts in psychology from the University of Tennessee in May, 2006. In August, 2006 she entered the doctoral program in clinical psychology at the University of Tennessee. Since 2006 she has worked as a graduate research assistant under the supervision of Dr. Todd Moore and has conducted research on substance abuse relapse, lab-based aggression, and the roles of negative affect and substance use in intimate partner violence. In addition to her research pursuits, Sara has been working as a graduate student clinician at the University of Tennessee Psychological Clinic from August 2007 to present and as a student therapist at Cherokee Health Systems from August 2008 to present.