An Event-Level Examination of Intimate Partner Violence Perpetration: Effects of Alcohol, Instigation, and Regulatory Mechanisms

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A dissertation

submitted in partial fulfillment of the

requirements for the degree of

Doctor of Philosophy

University of Washington

2023

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Program Authorized to Offer Degree:

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Abstract

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Intimate partner violence (IPV) perpetration, including psychological, physical, and sexual aggression by an intimate partner, is a significant public health concern. Despite efforts to mitigate this crisis, rates of IPV remain high among young adults, leading to increased calls for understanding why individuals perpetrate IPV. Building on the I^3 model as an empirical framework for understanding IPV perpetration risk, two studies examined how instigating (e.g., relationship tension), impelling (e.g., emotion regulation, distress tolerance), and disinhibiting (e.g., alcohol use) factors influence IPV perpetration among young adults in intimate relationships. Participants (N = 150) completed an online baseline survey assessing I^3 risk factors and past-year IPV perpetration followed by a daily diary protocol measuring psychological, physical, and sexual aggression over 25 days. In study 1, all risk factors assessed at baseline were associated with either IPV perpetration history or IPV during daily diary. Significant interactions emerged between relationship tension and alcohol use predicting IPV perpetration history as well as relationship tension and distress tolerance prospectively predicting IPV during

daily diary. Study 2 investigated the perfect storm theory, which postulates that IPV is more likely when instigation and impellance are strong and when inhibition is weak. Results of generalized estimating equations demonstrated a significant three-way interaction between average levels across the daily diary period of relationship tension, emotion regulation difficulties, and alcohol use predicting IPV perpetration likelihood. At high average levels of relationship tension and alcohol use, emotion regulation difficulties had a significant positive effect on IPV perpetration likelihood. When examining within-person deviations in I^3 factors, deviations in relationship tension above one's average level emerged as a significant predictor of IPV perpetration likelihood. Findings across both studies provide support for IPV interventions that target relationship tension and alcohol use, as well as regulatory factors including emotion regulation and distress tolerance.

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General Introduction

Intimate partner violence (IPV) refers to any behavior in which the primary goal is to cause harm to a romantic partner who is motivated to avoid being harmed (Baron & Richardson, 1994). IPV is a significant public health concern across the United States. The National Intimate Partner and Sexual Violence Survey (2010) estimates that approximately 1 in 3 women and 1 in 4 men have experienced some form of violence from an intimate partner across the lifespan (Black et al., 2011). Seventy percent of female IPV survivors reported first experiencing violence by a partner prior to age 25 (CDC, 2020). Experiences among men are similar, with around 56% of male IPV survivors reporting violence by an intimate partner before age 25 (CDC, 2020). Young adulthood is generally considered a time of increased risk for IPV perpetration and is associated with high rates of aggression between intimate partners (Kaukinen, 2014; Smith et al., 2003). Rates of IPV peak between ages 20 and 25 and then plateau and decrease as individuals mature into adulthood (Johnson et al., 2015; O'Leary, 1999). In fact, it is well documented that men and women perpetrate comparable rates of physical and psychological IPV (Harned, 2001; Katz et al., 2002; Shorey et al., 2008; Stappenbeck & Fromme, 2010; Straus, 2008)). Impacts of IPV are vast, with survivors often citing increased safety concerns, need for medical care due to physical or emotional injury, need for housing or legal services, and missed school or work (CDC, 2020).

Unsurprisingly, experiencing IPV is associated with myriad negative consequences including post-traumatic stress disorder (PTSD), depression, anxiety, substance use, and suicide

(Amar & Gennaro, 2005; Silverman et al., 2001). Moreover, experts recently warned of a "pandemic within a pandemic" (Evans et al., 2020) as stay-at-home orders during the coronavirus disease (COVID-19) left partners at greater risk of experiencing IPV in their homes, compounded by social isolation, work-from-home, and travel restrictions. Indeed, researchers found a higher incidence and severity of physical IPV during COVID-19 compared to the prior three years and have positively linked COVID-19 stress to IPV perpetration (Gosangi et al., 2021; Parrott et al., 2021). As such, COVID-19 has put a spotlight on this ongoing public health crisis while scholars and advocates work to reduce rates of IPV around the country.

Definitions of Intimate Partner Violence: Physical, Psychological, and Sexual

IPV is a broad umbrella term that encompasses many types of violence occurring between different types of partners, including current or former spouses, nonmarital partners, and dating partners. These relationships may be classified as casual or committed and may or may not involve monogamy. Physical IPV (i.e., physical aggression) is defined as a physical act that could cause harm to a partner's body, and includes behaviors such as hitting, slapping, punching, kicking, or throwing something at a partner. More than 1 in 4 women (28.3%) and 1 in 5 men (21.6%) reported perpetrating physical violence in an intimate relationship (Desmarais et al., 2012) and approximately 20% of women and 14% of men have experienced severe physical violence by an intimate partner in their lifetime (CDC, 2020).

Psychological IPV (i.e., psychological aggression) is any direct or indirect nonphysical act intended to upset a partner, harm their self-worth, or control a partner. Examples of psychological IPV include verbal insults, doing something to spite a partner, or threatening a partner. Nearly half of all men and women in the United States have experienced psychological aggression by an intimate partner in their lifetime (CDC, 2020). Among younger dating couples,

estimates of psychological IPV have been found in as many as 70-90% of relationships (Banyard et al., 2000; Shorey et al., 2008). Furthermore, sexual IPV (i.e., sexual aggression) refers to any nonconsensual sex act perpetrated by a partner, which can include unwanted sexual contact as well as attempted or completed rape (i.e., oral, anal, or vaginal penetration). Individuals may use a variety of tactics to perpetrate sexual aggression, including coercion (e.g., emotional manipulation, lying about intentions), incapacitation (e.g., giving someone alcohol or drugs or engaging in sexual acts with someone who is too intoxicated to give consent), and force or threats of force. Nearly 20% of women and 8% of men have experienced contact sexual violence by an intimate partner (CDC, 2020). In samples examining perpetration of sexual IPV, rates have ranged from 10-17% of men and 3-7% of women (Buday & Peterson, 2014; Fisher & Pina, 2013).

Understanding IPV Perpetration in Order to Intervene

Despite high rates of IPV perpetration, existing interventions have been largely ineffective at reducing aggression between intimate partners and are limited in their ability to flexibly address IPV risk factors (Massa et al., 2020; Murphy & Ting, 2010). For many scholars and policy makers, this raises questions about whether there is a sufficient scientific understanding of *how* and *why* individuals perpetrate IPV. Without this information, it is challenging to create evidence-based, theory-driven IPV intervention programs that work. Thus, the purpose of the present dissertation is to utilize a prominent IPV metatheory known as the I^3 or "I-cubed" model (Finkel, 2007; Finkel & Eckhardt, 2014) to investigate risk factors for psychological, physical, and sexual aggression, as well as gain a deeper understanding of how these risk factors influence and interact with each other to predict IPV. As such, paper one examines baseline-level predictors of both IPV perpetration history and future IPV perpetration.

In paper two, these same risk factors are assessed as proximal predictors of IPV perpetration at the daily level using a daily diary protocol. The I^3 model risk factors under investigation include instigating, impelling, and disinhibiting factors. Implications for clinical intervention and future research are discussed.

Predicting Past and Future Intimate Partner Violence Perpetration:

The Role of Instigation, Alcohol, and Regulatory Factors

Paper 1

Abstract

Intimate partner violence (IPV) perpetration, including psychological, physical, and sexual aggression by an intimate partner, is a significant public health concern, costing the U.S. over $5.8 billion per year. Despite efforts to mitigate this crisis, rates of IPV remain high among young adults, leading to increased calls for understanding why individuals perpetrate IPV. Historically, the IPV field has examined risk factors for aggression perpetration disparately and not in conjunction with other hypothesized predictors that may amplify risk for aggression. Using the I^3 model as a guiding framework, the current study investigates how instigating (e.g., relationship tension), impelling (e.g., emotion regulation, distress tolerance), and disinhibiting (e.g., alcohol use) factors each influence IPV perpetration among men and women in intimate relationships, as well as how impelling and disinhibiting factors may moderate the association between instigation and aggression. Participants (N = 150) completed an online baseline survey assessing I^3 risk factors and past-year IPV perpetration followed by a daily diary protocol measuring psychological, physical, and sexual aggression over 25 days. All risk factors were associated with either IPV perpetration history or IPV during daily diary. Significant interactions emerged between relationship tension and alcohol use predicting IPV perpetration history as well as relationship tension and distress tolerance prospectively predicting IPV during daily diary. Results provide support for IPV interventions that target relationship tension and alcohol use, as well as novel regulatory factors including emotion regulation and distress tolerance.

IPV Perpetration: A Public Health Crisis

Intimate partner violence (IPV) is a significant public health crisis associated with myriad deleterious consequences. Not only is this violence detrimental to victims, resulting in nearly two million injuries in the United States alone, but IPV costs over $5.8 billion per year, with $4.1 billion allocated for direct medical and mental health care services (National Center for Injury Prevention and Control, 2003). Despite having received sustained research attention, rates of IPV remain alarmingly high, especially among young adults. The problem of physical, psychological, and sexual aggression is now the subject of intense media and policy attention. The apparent failure to effectively mitigate the problem attests to an intractability borne of insufficient scientific understanding of *why* individuals perpetrate IPV.

Theoretical Approach to IPV: I^3 Model

The I^3 model (Finkel, 2014; Finkel & Hall, 2018) is a process-oriented metatheoretical approach to understanding IPV risk. The I^3 model posits that three key processes underlie IPV perpetration: instigation, impellance, and inhibition. Instigation refers to situational influences that trigger an urge to aggress, such as relationship tension or conflict. Impellance refers to situational or dispositional factors that psychologically prepare an individual to experience an urge to aggress at the moment of instigation. This may include factors such as emotion dysregulation or difficulty tolerating distress. Taken together, instigation and impellance determine an individual's "urge-readiness" or ability to respond aggressively in a particular situation with a particular instigator. The third process is inhibition, which refers to dispositional or situational factors that increase the likelihood that individuals will override an urge to aggress. For example, the presence of one's mother-in-law may serve as an inhibitor for some. Other situational factors, such as alcohol use, may also serve as disinhibitors – that is, they weaken

one's inhibition. For the purposes of this study, inhibition refers to the net difference between inhibiting and disinhibiting influences.

Taken together, the I^3 model (Finkel, 2014; Finkel & Hall, 2018) states that it is not pathological or even atypical for individuals to experience urges to aggress following instigation. The question, however, is whether individuals override the urge or succumb to it. Once instigation occurs, both impelling as well as inhibiting or disinhibiting forces may influence the strength and likelihood of an IPV response. Though the I^3 model defines these forces as orthogonal, suggesting that strong instigation, strong impellance, and weak inhibition may independently predict IPV perpetration, it also states that the relation between instigation and IPV perpetration may be moderated by strong impellance or weak inhibition. In the present study, we aim to examine relationship tension as a primary instigating factor, emotion regulation difficulties and distress tolerance as primary impelling factors, and alcohol use as a primary disinhibiting factor predicting past-year IPV perpetration history as well as future IPV perpetration (across a daily diary period) in a sample of young adults in intimate relationships. Additionally, we will investigate whether instigating relationship tension interacts with either impellance or inhibition to predict IPV perpetration.

Instigation and Impellance: The Roles of Relationship Tension and Regulatory Factors

Relationship tension refers to strain or pressure within a partnership and can arise from a variety of sources including an argument, provocation, or rejection. Prior research suggests that relationships with higher tension or conflict may be more at risk for IPV (Slotter & Finkel, 2011). For example, cross sectional work has demonstrated that negative relationship interactions including conflict and antagonism were positively associated with IPV perpetration among both men and women (Hanby et al., 2012; Dardis et al., 2015). Moreover, in a qualitative

study examining reasons for IPV perpetration among adjudicated women, provocation by one's partner was one of the most commonly endorsed explanations for aggression perpetration (Stuart et al., 2006). While relationship tension may both intuitively and empirically denote higher risk for IPV, it has yet to be examined in conjunction with impelling factors, such as emotion regulation difficulties and distress tolerance, to predict past and future aggression with an intimate partner. Varying levels of impellance (i.e., regulatory factors) may cause some individuals to disregard or "shrug off" an instigator, whereas others may react more intensely, experiencing a strong urge to perpetrate IPV.

Regulatory factors including emotion regulation difficulties and distress tolerance reflect an individual's general ability to regulate affective states and distress. Burgeoning research has established that emotion regulation difficulties were positively associated with physical and psychological IPV perpetration among undergraduates, but only one study examined sexual IPV, finding an association between the two for men (for review, see Neilson et al., 2021). Furthermore, in one of the only studies on distress tolerance and IPV perpetration, investigators concluded that distress tolerance was negatively associated with physical and psychological IPV perpetration among men in substance use treatment (Shorey et al., 2017). Notably, recent work has called for additional studies examining these regulatory factors in community samples and with sexual IPV included in IPV perpetration outcomes (Neilson et al., 2021). In alignment with the I^3 model, it is possible that individuals who experience high instigating relationship tension alongside high emotion dysregulation or low distress tolerance, may achieve the "urge-readiness" (Finkel, 2014; Finkel & Hall, 2018) that propels them to aggress against a partner. High levels of affective dysregulation can contribute to escalation of conflict in situations when tensions are already high. Additionally, it is possible that IPV perpetration may utilized as an

ineffective solution among individuals experiencing high relationship tension and difficulties regulating emotion or sitting with distress (Stuart et al., 2006). Nevertheless, the impact of regulatory factors on the association between relationship tension and IPV has not been examined in prior studies, despite its implications for intervention programming.

Inhibition: The Disinhibiting Effects of Alcohol Use

Alcohol use is a well-documented disinhibiting risk factor for IPV perpetration (Eckhardt et al., 2015). Research has shown a small to moderate effect size for IPV perpetrated by males and a small effect size for IPV perpetrated by females (Foran and O'Leary, 2008). Additional studies have consistently demonstrated associations between alcohol use and all types of IPV, including physical, psychological, and sexual aggression (Shorey et al., 2011). For example, a meta-analysis of 28 cross-sectional studies on alcohol and IPV perpetration concluded that frequency of alcohol use, quantity of alcohol use, heavy episodic drinking (4+ drinks in two hours for females, 5+ drinks in two hours for males), and alcohol problems were all positively associated with IPV perpetration (Rothman et al., 2012). These relationships persisted among cohabiting and married heterosexual couples, with alcohol problems linked to physical IPV perpetration (Cunradi et al., 2013). In community samples of men and women, problem drinking also significantly predicted IPV perpetration (Coker et al., 2000; White & Chen, 2002).

Despite the well-documented relationship between alcohol use and IPV perpetration, alcohol has been examined less frequently in the context of the I^3 model and alongside other risk factors for aggression. One advantage of the I^3 model is that it is inclusive of alcohol myopia theory (Steel & Josephs, 1990), which has garnered support for a wide range of alcohol-related behaviors including IPV (Giancola, 2010). For example, due to alcohol's myopic effects (Steel & Josephs, 1990), intoxicated individuals may be more likely to pay attention to salient instigating

cues (e.g., relationship tension or conflict) and pay less attention to less salient inhibiting cues (e.g., the legal consequences of aggressing). In this way, alcohol use may actually weaken one's ability to override aggression urges in response to relationship tension. However, an interaction between instigating relationship tension and disinhibiting alcohol use has yet to be explored as both a predictor of IPV perpetration history and as a prospective predictor of psychological, physical, and sexual aggression.

Tying it All Together: Predicting IPV Perpetration and the Current State of Research

Historically, the IPV field has examined risk factors for aggression perpetration disparately and not in conjunction with other hypothesized predictors that may amplify risk for IPV. Notably, this has resulted in IPV interventions that are largely untailored to the specific needs of individuals who perpetrate, given their risk profiles (Massa et al., 2020). One advantage of investigating relationship tension, regulatory factors, and alcohol use at the same time is that it allows for an exploration of which I^3 factors confer the greatest risk for IPV, and includes emotion dysregulation and distress tolerance, processes that have been understudied among IPV perpetrators. Additionally, exploring interactions between relationship tension and both regulatory factors and alcohol use historically and prospectively not only adds to a body of research investigating IPV in the context of the I^3 model, but may also provide information to refine and personalize IPV intervention programming. Moreover, in response to calls for the IPV field to move away from siloed investigations of aggression perpetration (Grych & Swan, 2012; Hamby & Grych, 2013), the present study utilizes a sample of both males and females and assesses sexual aggression as a component of IPV perpetration (Neilson et al., 2021).

Current Study

The purpose of the present investigation was to examine the influence of four I^3 risk factors – relationship tension, emotion regulation difficulties, distress tolerance, and alcohol use – on both past and future IPV perpetration in a sample of young adults with IPV histories. Participants completed an online baseline survey examining I^3 factors and past-year IPV perpetration as well as a daily diary protocol in which IPV perpetration was measured across 25 days. Utilizing the I^3 model as a guiding framework, the current study proposes the following aims and hypotheses: **Aim 1a:** Examine how instigation (e.g., relationship tension), impellance (e.g., emotion regulation difficulties, distress tolerance), and inhibition (e.g., alcohol use) assessed at baseline predict past-year IPV perpetration history also assessed at baseline. Hypothesis 1: Strong instigation, strong impellance, and weak inhibition will each predict IPV perpetration history. Hypothesis 2: Strong instigation will interact with strong impellance to predict IPV perpetration history. Hypothesis 3: Strong instigation will interact with weak inhibition to predict IPV perpetration history. **Aim 1b:** Examine how instigation (e.g., relationship tension), impellance (e.g., emotion regulation difficulties, distress tolerance), and inhibition (e.g., alcohol use) assessed at baseline each predict IPV perpetration assessed during daily diary. Hypothesis 4: Strong instigation, strong impellance, and weak inhibition at baseline will each predict IPV perpetration during daily diary. Hypothesis 5: Strong instigation will interact with strong impellance to predict IPV perpetration during daily diary. Hypothesis 6: Strong instigation will interact with weak inhibition to predict IPV perpetration during daily diary.

Method

Participants and Recruitment

Individuals (N = 150; 50% female birth sex) were recruited from the community and local universities to participate in an online study on young adults' relationships, health, and daily experiences. Print and electronic advertisements were placed on social media (e.g., Instagram, Facebook), online forums (e.g., Craigslist, Reddit), and across local venues, as well as emailed to students via the registrar at a large Pacific Northwest university. Eligibility criteria included individuals who: a) were 18-30 years old living in Washington state; b) consumed alcohol an average of two times per week in the past three months; c) reported at least one instance of heavy episodic drinking (HED; 4+ drinks in two hours for females, 5+ drinks in two hours for males; NIAAA, 2003) in the last three months; d) were in a self-defined romantic or dating/marital relationship (including those that are casual or non-exclusive); e) had physical or online contact with their partner at least 3-4 times/week; and f) reported perpetrating psychological, physical, or sexual IPV against a partner within the last three months. Participants who reported a lifetime history of the most severe forms of physical IPV perpetration (i.e., using a weapon against a partner or beating up a partner) were excluded from the present study due to ethical concerns and Institutional Review Board (IRB) regulations. Interested individuals were directed to a website that contained more information about the study as well as a link to an anonymous online screening questionnaire to determine eligibility. Potential participants could also call the study phone number for more information or to receive a link to complete the anonymous online screening questionnaire.

Participants were on average 24.8 (*SD* = 3.5) years old (see Table 1). In terms of gender identity, 47.6% identified as male, 45.6% identified as female, and 6.8% identified as non-binary, transgender, or gender nonconforming. A majority of the sample received a college or graduate degree (56.5%), whereas 43.5% were high school graduates or had attended some

college. Additionally, approximately half of participants (51.4%) were part-time or full-time students and 48.6% were non-students. Sixty-one percent of participants identified as White, 16.3% as Asian, 17% as Hispanic/Latinx, 15.7% as Multiracial, 3.4% as Black/African American, 2.0% as Native American, and 1.4% a Hawaiian/Pacific Islander. A majority (79.6%) of the sample reported being in a committed relationship or partnership and 20.4% reported being in a casual relationship or partnership, with the average length of participant relationships being 25.0 (*SD* = 17.4) months. Just under half of participants reported making more than $61,000 in yearly income.

Procedures

All study procedures were approved by the University of Washington IRB Human Subjects Division. Online surveys were hosted using Qualtrics survey software.

Online and Phone Screening

To determine participant eligibility, individuals first completed a 5-minute anonymous online screening survey with an assessment of demographics, alcohol use, and relationship functioning including IPV as well as positive relationship behaviors. Eligible individuals were then directed to a separate survey in which they entered their contact information. Due to the online nature of the study, research assistants utilized protocols to check for bots and called participants by phone to verify their identity and relationship status. Participants had the opportunity to ask questions and learn more about the study at this time.

Baseline Assessment

After the phone call, participants were sent a link to an online baseline assessment via email which took approximately one hour to complete. First, participants signed an electronic informed consent form. Next, participants were instructed to complete several online

questionnaires, including assessments of demographics and I^3 factors as well as IPV perpetration history. Participants had two weeks to finish the baseline assessment and were compensated $30 in the form of an Amazon.com gift card for completion.

Daily Diary Protocol

Participants then completed 25 consecutive daily diary surveys beginning the Thursday after they finished their baseline survey. Daily diary assessments were emailed to participants at 8 AM and closed at 3 PM and assessed IPV perpetration each day. Daily diary surveys took approximately five minutes to complete and were compatible with mobile devices to increase ease of responding. All participants received automated email reminders at 12 PM and text message reminders at 1 PM. To encourage compliance across the 25 daily diary assessments, participants were paid $4 to Amazon.com per assessment and a bonus of $25 to Amazon.com for completing 22 out of 25 (~88%) of the daily diary surveys. Thus, participants had the potential to earn up to $155 to Amazon.com throughout the duration of the study.

Measures

Screening Assessment Measures

The screening survey assessed all variables relevant to eligibility criteria, including two questions about participant age and state of residence and one question about participant relationship status. If the participant stated that they were in a casual or committed relationship, another question asked how frequently they were in contact with their partner through in-person or online means. Additionally, drinking frequency in the past three months was assessed with one item from the Daily Drinking Questionnaire (DDQ; Collins et al., 1985). HED (NIAAA, 2003) was assessed with one item; participants reported whether they consumed 4+ drinks in two hours (females) or 5+ drinks in two hours (males) in the last three months (0 = *No*; 1 = *Yes*).

Last, to gather information on IPV perpetration history, participants also reported whether they perpetrated any psychological, physical, or sexual IPV in the past three months (0 = *No*; 1 = *Yes*). Twenty items (e.g., "I threw something at my partner that could hurt") were derived from the psychological, physical, and sexual coercion subscales of the Revised Conflict Tactics Scale (CTS-2; Straus et al., 1996) and the Psychological Maltreatment of Women Inventory (PMWI; Tolman, 1999). Seven positive relationship filler items (e.g., "I showed respect for my partner's feelings about an issue") derived from the negotiation subscale of the CTS-2 were also dispersed throughout IPV items.

Baseline Assessment Measures

Demographics. Information was gathered on participant age, race/ethnicity, birth sex, gender identity, education status, and income. Questions pertaining to relationship status including relationship length were also included.

Relationship Tension. Relationship tension served as a primary measure of instigation and was assessed with one item created by the research team and added to the Relationship Assessment Scale (RAS; Hendrick, 1988), an instrument that examines general relationship satisfaction. Participants responded to one question, "In general, how tense is your relationship with your partner?" on a 5-point Likert scale ranging from 1 = *Not at all tense* to 5 = *Extremely tense*.

Regulatory Factors. Regulatory factors including emotion regulation difficulties and distress tolerance served as primary measures of impellance. Emotion regulation was measured using the 36-item Difficulties in Emotion Regulation scale (DERS; Gratz & Roemer, 2004; α = .95). Participants indicated the extent to which (1 = *Almost never*; 5 = *Almost always*) statements about their ability to regulate emotions were true for them (e.g., "When I'm upset, I become out

of control"). The total scale includes six facets of emotion regulation including non-acceptance of emotional responses, difficulties engaging in goal-directed behavior, difficulties controlling impulsive behavior, lack of emotional clarity, lack of emotional awareness, and limited access to emotion regulation strategies. All 36 items were summed to create a total score reflecting general emotion regulation, with higher levels indicative of greater emotion regulation difficulties. Distress tolerance was measured utilizing the Distress Tolerance Scale (DTS; Simons & Gaher, 2005; $\alpha = .93$). Participants responded to 15 items (e.g., I'll do anything to avoid feeling distressed or upset") on a scale of 1 = *Strongly agree* to 5 = *Strongly disagree*. Items were mean scored with higher average scores indicative of greater ability to tolerate distress.

Alcohol Use. Alcohol use served as a primary measure of inhibition. Alcohol use in the past year was assessed using one question from the NIAAA Recommended Alcohol Questions (NIAAA, 2003): "During the last 12 months, how many alcoholic drinks did you have on a typical day when you drank alcohol?" Participants responded to this item on a 10-point scale: 1 = *1 drink*; 2 = *2 drinks*; 3 = *3-4 drinks*; 4 = *5-6 drinks*; 5 = *7-8 drinks*; 6 = *9-11 drinks;* 7 = *12-15 drinks;* 8 = *16-18 drinks;* 9 = *19-24 drinks;* 10 = *25 or more drinks*. Alcohol use in the past month was assessed with a calculation of average drinks per drinking day using the Daily Drinking Questionnaire (DDQ; Collins et al., 1985). Participants reported the number of standard drinks they consumed each day during a typical week in the past month, and a mean drinks score was computed for alcohol use days. For both alcohol use measures, higher scores indicate greater alcohol use in each respective timeframe.

IPV Perpetration History. Physical, psychological, and sexual IPV perpetration in the past year was assessed with the Revised Conflict Tactics Scale (CTS-2; Straus et al., 1996). The CTS-2 includes three subscales: physical aggression (e.g., "I pushed or shoved my partner"; 12

items), psychological aggression (e.g., “I called my partner fat or ugly”; 8 items), and sexual coercion (e.g., “I used force to make my partner have sex”; 7 items). Additionally, seven items from the Psychological Maltreatment of Women Inventory (PMWI; Tolman, 1999) were included to assess psychological aggression as a form of coercive control (e.g., “I restricted my partner’s phone use”). Participants responded to all items from the CTS-2 and PMWI ($\alpha = .81$) on an 8-point scale: 0 = *This has never happened*; 1 = *Once in the past year*; 2 = *Twice in the past year*; 3 = *3-5 times in the past year*; 4 = *6-10 times in the past year*; 5 = *11-20 times in the past year*; 6 = *More than 20 times in the past year;* 7 = *Not in the past year, but it did happen before.* In alignment with Straus and colleagues scoring recommendations (1996), responses were recoded to the midpoint of the range (e.g., response option 4 was recoded to 8; response option 6 was recoded to 25; response option 7 was recoded to 0). Next, all items were summed to create a past-year IPV frequency score with higher scores reflecting greater IPV perpetration history.

Daily Diary Measures

The present study includes only a subset of outcomes from the daily diary protocol included in the larger study. For more detailed analyses regarding the impact of daily-level I^3 factors on IPV perpetration, see Paper 2.

IPV Perpetration. Participants reported whether or not (0 = *No;* 1 = *Yes*) they perpetrated any physical (e.g., I pushed, shoved, grabbed, or slapped my partner) and/or psychological (e.g., I called my partner fat or ugly) IPV perpetration with a dating partner on the previous day utilizing an adapted version of the CTS-2 (Straus et al., 1996) and Psychological Maltreatment of Women Inventory (PMWI; Tolman, 1999). Positive relationship filler items (e.g., “I showed respect for my partner’s feelings about an issue”) derived from the negotiation

subscale of the CTS-2 were dispersed throughout IPV items. Participants were also asked about past-day sexual IPV perpetration using one adapted question from the Sexual Experiences Survey – Short Form Perpetration (SES-SFP; Koss et al., 2006): "Yesterday, did you do any of the following to make your partner engage in sexual activity when they did not want to?" Participants reported any tactics (e.g., overwhelmed them with continual arguments or pressure; used or threatened to use some degree of physical force) that they used on the previous day. Any affirmative response to a sexually aggressive tactic was counted as sexual IPV for the previous day. Similarly, any affirmative response to a physical or psychological IPV item from the CTS-2 and PMWI also counted as physical or psychological IPV for the previous day.

From this, two scores were created to represent IPV across the daily diary period. First, a dichotomous outcome score was generated to reflect whether an individual perpetrated any psychological, physical, or sexual IPV (0 = *No*; 1 = *Yes*) throughout the 25-day daily diary period. Second, a percentage score was calculated to reflect the number of days the participant reported perpetrating IPV over the daily diary period divided by the total number of daily diary completion days, multiplied by 100 (e.g., if a participant perpetrated IPV on five daily diary days and completed 22 total daily diaries, their score would be equivalent to 22.72%).

Data Analytic Plan

All data were entered online via data collection software and downloaded into SPSS, Stata, and RStudio for analyses. To identify any random responders in the baseline survey, four attention check items (e.g., "Please respond with mildly agree to this item") were included throughout the assessment questionnaires and a sum attention check score was created (0 = *0 correct*; 4 = *4 correct*). Individuals who scored less than 3 on the attention check (n = 3) were

excluded from analyses. Additionally, two individuals opted out of the daily diary portion of the study and thus, were excluded from analyses involving daily diary days.

Descriptive characteristics were computed for baseline I^3 factors as well as past-year IPV perpetration frequency and IPV perpetration during daily diary for the total sample. Differences in baseline I^3 factors and IPV were computed by both birth sex (1 = *male*; 2 = *female*) and gender identity (1 = *male*; 2 = *female*; 3 = *nonbinary*). Because significant differences only emerged by birth sex (male vs. female), this was utilized as a covariate in all inferential analyses.

To examine the association between baseline I^3 factors and total IPV perpetration frequency over the past year (Aim 1a), generalized linear models (GzLM) with negative binomial distributions and log link function were used to account for count data, nonnormality, and overdispersion in the outcome IPV variable (Atkins & Gallop, 2007). Five separate models were tested including four main effects models examining relationship tension (i.e., instigation), emotion regulation difficulties and distress tolerance (i.e., impellance), and past-year alcohol use (i.e., inhibition), as well as a fourth model including all four of these factors together (i.e., all factors). The fifth model added three interactions between 1) relationship tension and emotion regulation difficulties, 2) relationship tension and distress tolerance, and 3) relationship tension and alcohol use to predict past-year IPV perpetration frequency. GzLMs with negative binomial distributions provide incidence rate ratios, which are exponentiated regression coefficients and represent a standardized effect size.

Next, to examine the association between baseline I^3 factors and IPV perpetration over the daily diary period (Aim 1b), we employed a two-part GzLM with both binary logistic and gamma distributions with log link function. Because one of our IPV outcome variables was a continuous percentage (calculated by dividing total IPV days during daily diary by the number of

daily diary days the participant completed multiplied by 100), and there were multiple participants who did not perpetrate any IPV in daily diary, we followed recommendations by Boulton and colleagues (2018) on analyzing skewed continuous outcomes with many zeroes. Utilizing the same models as Aim 1a but with past-month alcohol use instead of past-year alcohol use, five separate logistic regressions were performed predicting the occurrence of any IPV perpetration in daily diary period (0 = *No*; 1 = *Yes*). Next, to gain an understanding of how I^3 factors impact IPV frequency in daily diary, the same five models were run in separate gamma regressions predicting the percent of IPV days across the daily diary period. While GzLMs with binary logistic distributions provide odds ratios, GzLMS with gamma distributions provide incidence rate ratios, both of which are exponentiated regression coefficients and represent a standardized effect size. We followed recent recommendations and used marginal effects (*ME*) to probe significant interactions in all GzLMs (McCabe et al., 2021).

Results

Descriptive Statistics

Correlations and descriptive characteristics including means and standard deviations were examined for all primary study variables and IPV perpetration history (see Table 2; Table 3). One hundred percent of the sample (N = 147) reported perpetrating any type of IPV (i.e., psychological, physical, or sexual) in the past year, in alignment with recruitment criteria. Almost all (99.3%) individuals perpetrated psychological IPV in the past year, a quarter (25.9%) of individuals perpetrated physical IPV in the past year, and 21.1% of individuals perpetrated sexual IPV in the past year. On average, participants reported approximately 24 IPV perpetration events (SD = 29.1) over the previous twelve months. More males (30.1%) perpetrated sexual IPV than females (12.2%), $\chi^2 = 7.14$, $p = .008$.

Correlations and descriptive characteristics including means and standard deviations were also examined for all primary study variables and IPV perpetration during daily diary (see Table 5; Table 6). Seventy-two percent of the sample (n = 104) perpetrated any type of IPV (i.e., psychological, physical, or sexual) during the 25-day daily diary period. Approximately two-thirds of the sample (66.7%) indicated psychological IPV perpetration during daily diary, 16.7% reported physical IPV perpetration, and 12.5% reported sexual IPV perpetration. On average, participants reported 14.06% (*SD* = 20.68) IPV days during the daily diary period. Any IPV perpetration was significantly greater among females (80.6%) than males (63.9%) during daily diary, $\chi^2 = 4.99$, $p = .026$. Any psychological IPV perpetration was also significantly greater among females (77.8%) than males (55.6%) during daily diary, $\chi^2 = 8.00$, $p = .005$. There were no other significant differences by birth sex for any other primary variables or IPV outcomes.

Predicting Baseline IPV History (Aim 1a)

In the instigation model (see Table 4, Model 1), relationship tension emerged as a significant predictor of IPV perpetration history, with greater relationship tension associated with more IPV perpetration in the past year. In the impellance model (see Table 4, Model 2), emotion regulation difficulties but not distress tolerance was significantly associated with past-year IPV perpetration. In the inhibition model (see Table 4, Model 3), drinks per drinking day over the past year significantly predicted past-year IPV perpetration frequency. However, when all factors were included in one model (see Table 4, Model 4), only relationship tension remained significantly positively associated with IPV perpetration history. Last, when three, two-way interactions were added between relationship tension and emotion regulation difficulties, relationship tension and distress tolerance, and relationship tension and drinks per drinking day (see Table 4, Model 5), a significant interaction emerged between relationship tension and drinks

per drinking day in the past year (see Figure 1). At one *SD* below the mean of drinks per drinking day, there was no significant marginal effect of relationship tension on IPV perpetration frequency in the past year (*ME* = 2.87, *SE* = 2.81, 95% CI: [-2.64, 8.38], *p* = .31). However, at mean level of drinks, there was a significant marginal effect of relationship tension on IPV perpetration frequency in the past year (*ME* = 7.31, *SE* = 2.37, 95% CI: [2.66, 11.96], *p* = .002). Furthermore, at one *SD* above the mean of drinks, there was also a significant marginal effect of relationship tension on IPV perpetration frequency in the past year (*ME* = 13.58, *SE* = 4.10, 95% CI: [5.54, 21.63], *p* = .001). No other interactions predicting IPV perpetration history were significant.

Predicting IPV in Daily Diary (Aim 1b)

For the five models predicting likelihood of any IPV perpetration in the daily diary period (part 1), birth sex remained a significant covariate in the instigation, impellance, inhibition, and all factors models (see Table 7, Models 1-4). Female birth sex was associated with greater likelihood of perpetrating any IPV across all models. However, when three, two-way interactions were added between relationship tension and emotion regulation difficulties, relationship tension and distress tolerance, and relationship tension and drinks per drinking day (see Table 7, Model 5), a significant interaction emerged between relationship tension and distress tolerance after controlling for the effect of birth sex (see Figure 2). At one *SD* below the mean of distress tolerance, there was a significant marginal effect of relationship tension on the likelihood of any IPV perpetration occurring during daily diary (*ME* = 0.15, *SE* = 0.07, 95% CI: [0.02, 0.28], *p* = .02). At mean levels of distress tolerance, the marginal effect of relationship tension on likelihood of any IPV perpetration was not significant (*ME* = 0.04, *SE* = 0.04, 95% CI: [-0.04, 0.12], *p* = .34). There was also no significant marginal effect of relationship tension on

likelihood of any IPV perpetration at one *SD* above the mean of distress tolerance (*ME* = -0.08, *SE* = 0.07, 95% CI: [-0.20, 0.05], *p* = .25). No other interactions in the fifth model significantly predicted likelihood of any IPV perpetration during daily diary.

For the five models predicting the frequency of IPV perpetration in the daily diary period (part 2), relationship tension was significantly associated with IPV frequency in the instigation model (see Table 7, Model 6) and distress tolerance, but not emotion regulation difficulties, was significantly associated with IPV frequency in the impellance model (see Table 7, Model 7). There were no significant predictors of IPV frequency in the inhibition model (see Table 7, Model 8). Relationship tension and distress tolerance remained significant in the all factors model while controlling for the effects of birth sex, emotion regulation difficulties, and drinks per drinking day, with greater relationship tension associated with more IPV perpetration frequency in daily diary and greater distress tolerance associated with less IPV perpetration frequency during daily diary (see Table 7, Model 9). There were no significant predictors of IPV perpetration frequency in the interactions model (see Table 7, Model 10).

Discussion

This was the first study to examine relationship tension, emotion regulation difficulties, distress tolerance, and alcohol use as predictors of both IPV perpetration history and prospective IPV perpetration in a community sample of young adults in intimate relationships. This investigation demonstrates that each of these factors was associated with past or future psychological, physical, and sexual aggression perpetration and adds to a body of research utilizing the I^3 metatheoretical framework to explore IPV risk. Importantly, results underscore the interactive role of these I^3 factors, in which both distress tolerance and alcohol use, impelling and inhibiting factors, respectively, moderated the association between instigation and IPV

perpetration. Information about the confluence of risk factors in adults with IPV histories may be useful for future efforts that aim to personalize and refine IPV interventions using the I^3 model (Masssa et al., 2020).

Consistent with prior research (Shorey et al., 2015; Stappenbeck et al., 2016), participants reported perpetrating psychological IPV the most frequently over the past year and during the daily diary period. Rates of physical and sexual IPV perpetration were lower, with nearly a quarter of the sample reporting physical aggression and one-fifth of participants indicating sexual IPV in the past twelve months. Fewer participants reported perpetrating IPV during the daily diary assessment, perhaps because data was collected over a shorter time period of 25 days. Importantly, analyses revealed differences between males and females in IPV perpetration over the past year and throughout the daily diary period. More males reported sexual aggression over the past year and more females reported any IPV in daily diary than males, largely driven by differences in the number of females who reported psychological aggression perpetration. The former is consistent with a large body of work suggesting that most sexually aggressive acts are perpetrated by men against women (Black et al., 2014). However, the latter is reflective of studies highlighting slightly higher rates of psychological aggression by females compared to males as well as the notion that females may be more willing to disclose IPV perpetration in research studies (for review, see Shorey et al., 2008).

When examining IPV perpetration frequency over the past year, relationship tension, emotion regulation difficulties, and alcohol use emerged as predictors of IPV in three disparate models, suggesting that each of these influence IPV perpetration on their own. However, when combined in one model, only relationship tension, an instigating factor, remained significant while controlling for the effects of emotion regulation difficulties, distress tolerance, and alcohol

use. It appears that tension between partners played an outsized role in predicting IPV perpetration in the past year, compared to other impelling and inhibiting factors. This emphasizes the utility of examining these risk factors in conjunction with one another and in accordance with the I^3 framework. Notably, one's general ability to tolerate distress did not predict past-year IPV perpetration, providing only partial support for hypothesis 1 that strong instigation, strong impellance, and weak inhibition would each predict IPV perpetration history.

Additionally, although results did not support hypothesis 2 that strong instigation would interact with strong impellance to predict IPV perpetration history, they did support hypothesis 3 that strong instigation would interact with weak inhibition to predict IPV perpetration history. In the interactions model predicting IPV perpetration history, alcohol use moderated the association between relationship tension and IPV such that relationship tension exerted significant effects on IPV when individuals consumed alcohol at mean levels or one standard deviation above. Moreover, the marginal effect of relationship tension on IPV perpetration was largest at one standard deviation above the mean on alcohol use. This two-way interaction between strong instigation and weak inhibition is consistent with the I^3 model. It is possible that heavier drinkers experience the myopic effects of alcohol more profoundly (Steele & Josephs, 1990), making them more attuned to salient instigation, such as tension or conflict in their relationships. In effect, this may result in the "urge-readiness" described by Finkel and colleagues (2014; 2018) that propels an individual toward aggression.

Given that a majority of IPV research is cross-sectional, one strength of the current study was including a prospective examination of risk factors for IPV perpetration by calculating IPV events across a daily diary assessment period. When examining IPV frequency across the daily diary period, relationship tension and distress tolerance emerged as significant both in separate

models as well as in an all factors model, suggesting that each were predictive of IPV perpetration frequency above and beyond the effects of emotion regulation difficulties and past month alcohol use. Although emotion regulation and alcohol use were predictive of IPV perpetration in the past year, they did not appear to be prospective predictors of IPV perpetration in daily diary, providing only partial support for hypothesis 4 that strong instigation, strong impellance, and weak inhibition at baseline would each predict IPV perpetration during daily diary. It is unclear why this may be the case; however, it is possible that past month alcohol use, the variable used to capture alcohol in our prospective investigation of IPV, was not reflective of the actual alcohol quantities consumed during the daily diary period. Nevertheless, impelling regulatory factors, which have been understudied in the IPV field, were recognized as important predictors of both IPV perpetration history and IPV during daily diary.

Distress tolerance moderated the association between relationship tension and any IPV perpetration during daily diary. Thus, although hypothesis 5 that strong instigation and strong impellance would interact to predict IPV during daily diary was partially supported, hypothesis 6 that strong instigation and weak inhibition would interact to predict IPV during daily diary was not. Notably, it was at low levels of distress tolerance that the marginal effect of relationship tension on IPV was significant and at its strongest magnitude. It is conceivable that individuals who have difficulty sitting with high distress, including negative affect and uncomfortable physiological sensations, may experience urges to reduce distress immediately during conflict. For individuals with low distress tolerance, one potential way to reduce distress or negative emotion may be to engage in ineffective or even harmful behavior, such as IPV perpetration, in response to instigating relationship tension. Not only might this help an individual regulate their distress, but it could also create a negatively reinforcing response of aggression. Notably, this is

one of the first investigations to examine distress tolerance in the context of the I^3 model and link low distress tolerance, alongside high instigation, to future IPV perpetration.

Limitations

There are several noteworthy limitations of this study. First, to comply with IRB and NIH regulations, we opted to exclude individuals who reported severe physical IPV histories including those who beat up a partner or used a gun or knife against a partner. IPV research often presents a "catch-22" scenario; while investigating IPV perpetration is necessary to inform intervention and prevention efforts, psychological, physical, and sexual aggression are also harmful behaviors with unique human subjects concerns. As a result of our exclusionary criteria, this research may not be generalizable to young adult populations with more severe histories of IPV, who consequently are most in need of IPV intervention. Additionally, to protect participant confidentiality and satisfy IRB requirements, we did not ask questions that could reveal the identity of a partner (e.g., marital status). Thus, we have less information about the characteristics of participant relationships and are unable to examine these facets in the context of the I^3 model.

Another limitation of the present study is that we only assessed IPV reports by one partner. While past research has demonstrated moderate agreement between partner and participant IPV reports (Testa et al., 2014), additional information on partner reports of IPV could help strengthen the validity of participant reporting. Given the prominence of relationship tension as an instigator for IPV, future research should continue to assess the dyadic nature of this tension to understand how a partner's behaviors and emotions may serve as risk factors for IPV perpetration. Notably, due to the sensitive nature of IPV research in couples, dyadic studies

must find novel ways to balance ethical responsibilities when collecting data about two partners and high-risk violent behavior.

Last, portions of this study were cross-sectional and all measures of IPV perpetration relied on self-report, which can present some limitations. Research suggests that participants may be more likely to report IPV perpetration in daily diary studies compared to retrospective summary measures (Waterman et al., 2021), potentially due to recall bias. To address this, the present study included an assessment of both IPV perpetration history and IPV during a daily diary period to augment findings. However, it is also possible that measurement of IPV perpetration during daily diary can be impacted by participants' awareness of being observed or desire to respond in socially acceptable ways. To mitigate this concern, items about positive relationship behaviors and filler questions (e.g., How often do you exercise?) were included each day. Nevertheless, through both cross-sectional and prospective investigation, it is still difficult to conclude how I^3 risk factors unfold "in the moment" to predict IPV perpetration. Future research would benefit from using event-level methodology to examine whether these I^3 factors interact to predict risk for specific IPV events.

IPV Intervention and Prevention Considerations

Limitations notwithstanding, results of this study provide several potential avenues for intervention creation or refinement with individuals who perpetrate IPV. Whereas a majority of existing IPV interventions utilize a unidimensional approach to treatment, the present investigation demonstrates that risk for IPV is in fact more multifaceted, consisting of complex interactions between instigating, impelling, and inhibiting risk factors. Current interventions would benefit from either broadening the risk factors that they target or adapting a more tailored

treatment strategy to address instigating, impelling, and inhibiting influences, depending on the setting (for a review, see Massa et al., 2020).

For example, the present study was one of the first to link lower levels of distress tolerance to IPV perpetration in young adults, and to discover that relationship tension may be highly relevant when distress tolerance levels are low. It is possible that IPV interventions could utilize distress tolerance skills from dialectical behavior therapy (DBT; Linehan, 2014), in which a primary goal is for individuals to learn how to sit with distress and manage ineffective urges to reduce distress. Skills such as TIPP, which includes using temperature, intense exercise, paced breathing, and paired muscle relaxation to reduce arousal (Linehan, 2014) may provide practical ways for individuals to regulate distress during periods of partner conflict. Similarly, both cognitive behavioral therapy (Ellis, 2008) and DBT provide strategies for regulating emotions, including skills for restructuring cognitions and not acting on harmful emotion-driven urges. Individuals who perpetrate IPV may benefit from learning how regulatory skills such as emotion regulation and distress tolerance may serve as impelling factors for aggression as well as specific skills and action steps to reduce IPV urges.

Interventions may also focus on reducing alcohol use, especially in the presence of high relationship tension. Psychoeducation about the myopic and disinhibiting effects of alcohol could be especially useful for partners with high levels of relationship conflict in addition to general harm reduction skills such as protective behavioral strategies (Martens et al., 2004). Unfortunately, a majority of IPV interventions have not included any focus on alcohol use (Shorey et al., 2012). Among those that have, some success has been found using motivational interviewing and normative feedback to increase motivation to change alcohol use and IPV perpetration among men in substance use treatment (Schumacher et al., 2011), though this has

not been examined with young adult non-treatment seeking populations. Moreover, the prominence of relationship tension in the present study points to the use of systemic approaches for IPV prevention including teaching healthy interpersonal relationship skills and providing evidence-based sex education, inclusive of discussions of sexual violence and consent, to young adult populations. Moving forward, IPV interventions may benefit from using the I^3 model to guide a multidimensional treatment approach.

Conclusions

This study provides support for relationship tension, emotion regulation difficulties, distress tolerance, and alcohol use as risk factors for either IPV perpetration history or prospective IPV perpetration in a community sample of young adults. Exploring these predictors within the context of the I^3 model highlights the interactive nature of instigation, impellance, and inhibition when predicting IPV risk. Effectiveness of intervention and prevention efforts may be increased by addressing these specific risk factors or by utilizing the I^3 framework to personalize interventions targets. Future research should continue to explore how relationship tension, emotion regulation, distress tolerance, and alcohol use operate “in the moment” to predict aggression using event-level designs that may provide more nuanced avenues for intervention.

Table 1. Demographics

	N = 147
Age	M = 24.8 (*SD* = 3.45)
Sex	
Male	49.7%
Female	50.3%
Gender Identity	
Male	47.6%
Female	45.6%
Non-binary/Transgender/Other	6.8%
Race and Ethnicity	
White/Caucasian	61.2%
Asian	16.3%
Hispanic/Latinx	17.0%
Multiracial/Other	15.7%
Black/African American	3.4%
Native American	2.0%
Hawaiian/Pacific Islander	1.4%
Education Level	
High school graduate or GED	19.7%
Some college	23.8%
College graduate	46.3%
Graduate degree	10.2%
Student Status	
Non-student	48.6%
Part- or full-time student	51.4%

Income	
Less than $10,999	9.0%
$11,000-20,999	6.9%
$21,000-30,999	10.4%
$31,000-40,999	11.1%
$41,000-50,999	8.3%
$51,000-60,999	7.6%
More than $61,000	46.5%
Relationship Status	
Casual relationship or partnership	20.4%
Committed relationship or partnership	79.6%
Relationship Length (Months)	M = 25.0 (*SD* = 17.4)

Table 2. Descriptive characteristics of Aim 1a variables predicting IPV perpetration history reported by sex

	Total Sample (N = 147)		Males (n = 73)		Females (n = 74)		
	M (*SD*)		M (*SD*)		M (*SD*)		*t* test
Relationship tension	1.98 (0.98)		2.06 (1.08)		1.91 (0.86)		0.93
Emotion regulation difficulties	88.50 (25.65)		88.70 (24.39)		88.31 (26.97)		0.09
Distress tolerance	3.16 (0.90)		3.22 (0.88)		3.09 (0.93)		0.82
Drinks per drinking day, past year	3.0 (1.1)		3.15 (1.30)		2.84 (0.94)		1.68
	N (%)	M (*SD*)	N (%)	M (*SD*)	N (%)	M (*SD*)	χ^2 test (1 *df*)
Total IPV perpetration frequency, past year	147 (100%)	23.89 (29.09)	73 (100%)	26.19 (30.93)	74 (100%)	21.62 (27.17)	0.00
Psychological IPV perpetration frequency, past year	146 (99.3%)	21.13 (24.83)	72 (98.6%)	22.77 (25.62)	74 (100%)	19.51 (24.10)	1.02
Physical IPV perpetration frequency, past year	38 (25.9%)	1.45 (4.90)	21 (28.8%)	1.55 (6.01)	17 (23.0%)	1.35 (3.53)	0.64
Sexual IPV perpetration frequency, past year	31 (21.1%)	1.31 (4.47)	22 (30.1%)	1.88 (5.28)	9 (12.2%)	0.76 (3.44)	7.14**

Note. IPV = intimate partner violence. There were no significant differences in IPV perpetration frequency means by birth sex.

Table 3. Correlations for Aim 1a variables predicting IPV perpetration history

	1.	2.	3.	4.	5.	6.	7.	8.
1. Relationship tension	--							
2. Emotion regulation difficulties	.33**	--						
3. Distress tolerance	-.30**	-.68**	--					
4. Drinks per drinking day, past year	.20*	.06	-.08	--				
5. Total IPV perpetration frequency, past year	.50**	.24**	-.18*	.19*	--			
6. Psychological IPV perpetration frequency, past year	.50**	.23**	-.18*	.22**	.97**	--		
7. Physical IPV perpetration frequency, past year	.20*	.10	-.07	.01	.63**	.47**	--	
8. Sexual IPV perpetration frequency, past year	.28*	.13	-.12	-.03	.43**	.24**	.44**	--

Note. IPV = intimate partner violence.

*$p < .05$. **$p < .01$

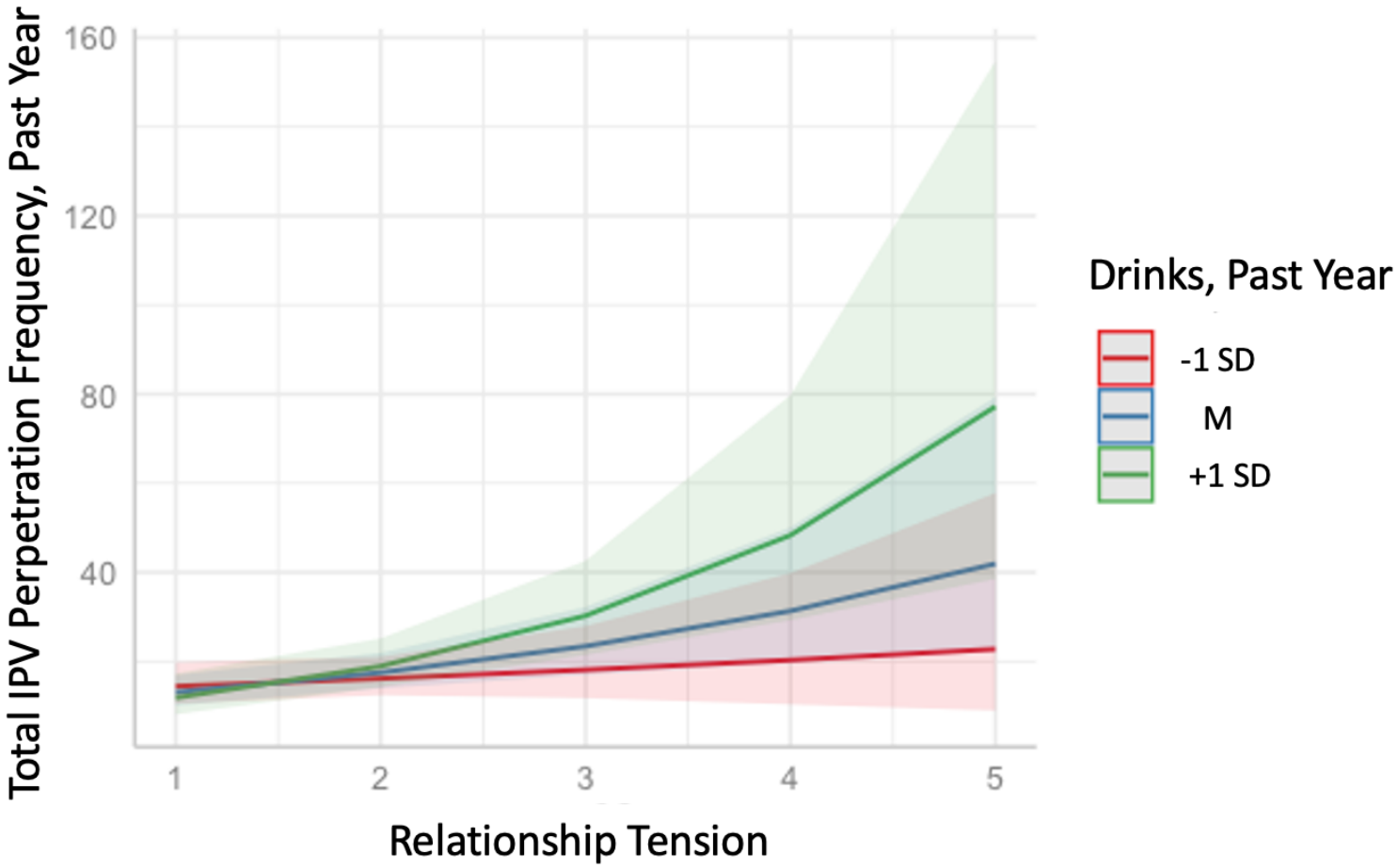
Table 4. Results of GzLMs with negative binomial regression examining the influence of I^3 factors predicting total IPV perpetration frequency over the past year controlling for birth sex

	Instigation Model		Impellance Model		Inhibition Model		All Factors Model		Interactions Model	
	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	IRR (95% CI)	*b*	IRR (95% CI)	*b*	IRR (95% CI)	*b*	IRR (95% CI)	*b*	IRR (95% CI)
Birth sex	-.08	0.92 (0.66, 1.29)	-.16	0.85 (0.61, 1.19)	-.14	0.87 (0.63, 1.22)	-.04	0.96 (0.68, 1.35)	-.10	0.91 (0.64, 1.29)
Relationship tension	.44***	1.55 (1.32, 1.82)	--	--	--	--	.40***	1.50 (1.24, 1.80)	-.16	0.85 (0.12, 6.10)
Emotion regulation difficulties	--	--	.01*	1.01 (1.00, 1.02)	--	--	.01	1.01 (1.00, 1.02)	.01	1.00 (0.98, 1.02)
Distress tolerance	--	--	.01	1.01 (0.76, 1.33)	--	--	.14	1.15 (0.88, 1.52)	0.34	1.41 (0.77, 2.57)
Drinks/drinking day, past year	--	--	--	--	.18**	1.20 (1.04, 1.38)	.05	1.05 (0.91, 1.22)	-.24	0.79 (0.55, 1.11)
Relationship tension x Drinks	--	--	--	--	--	--	--	--	.16*	1.17 (1.00, 1.37)
Relationship tension x ER	--	--	--	--	--	--	--	--	.01	1.00 (0.99, 1.02)
Relationship tension x DT	--	--	--	--	--	--	--	--	-.08	0.92 (0.67, 1.27)

Note. IRR = incidence rate ratio; CI = confidence interval; IPV = intimate partner violence inclusive of psychological, physical, and sexual aggression; Drinks = Drinks per drinking day, past year; ER = Emotion regulation difficulties; DT = Distress tolerance.

*$p < .05$. **$p < .01$. ***$p < .001$.

Figure 1. Drinks per drinking day over the past year moderates the relation between relationship tension and total IPV perpetration frequency in the past year.



Note. IPV = intimate partner violence; M = mean; SD = standard deviation.

Table 5. Descriptive characteristics of Aim 1b variables predicting IPV perpetration during daily diary reported by sex

	Total Sample (N = 145)	Males (n = 72)	Females (n = 73)	*t* test
	M (*SD*)	M (*SD*)	M (*SD*)	
Relationship tension	1.99 (0.98)	2.07 (1.08)	1.92 (0.86)	0.94
Emotion regulation difficulties	88.03 (25.44)	88.44 (24.46)	87.63 (26.51)	0.19
Distress tolerance	3.16 (0.91)	3.22 (0.88)	3.09 (0.93)	0.87
Drinks/drinking day, past month	3.00 (1.74)	3.33 (2.01)	2.67 (1.37)	2.33*
	N (%)	N (%)	N (%)	χ^2 test (1 *df*)
Any IPV perpetration in daily diary	104 (72%)	46 (63.9%)	58 (80.6%)	4.99*
Any psychological IPV in daily diary	96 (66.7%)	40 (55.6%)	56 (77.8%)	8.00**
Any physical IPV perpetration in daily diary	24 (16.7%)	13 (18.1%)	11 (15.3%)	0.20
Any sexual IPV perpetration in daily diary	18 (12.5%)	9 (12.5%)	9 (12.5%)	0
	M (*SD*)	M (*SD*)	M (*SD*)	*t* test
IPV days in daily diary (%)	14.06 (20.68)	13.04 (20.98)	15.08 (20.48)	-0.59
Psychological IPV days in daily diary (%)	12.86 (19.92)	11.58 (20.22)	14.15 (19.68)	-0.77
Physical IPV days in daily diary (%)	1.33 (4.45)	1.35 (3.58)	1.31 (5.21)	0.05
Sexual IPV days in daily diary (%)	1.66 (8.62)	0.99 (3.21)	2.33 (11.77)	-0.93

Note. IPV = intimate partner violence. *$p < .05$. **$p < .01$. Percentage of IPV days calculated by dividing total IPV days during daily diary by the number of daily diary days the participant completed multiplied by 100. This calculation was also used for psychological, physical, and sexual IPV day percentages.

Table 6. Correlations for Aim 1b variables predicting IPV perpetration during daily diary

	1.	2.	3.	4.	5.	6.
1. Relationship tension	--					
2. Emotion regulation difficulties	.35**	--				
3. Distress tolerance	-.30**	-.70**	--			
4. Drinks per drinking day, past month	-.01	.04	-.08	--		
5. IPV perpetration during daily diary, dichotomous	.06	.04	-.04	-.01	--	
6. Percentage of IPV days during daily diary	.37**	.20*	-.26**	.01	.42**	--

Note. IPV = intimate partner violence.

*$p < .05$. **$p < .01$

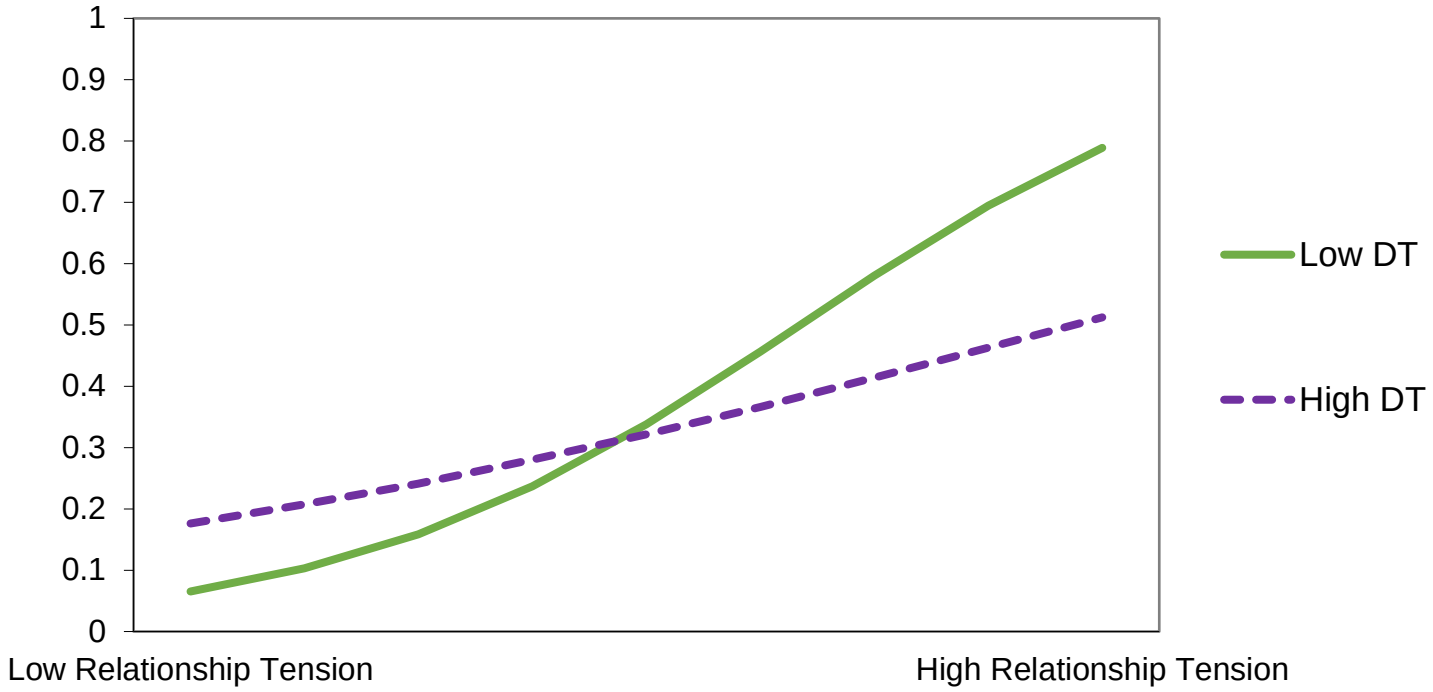
Table 7. Results from two-part model utilizing logistic regression (part 1) and GzLM with gamma distribution (part 2) examining the influence of relationship tension, emotion regulation difficulties, distress tolerance, and alcohol on occurrence of any IPV perpetration in daily diary period and percent of IPV perpetration days in daily diary period

Any IPV in daily diary	Instigation Model		Impellance Model		Inhibition Model		All Factors Model		Interactions Model	
	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	OR (95% CI)	*b*	OR (95% CI)	*b*	OR (95% CI)	*b*	OR (95% CI)	*b*	OR (95% CI)
Birth sex	.93*	2.52 (1.18, 5.41)	.90*	2.47 (1.15, 5.31)	.88*	2.40 (1.11, 5.19)	1.02*	2.77 (1.25, 6.18)	1.0*	2.83 (1.24, 6.48)
Relationship tension	.18	1.20 (0.81, 1.77)	--	--	--	--	.18	1.20 (0.79, 1.83)	3.5	34.3 (0.44, 2682.3)
Emotion regulation difficulties	--	--	.01	1.00 (0.98, 1.03)	--	--	.01	1.00 (0.98, 1.03)	.03	1.03 (0.99, 1.09)
Distress tolerance	--	--	.03	1.03 (0.58, 1.84)	--	--	.09	1.09 (0.61, 1.97)	1.3	3.63 (0.92, 14.41)
Drinks/drinking day, past month	--	--	--	--	.04	1.04 (0.84, 1.28)	.07	1.07 (0.86, 1.33)	-.13	0.87 (0.53, 1.45)
Relationship tension x Drinks	--	--	--	--	--	--	--	--	.11	1.11 (0.85, 1.45)
Relationship tension x ER	--	--	--	--	--	--	--	--	-.02	0.98 (0.96, 1.01)
Relationship tension x DT	--	--	--	--	--	--	--	--	-.67*	0.51 (0.25, 1.04)
IPV frequency in daily diary	Instigation Model		Impellance Model		Inhibition Model		All Factors Model		Interactions Model	
	Model 6		Model 7		Model 8		Model 9		Model 10	
	b	IRR (95% CI)	*b*	IRR (95% CI)	*b*	IRR (95% CI)	*b*	IRR (95% CI)	*b*	IRR (95% CI)

Birth sex	.02	1.02 (0.73, 1.42)	-.14	0.87 (0.62, 1.22)	-.09	0.92 (0.64, 1.32)	-.04	0.96 (0.68, 1.35)	-.04	0.96 (0.63, 1.46)
Relationship tension	.38***	1.46 (1.25, 1.71)	--	--	--	--	.35***	1.41 (1.18, 1.69)	.22	1.24 (0.13, 11.4)
Emotion regulation difficulties	--	--	-.01	1.00 (0.99, 1.01)	--	--	-.01	0.99 (0.98, 1.00)	-.02	0.98 (0.95, 1.01)
Distress tolerance	--	--	-.36*	0.70 (0.52, 0.92)	--	--	-.30*	0.74 (0.57, 0.96)	-.26	0.77 (0.40, 1.49)
Drinks/drinking day, past month	--	--	--	--	.01	1.00 (0.90, 1.12)	.01	1.00 (0.90, 1.11)	.21	1.24 (0.91, 1.68)
Relationship tension x Drinks	--	--	--	--	--	--	--	--	-.13	0.88 (0.76, 1.02)
Relationship tension x ER	--	--	--	--	--	--	--	--	.01	1.01 (0.99, 1.02)
Relationship tension x DT	--	--	--	--	--	--	--	--	-.02	0.98 (0.70, 1.36)

Note. IRR = incidence rate ratio; OR = odds ratio; CI = confidence interval; Drinks = drinks/drinking day, past month; ER = emotion regulation difficulties; DT = distress tolerance. Percentage of IPV days calculated by dividing total IPV days during daily diary by the number of daily diary days the participant completed multiplied by 100. *$p < .05$. **$p < .01$. ***$p < .001$.

Figure 2. Relationship tension and distress tolerance at baseline interact to predict probability of any IPV perpetration occurring during daily diary period.



Note. DT = distress tolerance. Low and high levels refer to -1 *SD* below the mean and +1 *SD* above the mean.

Where To Go From Here? Moving from Investigations of Distal I^3 Factors Toward Event-Level Examinations of I^3 Factors and IVP Perpetration

Using the I^3 model (Finkel, 2007; Finkel & Eckhardt, 2014) as a guiding framework, the previous paper examined how instigating (e.g., relationship tension), impelling (e.g., emotion regulation, distress tolerance), and disinhibiting (e.g., alcohol use) factors assessed at baseline influenced both past-year IPV perpetration history as well as subsequent IPV perpetration assessed via a daily diary period and aggregated across the 25-day period. Hypotheses were generally supported, given that all I^3 risk factors were associated with either IPV over the previous 12 months or IPV across daily diary when examined independently, and that high instigation interacted with high impellance and low inhibition separately to predict IPV perpetration. Although study one only examined distal risk factors for IPV perpetration, novel additions included a) an investigation of regulatory factors such as distress tolerance and emotion regulation; b) a prospective examination of these risk factors and IPV perpetration; and c) an IPV outcome variable inclusive of psychological, physical, and sexual aggression perpetration.

Nevertheless, studies on IPV perpetration can be strengthened by investigating proximal predictors of IPV perpetration using event-level methodology. Though a body of previous work has assessed IPV perpetration using daily diary studies (Shorey et al., 2014a; 2014b), this research has typically assessed risk factors disparately without examining all potential avenues of risk included in the I^3 model. To address this gap, the second paper focuses specifically on the 25-day daily diary period, investigating how instigating (e.g., relationship tension), impelling (e.g., emotion regulation, distress intolerance), and disinhibiting (e.g., alcohol use) factors influence day-to-day IPV perpetration likelihood among the same sample of young adults with IPV histories. Moreover, the second study investigates an understudied phenomenon –whether

within-person deviations in these I^3 factors impact likelihood of same-day IPV perpetration; that is, are daily deviations from an individual's own average associated with increased risk of IPV perpetration on that day? Whereas the first study generally supported the I^3 model and pointed toward novel intervention targets (e.g., distress tolerance), the second study will directly test the "perfect storm theory" of the I^3 model (Finkel, 2007; Finkel & Eckhardt, 2014), which purports that IPV is most likely under conditions of high instigation, high impellance, and low inhibition, and may provide more nuanced intervention avenues given its daily diary design.

Examining the Perfect Storm Theory in the Context of Intimate Partner Violence Perpetration: A Daily Diary Investigation

Paper 2

Abstract

Intimate partner violence (IPV) perpetration, including physical, psychological, and sexual aggression by a dating partner, is a significant public health concern resulting in numerous deleterious consequences. Building on the I^3 model as an empirical framework for understanding IPV perpetration risk, the perfect storm theory postulates that IPV is more likely when instigation and impellance are strong and when inhibition is weak. The current study examined the confluence of instigating (e.g., relationship tension), impelling (e.g., emotion regulation difficulties, distress intolerance), and disinhibiting (e.g., alcohol use) I^3 factors predicting physical, psychological, and sexual aggression perpetration utilizing a daily diary protocol. This study also investigated how within-person deviations in these I^3 factors impact likelihood of same-day IPV perpetration. A community sample of young adults with IPV histories (N = 150) completed 25 online surveys examining I^3 risk factors and IPV perpetration each day. Results of generalized estimating equations demonstrated a significant three-way interaction between average levels across the daily diary period of relationship tension, emotion regulation difficulties, and alcohol use predicting IPV perpetration likelihood. At high average levels of relationship tension and alcohol use, emotion regulation difficulties had a significant positive effect on IPV perpetration likelihood. When examining within-person deviations in I^3 factors, deviations in relationship tension above one's average level emerged as a significant predictor of IPV perpetration likelihood. Findings support the perfect storm theory of aggression and point to novel targets for IPV interventions that focus on instigating, impelling, and inhibiting factors.

Intimate Partner Violence: A Public Health Concern

Intimate partner violence (IPV), including psychological, physical, and sexual aggression by a dating partner, is a significant public health concern associated with a range of harmful consequences for both survivors and perpetrators. It is estimated that IPV costs the United States approximately $6 billion annually and results in over two million injuries each year (National Center for Injury Prevention and Control, 2003). Young adulthood is a time of increased risk for IPV as individuals explore intimate relationships, many for the first time (Kaukinen, 2014; Smith et al., 2003). Unfortunately, existing IPV interventions have been largely ineffective, and many are not tailored to the specific needs of the populations they aim to serve (Massa et al., 2020). In fact, rates of IPV remain high and have even increased over the last several years (Gosangi et al., 2021). This begs the question: is there sufficient scientific understanding of *why* and under what circumstances individuals aggress against an intimate partner? Whereas past research has examined distal risk factors for IPV perpetration, burgeoning event-level work aims to investigate proximal risk factors that may influence IPV perpetration on a given day (Shorey et al., 2014a; 2014b; Stappenbeck et al., 2016). In service of galvanizing intervention and prevention efforts, the present study aims to add to this body of research by comprehensively examining between- and within-person risk factors for IPV perpetration using daily diary methodology.

Theoretical Approach to IPV: I^3 Model and Perfect Storm Theory

The I^3 (I-cubed) model is a process-oriented theoretical framework which conceptualizes IPV perpetration as a confluence of multiple factors. Instigating, impelling, and inhibiting forces all serve as risk factors for physical, psychological, and sexual aggression perpetration (Finkel, 2007; Finkel & Eckhardt, 2014). Each of these three processes influence the likelihood and

intensity of aggressive behavior. Specifically, instigating factors refer to the perpetrator's exposure to discrete social dynamics and immediate environmental stimuli that trigger an urge to aggress (e.g., relationship tension). Impelling factors consist of dispositional or situational characteristics that prepare the perpetrator to experience a strong urge to aggress at the moment of instigation (e.g., emotion dysregulation, distress intolerance). Last, inhibiting factors are qualities that influence how strongly the proclivity to aggress is overridden. The integrity of inhibiting factors may be acted upon by disinhibiting influences (e.g., alcohol use) which weaken inhibitory effects. Thus, inhibition represents the difference between inhibiting and disinhibiting influences; for parsimony, we will refer to this net difference as inhibition throughout and specify that alcohol is a disinhibiting factor. According to the I^3 model, strong instigation, strong impellance, and weak inhibition independently predict IPV perpetration (see Figure 1; paths 1-3 indicate main effects). Moreover, the model depicts interactions between strong instigation and strong impellance, strong instigation and weak inhibition, and strong impellance and weak inhibition to predict IPV perpetration (see Figure 1; paths 4-6 indicate three, 2-way interactions). Finally, these interactions are superseded by the perfect storm theory—a derivative of the I^3 model (Finkel, 2007; Finkel & Eckhardt, 2014)—which posits that an individual is most likely to aggress when instigation and impellance are strong and when inhibition is weak (see Figure 1; path 7 indicates 3-way interaction).

Though the perfect storm theory postulates a three-way synergistic interaction between risk factors predicting IPV perpetration, past research has examined I^3 factors disparately (Grych & Swan, 2012). For example, research has shown that IPV perpetration is more likely for individuals experiencing relationship tension or conflict (Marshall et al., 2012), a strong instigating factor, and for those with emotion regulation difficulties, a strong impelling factor

(McNulty & Hellmuth, 2008; Neilson et al., 2021; Shorey et al., 2015; Stappenbeck & Fromme, 2014). Many studies have demonstrated that alcohol use, a disinhibiting factor, is associated with increased physical, psychological, and sexual IPV perpetration (Hine & Straus, 2007; Rothman et al. 2012; Shorey et al., 2011; Stappenbeck & Fromme, 2010; Stappenbeck et al., 2016). However, these risk factors are typically examined in isolation or alongside only one other factor, and not in conjunction with all three I^3 factors proposed by the perfect storm theory, stunting progress in understanding who is at greatest risk for perpetrating IPV. This shortcoming necessitates a comprehensive examination of the I^3 model of aggression, including measures of instigation, impellance, and inhibition to delineate why and under what circumstances individuals perpetrate IPV. Specifically, we propose examining relationship tension as a primary instigating factor, emotion regulation difficulties and distress intolerance as primary impelling factors, and alcohol use as a primary disinhibiting factor.

Disinhibiting Factor: Acute Alcohol Intoxication and IPV Perpetration

Alcohol myopia theory posits that alcohol consumption pharmacologically impedes executive functioning (Steele & Josephs, 1990); consequently, an individual processes highly salient environmental cues, such as moments of strong instigation (e.g., relationship tension), and disregards distal, less salient inhibitory cues (e.g., consequences of IPV perpetration). Thus, according to the I^3 model of aggression, alcohol intoxication serves as a disinhibiting factor (Finkel & Eckhardt, 2013). Results of methodologically rigorous laboratory-based research have consistently supported this assertion; alcohol intoxication was robustly associated with aggressive behavior and aggression intentions (Chermack & Giancola, 1997; Giancola, 2002; Giancola et al., 2010; Parrott & Zeichner, 1995). Moreover, the effects of alcohol on aggression varied across individuals, suggesting that dispositional or situational factors may have influenced

some individuals' propensity to aggress (Giancola et al., 2005; Giancola & Zeichner, 1995; Phillips & Giancola, 2008).

Similarly, longitudinal and event-level research has examined the impact of alcohol intoxication on actual IPV behavior. These findings have demonstrated a positive association between alcohol and physical, psychological, and sexual IPV perpetration (Rothman et al., 2012; Shorey et al., 2014a; Shorey et al., 2014b). In a longitudinal study of college men and women, heavy drinking was associated with greater IPV perpetration for both sexes (Stappenbeck & Fromme, 2010). Moreover, event-level research revealed that greater acute intoxication was associated with an increased likelihood of same-day IPV perpetration for both men and women (Shorey et al., 2014a; Shorey et al., 2014b).

Daily Diary Design: Deviations in Drinking

Daily diary assessments of the effects of acute alcohol intoxication on IPV perpetration provide an alternative to laboratory-based experiments in which there are often concerns with ecological validity. Additionally, daily diary studies in which participants provide repeated self-reports of daily experiences close to "real-time" (e.g., the same day or next day) are impacted less by recall bias compared to self-reports of behavior over a long period of time (Bolger & Laurenceau, 2013; Shiffman, 2009). This methodological design invokes the ability to assess temporal ordering of relevant constructs, which is important when examining explanatory I^3 mechanisms and IPV perpetration. Most notably, daily diary research provides a richness of data not fully available and utilized in prior investigations of alcohol use and IPV perpetration. Daily diary studies make it possible to assess within-person deviations in intoxication (i.e., the deviation on a given drinking occasion from an individual's average level of intoxication assessed across the entire daily diary period), and how this may impact the likelihood of same-

day IPV perpetration (Stappenbeck et al., 2016). Thus, an individual has an average level of alcohol intoxication that they achieve while drinking, and on any drinking occasion they can deviate from their average level.

The extent to which one deviates from their average level of intoxication on a given day has been predictive of myriad negative sequalae, including sexual risk-taking (Brown & Vanable, 2007; Neal & Fromme, 2007; Patrick & Magg, 2009; Parks et al., 2011; Scaglione et al., 2014) and driving under the influence (Neal & Carey, 2007). However, examinations of within-person deviations in intoxication on IPV perpetration are limited. One recent study discovered that increases in daily intoxication above one's average level were associated with an increased likelihood of physical and psychological IPV perpetration, and that this association was stronger for individuals with lower average levels of intoxication (Stappenbeck et al., 2016). Thus, it is possible that lighter drinkers may be less tolerant of the effects of alcohol as they become more intoxicated than normal, and that this may increase their likelihood of IPV perpetration (Neal & Fromme, 2007; Stappenbeck et al., 2016). However, it is unknown how within-person deviations in intoxication influence sexual IPV, or how deviations in alcohol consumption, a disinhibiting factor, interact with deviations in instigating and impelling I^3 risk factors to predict IPV.

Instigating and Impelling Factors: Relationship Tension, Regulatory Mechanisms, and IPV Perpetration

Daily diary studies also allow for investigations of proximal, situationally specific instigating factors, such as relationship tension, which increase one's urge to aggress. Relationship tension may arise from an argument with an intimate partner, provocation from a partner, or rejection from a partner. Research has demonstrated a positive association between

relationship conflict and IPV perpetration among both men and women (Dardis et al., 2015; Marshall et al., 2012), though this relation has primarily been examined disparately without other I^3 impelling or inhibiting factors. Moreover, event-level research allows for an investigation of in-the-moment impelling factors. Impelling factors primarily refer to dispositional or regulatory characteristics that prepare an individual to experience a strong urge to aggress at instigation (Finkel & Eckhardt, 2013). Strong impelling factors may include regulatory mechanisms such as emotion regulation difficulties or inability to tolerate distress. These constructs reflect an individual's ability to regulate emotions and distress, as well as any physiological sensations associated with an affective experience.

Indeed, in a sample of college-aged men, negative affect was proximally associated with increased odds of physical IPV perpetration when emotion dysregulation was high but not low (Shorey et al., 2015). Another regulatory construct, distress tolerance, was negatively associated with physical and psychological IPV perpetration among men in substance use treatment (Shorey et al., 2017). However, no study has examined whether these regulatory factors function as proximal predictors of psychological, physical, and sexual aggression using a daily diary design. Moreover, it is conceivable that in alignment with the perfect storm theory (Finkel, 2007; Finkel & Eckhardt, 2014), high levels of these impelling factors may interact with high levels of relationship tension and alcohol use to predict greater likelihood of IPV on a given day.

Furthermore, within-person deviations in instigating and impelling factors may also increase likelihood of IPV perpetration. Females were more likely to perpetrate both physical and psychological IPV on days in which they experienced increases in negative affect (Shorey et al., 2014b). However, this is the only known study that has examined within-person deviations in impelling factors, despite its value for understanding who is at greatest risk for perpetrating IPV.

Thus, one goal of the current study is to examine whether within-person deviations in instigating and impelling factors influence same-day IPV perpetration, as well as if these factors interact with within-person deviations in alcohol intoxication to predict aggression.

Current Study

Building upon Study 1, the present study utilized daily diary methodology to examine the proximal influence of I^3 risk factors – relationship tension, emotion regulation difficulties, distress intolerance, and alcohol use – on IPV perpetration in a sample of young adults with IPV histories. Participants in intimate relationships completed online surveys in which I^3 risk factors and psychological, physical, and sexual IPV perpetration were measured across 25 days. Utilizing the perfect storm theory derivative of the I^3 model as a guiding framework, the current study includes the following aims and hypotheses: **Aim 2)** Comprehensively examine the perfect storm theory of aggression by investigating the confluence of instigation (e.g., relationship tension), impellance (e.g., emotion regulation difficulties, distress intolerance), and inhibition (e.g., alcohol use) to predict event-level IPV perpetration. Hypothesis 2a: There will be main effects of the I^3 factors such that IPV perpetration likelihood during daily diary will be independently predicted by strong instigation, strong impellance, and weak inhibition. Hypothesis 2b: There will be an interaction between I^3 factors such that IPV perpetration will be more likely when instigation and impellance are strong and when inhibition is weak. **Aim 3)** Evaluate how daily within-person deviations in instigation (e.g., relationship tension), impellance (e.g., emotion regulation difficulties, distress intolerance), and inhibition (e.g., alcohol use) impact same-day IPV perpetration. Hypothesis 3a: IPV perpetration will be more likely on days when instigation is higher than average levels, on days when impellance is higher than average levels, and on days when inhibition is lower than average levels. Hypothesis 3b: Larger

deviations in inhibition (e.g., alcohol use) above one's average will interact with deviations in instigation and impellance to predict increased likelihood of same-day IPV perpetration.

Method

Participants and Recruitment

Individuals (N = 150; 50% male birth sex) were recruited from a Pacific Northwest community to participate in an online study about young adult health, relationships, and daily experiences. Advertisements were placed on online forums (i.e., Craigslist, Reddit), social media (i.e., Instagram, Facebook), and throughout local universities and community colleges. Eligibility criteria targeted individuals who were at greater risk for alcohol-involved IPV perpetration while balancing maximum generalizability of findings. Participants were deemed eligible if they: a) were age 18-30 living in Washington state; b) reported drinking alcohol two times per week in the past three months; c) reported at least one episode of heavy episodic drinking (HED; 4+ drinks in two hours for females, 5+ drinks in two hours for males; NIAAA, 2003) in the past three months; d) were in a self-defined romantic or dating/marital relationship (including those that are non-exclusive or casual); e) had physical or online contact with their partner at least 3-4 times/week; and f) reported perpetrating psychological, physical, or sexual IPV against a partner within the last three months. Due to ethical concerns and Institutional Review Board (IRB) regulations, participants who indicated perpetrating the most severe forms of physical IPV (i.e., beating up a partner and/or using a weapon against a partner) were excluded from the present study. Individuals who were interested in the study could access more information via a study phone number and website, the latter of which also had a link to an anonymous screening questionnaire assessing recruitment criteria.

Participants were on average 24.8 (*SD* = 3.5) years old (see Table 1). When reporting gender identity, 47.6% identified as male, 46.2% identified as female, and 6.2% identified as non-binary, transgender, or other. Half of the sample were students and a majority (56.5%) had received a college or graduate degree. Just over 50% of participants made less than $61,000 while 47.2% made more. Nearly two-thirds (61.4%) of participants identified as White, 16.6% as Asian, 16.6% as Hispanic/Latinx, 15.0% as Multiracial, 3.5% as Black/African American, 2.1% as Native American, and 1.4% as Hawaiian/Pacific Islander. Additionally, around 80% of participants reported being in a committed relationship, whereas 20% reported being in a casual relationship. Average relationship length was 25 months (*SD* = 17.4).

Procedures

The University of Washington IRB Human Subjects Division approved all study procedures. Qualtrics was used for all online survey assessments.

Online and Phone Screening

Interested individuals first completed a short, 5-minute anonymous screening survey online, which included questions about eligibility criteria such as alcohol use, relationship status, and IPV history. Eligible individuals then entered their contact information including their name and phone number into a separate survey if they wanted to participate. Because the study was hosted online, research assistants completed protocols to check for bots and called participants to verify information including their identity, state of residence, and relationship status. Eligible individuals also had the opportunity to ask questions about their study participation at this time.

Baseline Assessment

After the phone call, participants were sent an online baseline assessment via email in which participants completed an electronic informed consent document. Individuals also filled

out demographic survey measures. Participants had two weeks to finish the 1-hour baseline assessment and were compensated $30 in the form of an Amazon.com gift card for completion.

Daily Diary Protocol

Next, participants completed 25 consecutive daily diary surveys beginning the Thursday after they finished the baseline survey. Daily diary assessments were emailed to participants each morning at 8 AM and remained open until 3 PM. Each survey assessed past-day relationship tension, alcohol use, and IPV perpetration, as well as same-day emotion regulation and distress intolerance. Surveys were designed to take five minutes to complete and were accessible via both computer and mobile device to increase ease of responding. To maintain retention across assessments, all participants received email reminders at 12 PM and text message reminders at 1 PM. Additionally, participants were paid $4 to Amazon.com for each completed daily diary survey and a bonus of $25 to Amazon.com for finishing at least 22 out of 25 (~88%) of the daily diary assessments. Participants were reminded that they had the opportunity to earn up to $155 to Amazon.com for completing every survey in the full study. If a daily diary assessment was not completed by 3 PM, the participant was contacted by a trained research assistant the next day to check in, answer any questions, and encourage continued participation.

Measures

Screening Assessment Measures

The screening survey assessed eligibility criteria and included questions about participant age, state of residence, and relationship status. When individuals indicated that they were in a casual or committed relationship, one follow-up question assessed frequency of partner contact either through online or in-person means. Alcohol use in the past three months was assessed with two questions asking about drinking frequency and heavy episodic drinking from the Daily

Drinking Questionnaire (DDQ; Collins et al., 1985) and NIAAA Recommended Alcohol Questions (NIAAA, 2003), respectively. Participants also reported whether they perpetrated any IPV in the past three months (0 = *No*; 1 = *Yes*). Behavioral items were derived from both the Revised Conflict Tactics Scale (CTS-2; Straus et al., 1996) and the Psychological Maltreatment of Women Inventory (PMWI; Tolman, 1999) and included twenty statements (e.g., "I threw something at my partner that could hurt") assessing psychological, physical, and sexual aggression. Moreover, to reduce demand characteristics, positive relationship behaviors (e.g., "I showed respect for my partner's feelings about an issue") derived from the negotiation subscale of the CTS-2 were interspersed throughout IPV items.

Baseline Assessment Measures

Demographics. Participants responded to questions about their age, race/ethnicity, birth sex, gender identity, education status, income, relationship status, and relationship length.

Daily Diary Measures

Relationship Tension. Relationship tension served as a primary measure of previous day instigation and was assessed with one item created by the research team and adapted from the Daily Inventory of Stressful Events (DISE; Almeida et al., 2002). Participants responded to one question about experiences of instigation: "How tense were things with you and your partner yesterday?" on a 5-point Likert scale ranging from 1 = *Not at all tense* to 5 = *Extremely tense*.

State Emotion Regulation. Emotion regulation difficulties served as a primary measure of current day impellance. State emotion regulation was assessed using the eight item State Difficulties in Emotion Regulation Scale (S-DERS; Lavender et al., 2017; $\alpha = .81$). Participants indicated the extent to which each statement (e.g., My emotions feel out of control) was true for

them in the present moment on a scale of 1 = *Not at all* to 5 = *Completely*. All items were summed such that higher scores were indicative of greater emotion regulation difficulties.

Distress Intolerance. Distress intolerance served as another primary measure of current day impellance and was assessed with the 3-item Momentary Distress Intolerance Scale (MDIS; Veilleux et al., 2018; α = .70). Participants responded to each statement (e.g., I want to stop what I am doing right now so I can feel better) on a scale of 1 = *Strongly disagree* to 7 = *Strongly agree*. All items were summed such that higher scores were indicative of greater difficulty tolerating distress.

Alcohol Use. Alcohol use served as a primary measure of previous day inhibition and was assessed with the question: "How many standard drinks did you have yesterday from the time you woke up to the time you went to sleep?" A standard drink was defined as any drink containing half an ounce of absolute alcohol and an image was displayed to participants with examples of standard drink amounts for beer, wine, and liquor. Participants responded to this question on a scale of 0 = *0 drinks* to 25 = *25 or more drinks*. If participants reported IPV on the previous day, only alcoholic drinks consumed prior to IPV perpetration were included. If participants reported no IPV on the previous day, all standard drinks consumed were included.

IPV Perpetration. Participants reported whether any (0 = *No;* 1 = *Yes*) psychological (e.g., I called my partner fat or ugly; 7 items) and/or physical (e.g., I pushed, shoved, grabbed, or slapped my partner; 8 items) IPV occurred with their partner on the previous day using an adapted version of the CTS-2 (Straus et al., 1996) and Psychological Maltreatment of Women Inventory (PMWI; Tolman, 1999). Items assessing positive relationship behaviors from the negotiation subscale of the CTS-2 (e.g., "I showed respect for my partner's feelings about an issue"; 7 items) were interspersed throughout physical and psychological IPV items.

To assess sexual IPV the previous day, participants responded to one question: "Yesterday, did you do any of the following to make your partner engage in sexual activity when they did not want to?" adapted from the Sexual Experiences Survey – Short Form Perpetration (SES-SFP; Koss et al., 2006). Individuals reported any tactics they used (e.g., overwhelmed them with continual arguments or pressure; used or threatened to use some degree of physical force) on the previous day to obtain sexual activity without consent. Any affirmative response to a tactic was counted as sexual IPV for the previous day. Similarly, any positive response to a psychological or physical aggression item from the CTS-2 and PMWI also counted as physical or psychological IPV for the previous day. If any form of psychological, physical, or sexual aggression occurred on the previous day, the participant was scored as having perpetrated any type of IPV (0 = *No IPV*, 1 = *Any IPV*).

Data Analytic Plan

All data were entered online in Qualtrics and downloaded into SPSS and Stata for analyses. Of the 150 participants who completed the baseline survey, three individuals did not finish any daily diary surveys and thus were not included in inferential analyses. Descriptive characteristics were computed for I^3 factors and IPV perpetration during daily diary. Differences in IPV perpetration were calculated by both birth sex (1 = *male*; 2 = *female*) and gender identity (1 = *male*; 2 = *female*; 3 = *nonbinary*). Significant differences only emerged by birth sex (male vs. female), which was then included as a covariate in all inferential analyses.

Because repeated measures were nested within individuals, generalized estimating equations (GEE; Hardin & Hilbe, 2003) were used to examine the event-level association between I^3 factors and IPV perpetration. For all models, the dependent variable referred to the occurrence of any psychological, physical, or sexual IPV perpetration on a given day (0 = *No*

IPV, 1 = *Any IPV*). Due to the binary nature of the outcome variable, we specified a binomial distribution and logit link function. Results are presented using odds ratios which provides a standardized effect size.

To investigate the influence of instigation, impellance, and inhibition on likelihood of IPV perpetration (Aim 2), separate models tested the main effects of I^3 factors, calculated as average levels across the assessment period of relationship tension (instigation model), emotion regulation difficulties and distress intolerance (impellance model), and standard drinks (inhibition model). A fourth main effects model included all four of these factors together (all factors model). To examine the perfect storm theory, model five (interactions model) included two, three-way interactions between 1) relationship tension, emotion regulation difficulties, and standard drinks; and 2) relationship tension, distress intolerance, and standard drinks, as well as all subsumed two-way interactions.

To examine the within-person influence of instigation, impellance, and inhibition on likelihood of IPV perpetration (Aim 3), separate models also tested the main effects of daily deviations in relationship tension (instigation model), emotion regulation difficulties and distress intolerance (impellance model), and standard drinks (inhibition model). A fourth main effects model included daily deviations of all four of these factors together (all factors model). Daily deviations of I^3 factors were calculated as an individual's level on a specific day less their average level of the same variable across the daily assessment period (i.e., $standard\ drinks_{dev} = standard\ drinks_{day} - standard\ drinks_{avg}$). Model five (interactions model) also included two, three-way interactions between daily deviations in relationship tension, standard drinks, and either emotion regulation or distress intolerance, as well as all subsumed two-way interactions. In addition to birth sex (1 = *male;* 2 = *female*), weekend (0 = *weekday*; 1 = *weekend*) and daily

diary day (*1-25*) were included as covariates in all models given that drinking can be more likely on weekends relative to weekdays and that IPV reporting can decrease across daily diary periods. Marginal effects (*ME*) were used to probe significant interactions (McCabe et al., 2021).

Power and sample size considerations

We computed the effective sample size, accounting for 20% attrition from our original *N* of 150 and 80% completion of daily diary surveys. Based on a sample of 120 participants, 20 observations within-individuals, and an estimated ICC of 0.6, the effective sample size would be approximately 194. These analyses were conducted utilizing methods by Snijders and Bosker (2005).

Results

Descriptive Statistics

Descriptive characteristics (see Table 2) were examined for all primary study variables and IPV perpetration. Throughout the daily diary assessment period, participants fully completed 3036 daily surveys and partially completed 25 daily surveys. Participants finished an average of 20.46 daily surveys per person (*SD* = 6.61), with 68% of individuals (n = 102) completing at least 22 out of 25 surveys, enough to receive the bonus payment. Participants reported an average of 9.40 (*SD* = 6.01) drinking days across the daily diary period. Of the 3061 total daily diary surveys, approximately 389 days (12.7%) involved psychological, physical, or sexual IPV perpetration. Alcohol was used by the participant prior to aggression in approximately 68 of these IPV days (17.4%).

Seventy-one percent of the sample (n = 104) perpetrated any type of IPV (i.e., psychological, physical, or sexual) across the daily diary period with an average of 2.63 IPV days (*SD* = 4.00) per person. Approximately two-thirds of the sample (65.3%) indicated

psychological IPV perpetration during daily diary with an average of 2.41 psychological IPV days (*SD* = 3.80) per person. Moreover, 16.3% of participants reported physical IPV perpetration and 12.2% reported sexual IPV perpetration throughout the assessment period with averages of 0.24 (*SD* = 0.66) and 0.32 (*SD* = 1.91) physical and sexual IPV days per person, respectively.

Significant differences were also found in main study variables and IPV perpetration by birth sex. Males reported significantly greater average levels of relationship tension, emotion regulation difficulties, distress intolerance, and standard drinks consumed, though there were no significant differences by birth sex for daily deviations in these factors. Additionally, although no differences emerged between sexes for frequency of IPV perpetration days, there were differences in the number of males and females who perpetrated IPV across the daily diary period. More females (79.5%) reported any IPV perpetration than males (62.2%) during daily diary. Additionally, a greater number of females (76.7%) reported psychological IPV perpetration than males (54.1%) across the 25 days.

Average Levels of I^3 Factors Predicting IPV Perpetration (Aim 2)

To investigate the influence of instigation, impellance, and inhibition on likelihood of IPV perpetration (Aim 2), correlations were computed for average levels of I^3 factors across the daily diary period and IPV perpetration (see Table 3). In the instigation model (see Table 4, Model 1), average relationship tension significantly predicted likelihood of IPV perpetration after controlling for the effects of birth sex, weekend, and daily diary day. In the impellance model (see Table 4, Model 2), average distress intolerance but not average emotion regulation difficulties significantly predicted IPV perpetration likelihood during daily diary after controlling for covariates. However, average standard drinks did not predict IPV perpetration likelihood in the inhibition model (see Table 4, Model 3). When average levels of all I^3 factors and covariates

were included in one model, average relationship tension and average distress intolerance remained significant predictors of IPV perpetration likelihood (see Table 4, Model 4). A one unit increase in average relationship tension was associated with a 285% increase in the odds of IPV perpetration and a one unit increase in average distress intolerance was associated with an 8% increase in the odds of IPV perpetration.

Last, the interactions model added two, three-way interactions between average 1) relationship tension, emotion regulation difficulties, and standard drinks; and 2) relationship tension, distress intolerance, and standard drinks, as well as all subsumed two-way interactions (see Table 5, Model 5). A significant three-way interaction emerged between average levels across the daily diary period of relationship tension, emotion regulation difficulties, and standard drinks predicting IPV perpetration likelihood (see Figure 2). Marginal effects (*ME*) were utilized to probe the effect of average emotion regulation difficulties on IPV perpetration likelihood at high and low levels of average alcohol use (+/- 1 *SD* on average standard drinks) and at high and low levels of average relationship tension (+/- 1 *SD* on average relationship tension).

Only at high levels of both average alcohol use and average relationship tension was there a significant marginal effect of average emotion regulation difficulties on likelihood of IPV perpetration (*ME* = 0.06, *SE* = 0.01, 95% CI: [0.02, 0.10], *p* = .001). There was no significant marginal effect of average emotion regulation difficulties on IPV likelihood at high levels of average alcohol use and low levels of average relationship tension (*ME* = 0.00, *SE* = 0.01, 95% CI: [-0.02, 0.02], *p* = .99), at low levels of average alcohol use and high levels of average relationship tension (*ME* = 0.02, *SE* = 0.01, 95% CI: [-0.01, 0.04], *p* = .07), or at low levels of average alcohol use and low levels of average relationship tension (*ME* = -0.01, *SE* = 0.01, 95%

CI: [-0.01, 0.01], p = .10). The three-way interaction between average levels of relationship tension, distress intolerance, and standard drinks was not significant.

Daily Deviations of I^3 Factors Predicting IPV Perpetration (Aim 3)

To examine the within-person influence of instigation, impellance, and inhibition on likelihood of IPV perpetration (Aim 3), correlations were computed for daily deviations of I^3 factors and IPV perpetration (see Table 6). After controlling for the effects of birth sex, weekend, and daily diary day, deviations in relationship tension from one's average level emerged as a significant predictor of IPV perpetration likelihood in the instigation model (see Table 7, Model 1), whereas no other daily deviations of I^3 factors were associated with IPV perpetration likelihood in the impellance or inhibition models (see Table 7, Models 2-3). When daily deviations for all I^3 factors were included in one model, deviations in relationship tension from one's average level remained a significant predictor of IPV perpetration likelihood (see Table 7, Model 4). A one unit increase in deviation in relationship tension from one's average was associated with a 180% increase in odds of IPV perpetration.

Last, the interactions model added two, three-way interactions between daily deviations from average levels of 1) relationship tension, emotion regulation difficulties, and standard drinks; and 2) relationship tension, distress intolerance, and standard drinks, as well as all subsumed two-way interactions predicting IPV perpetration likelihood (see Table 8, Model 5). No significant interactions emerged. Deviations in relationship tension from one's average level, however, continued to predict likelihood of IPV perpetration in the interactions model.[1]

Discussion

This is the first study to examine relationship tension, emotion regulation difficulties, distress intolerance, and alcohol use as proximal risk factors for IPV perpetration using a daily

diary protocol. Results add to a body of research examining psychological, physical, and sexual IPV in the context of the I^3 model (Finkel, 2007; Finkel & Eckhardt, 2014) and provide support for the perfect storm theory at the event-level, demonstrating that instigation, impellance, and inhibition interact to predict IPV perpetration in young adults with IPV histories. Importantly, this study attempted to move away from siloed investigations of IPV by assessing psychological, physical, and sexual aggression among intimate partners, the latter of which has been rarely included in daily diary studies. Additionally, the present examination focused on several understudied behavior patterns, including the extent to which individuals deviate on a given day from their average levels of instigation, impellance, and inhibition, as risk factors for perpetrating IPV.

Seventy-one percent of the sample reported approximately 389 days of IPV perpetration throughout the daily diary period. Compared to other daily diary studies examining aggression among intimate partners over three months (Shorey et al., 2014a; 2014b; Stappenbeck et al., 2016), this sample demonstrated as many or more IPV events in an even shorter time period of 25 days. This is likely due to our recruitment criterion requiring that individuals report a recent history of IPV to participate. Thus, results of the present study should be contextualized within the community sample from which they were derived - young adults in relationships who use alcohol and who had already demonstrated some form of aggression with a partner in the past three months. This differs from previous event-level work that has primarily focused on college students that may or may not have histories of IPV.

In alignment with past research on IPV prevalence (Shorey et al., 2015), psychological aggression was the most common type of IPV perpetration reported throughout the daily diary period, followed by physical and sexual aggression, respectively. Males also reported higher

levels of average relationship tension, emotion regulation difficulties, distress intolerance, and standard drinks compared to females. More females than males, however, reported any type of IPV perpetration, a difference that was largely driven by the finding that females were also more likely to report any psychological IPV perpetration during the daily diary period. Although past research has generally demonstrated gender symmetry in psychological and physical IPV perpetration, some studies have shown higher rates of psychological aggression among females (for review, see Chan, 2011). Differences may also exist between males and females in their willingness to disclose IPV perpetration, with some studies finding that females were more likely to self-identify as perpetrators of violence compared to males (Caetano et al., 2002; Robertson & Murachver, 2007).

Results provided partial support for Hypothesis 2a that IPV perpetration during daily diary would be independently predicted by strong instigation, strong impellance, and weak inhibition. When examining the influence of average levels of I^3 factors on IPV perpetration likelihood, relationship tension and distress intolerance emerged as significant predictors in separate instigation and impellance models, highlighting that increases in each of these factors influence IPV perpetration likelihood on their own. In contrast with previous work demonstrating a strong relation between alcohol use and IPV (for review, see Cafferky et al., 2016), average standard drinks did not significantly predict IPV perpetration likelihood by itself in an inhibition model. When all factors were included in one model, average relationship tension and distress intolerance remained significant predictors of IPV perpetration likelihood while controlling for the effects of average emotion regulation difficulties and standard drinks, though the impact of relationship tension was larger than that of distress intolerance. This is the first study to find that average distress intolerance across 25 daily diary days influenced IPV

perpetration likelihood in the same time period and adds to burgeoning research examining this regulatory construct as a risk factor for IPV.

Moreover, results provided support for Hypothesis 2b that I^3 factors would interact such that IPV would be more likely when instigation and impellance were strong and when inhibition was weak. Indeed, a three-way interaction was found between average levels of relationship tension, emotion regulation difficulties, and standard drinks predicting IPV perpetration likelihood during the daily diary period. Average emotion regulation difficulties exerted a significant positive effect on IPV perpetration likelihood only at high levels of both average alcohol use and average relationship tension. Thus, emotion regulation abilities were particularly important across the 25 days for individuals who experienced high instigating tension with their partners as well as low inhibition by consuming greater amounts of alcohol. Notably, emotion regulation difficulties did not impact IPV perpetration likelihood when either average alcohol use or average relationship tension were low. Thus, it appears that "perfect storm" conditions were created specifically when participants experienced high relationship tension and difficulty regulating emotional responses, resulting in an urge-readiness to aggress. This, coupled with weak inhibition from high levels of drinking may have contributed to greater IPV likelihood across the 25 days. This was the first daily diary study to examine the proximal effects of relationship tension, emotion regulation difficulties, and alcohol on IPV perpetration likelihood, adding support for the I^3 model and emphasizing the importance of regulatory factors such as emotion regulation.

Findings also provided partial support for Hypothesis 3a that IPV perpetration would be more likely on days when instigation was higher than average levels, on days when impellance was higher than average levels, and on days when inhibition was lower than average levels.

When examining the within-person influence of instigation, impellance, and inhibition on likelihood of IPV perpetration, deviations in relationship tension from one's average level emerged as a significant predictor of IPV perpetration likelihood in an instigation model. In contrast to expectation, deviations from one's average level of emotion regulation difficulties, distress intolerance, and standard drinks had no impact on IPV perpetration likelihood. This finding was bolstered by a fourth model which found that deviations in relationship tension from average predicted IPV perpetration likelihood while controlling for the effects of deviations from one's average for emotion regulation difficulties, distress intolerance, and standard drinks. It appears that the within-person effects of instigation were more impactful than the within-person effects of impellance or inhibition; on days when individuals experienced higher levels of relationship tension than average, they were significantly more likely to perpetrate IPV that day. Diverging from previous research (Stappenbeck et al., 2016), drinking above one's average level of alcohol use was not associated with greater IPV perpetration likelihood. It is possible that in our sample recruited specifically for individuals with IPV histories, participants were less influenced by large fluctuations in alcohol intoxication. For example, as was evident in the model examining average-level effects of I^3 factors, alcohol may only exert its effect in conjunction with high instigation and impellance for these individuals.

Results also did not support Hypothesis 3b that larger deviations in inhibition (e.g., alcohol use) above one's average would interact with deviations in instigation and impellance to predict increased likelihood of same-day IPV perpetration. Indeed, there were no significant three-way interactions between deviations in relationship tension, regulatory factors, and standard drinks, though deviations from one's average level of relationship tension remained a significant predictor of IPV perpetration likelihood. It is interesting to note that while average

levels across the daily diary period of instigation, impellance, and inhibition interacted to predict IPV likelihood, daily deviations in these factors did not function in the same way. It is plausible that individuals with IPV histories have developed patterns of responding to instigation in ways that are more dependent on their typical abilities and are less dependent on day-to-day changes. For example, aggression may be a normative or patterned response for individuals who generally experience high levels of relationship tension, emotion dysregulation, and alcohol use. Moreover, in accordance with qualitative studies examining reasons for IPV perpetration (Stuart et al., 2006), aggression may even function as an ineffective way to regulate emotion among individuals who are highly dysregulated, potentially in response to greater levels of partner conflict. Thus, while one's average proclivity to instigation, impellance, and inhibition remains prominent, daily fluctuations in instigation are also important to consider when predicting IPV risk.

Limitations

This study does have several limitations. Investigating IPV perpetration is challenging due to the sensitive nature of the behaviors being examined. Utilizing daily diary methods to conduct this type of research poses an ethical dilemma; while investigating proximal predictors of IPV is necessary to inform interventions, IPV is also a harmful behavior with unique human subjects concerns. In collaboration with the IRB and NIH, the research team took necessary steps to protect participants from harm, such as refraining from asking identifying questions about participants' partners and excluding individuals with histories of severe physical IPV. Notably, this precludes us from drawing conclusions about individuals who exhibit the most severe forms of IPV who we would want to create interventions for. Nevertheless, this study did recruit a

sample at higher risk for IPV compared to previous daily diary studies given the requirement of aggression perpetration in the previous three months.

Another limitation of the current study is that the daily diary portion only lasted for 25 days. While a longer period of data collection would have been preferable, monetary and feasibility concerns influenced our decision to maintain a reporting time frame of just under one month. Given that high risk alcohol-related events may be more likely to occur on weekends (Neal & Fromme, 2007) and that IPV-related emergency room visits increase on weekends (Khurana et al., 2022), the daily diary period started on a Thursday specifically to capture IPV perpetration across four separate weekends, though weekend day never emerged as a significant covariate in inferential analyses. Additionally, a daily diary period longer than 25 days would have resulted in more opportunities for daily fluctuations in I^3 risk factors. It is possible that with only 25 reports, there were simply too few daily fluctuations from average in I^3 risk factors to draw meaningful conclusions about the impact of these within-person deviations on IPV.

Other common concerns with daily diary examinations of IPV include retention as well as social desirability bias. Fortunately, approximately 70% of participants received a bonus payment, meaning that they completed almost 90% of their daily diary surveys over the 25 days. This was likely due to frequent phone and text reminders from the study team to participants. Though we did not include an explicit measure of social desirability because of survey time constraints, all participants reported IPV perpetration during the previous screening and baseline surveys, suggesting that they were likely and willing to disclose this information during daily diary. Nevertheless, future research should attempt to measure social desirability and potential differences in disclosures of IPV reports among participants.

Last, while daily diary designs enable a greater understanding of proximal risk factors for IPV perpetration, they still lack the precision that ecological momentary assessments (EMA) multiple times per day can provide. For example, though this study assessed the level of relationship tension an individual experienced yesterday, the exact time in which the participant experienced this tension compared to when they perpetrated IPV, or how levels of tension changed throughout the day, was not assessed. Moreover, dyadic research involving both partners may add even more nuance to this type of assessment by including mutual reports of I^3 factors and IPV, which could lead to a greater understanding of how IPV events unfold within couples.

Implications for Clinical Interventions

Even so, the present study provides several important avenues for IPV intervention refinement and specifically supports a treatment approach informed by the I^3 metatheoretical framework. Though a majority of current IPV interventions use a unidimensional approach to treatment, the current investigation demonstrates that IPV risk is in fact more complex and can even result from a "perfect storm" of instigating, impelling, and disinhibiting risk factors. Thus, current interventions may benefit from expanding the risk factors that they target, especially in group settings, or personalizing interventions to an individual's specific set of I^3 risk factors if providing treatment in a one-on-one setting (for review, see Massa et al., 2020). Moreover, this study offers support for "just-in-time" interventions that could be delivered daily or in response to high-risk situations, such as greater levels of relationship tension on a specific day or a prolonged period of high relationship tension over several days.

Importantly, this study was the first to use daily diary methodology to link average levels of distress intolerance and IPV perpetration likelihood, suggesting that IPV interventions may

benefit from teaching individuals how to sit with high levels of distress including physiological arousal. For example, distress tolerance skills from Dialectical Behavior Therapy (DBT; Linehan, 2014) teach strategies for dealing with painful or distressing feelings and not acting in ways that make a situation worse (i.e., perpetrating IPV). Moreover, because average levels of relationship tension as well as relationship tension above one's average level were associated with higher IPV perpetration likelihood, interventions may include psychoeducation components that instruct participants how to use stimulus control techniques (e.g., reduce partner contact) to decrease levels of instigation in their relationships.

Additionally, individuals who perpetrate IPV may benefit from learning about how high instigation, high impellance, and low inhibition influence IPV perpetration. Specifically, results of this study point to the importance of emotion regulation abilities when relationship tension and alcohol use are high. Emotion regulation skills from cognitive behavioral therapy (Ellis, 2008) or DBT (Linehan, 2014), such as techniques for identifying and changing emotional responses or acting opposite of an ineffective emotion urge could be incorporated into existing IPV interventions. Individuals may also benefit from psychoeducation about how IPV can function as an ineffective solution for regulating intense emotion, especially when intoxicated. Unfortunately, IPV interventions rarely target alcohol use (Shorey et al., 2012) despite its role in predicting risk for IPV. For example, harm reduction skills such as protective behavioral strategies (Martens et al., 2004) or normative feedback (Schumacher et al., 2011) could be given to IPV perpetrators who also drink alcohol. Notably, in support of our study findings, Leonard and colleagues (2017) concluded that the effectiveness of IPV interventions targeting alcohol use may also depend on the balance of instigating and inhibiting forces an individual experiences.

This highlights the need to create IPV interventions that also target other I^3 factors concurrently with alcohol use.

In addition to general interventions aimed to increase emotion regulation abilities or decrease alcohol use, future research should examine the utility of just-in-time interventions delivered daily or in response to a high-risk situation (e.g., partner conflict). These types of interventions could remind participants of a specific emotion regulation skill and/or deliver messages aimed at reducing alcohol use. It is important to note, however, that messages targeting emotion regulation may not be as effective if an individual is also drinking. Thus, research aiming to understand how to deliver these types of interventions during periods of acute intoxication may be beneficial.

Conclusions

This study provides support for the perfect storm theory of aggression, demonstrating that high average levels of instigation (e.g., relationship tension), high average levels of impellance (e.g., emotion regulation difficulties), and low average levels of inhibition (e.g., alcohol use) interacted to predict IPV perpetration likelihood among young adults with IPV histories. This was the first study to use a daily diary protocol to examine relationship tension, emotion regulation difficulties, distress intolerance, and alcohol use using the I^3 framework. Moreover, deviations in relationship tension above one's average level emerged as a significant predictor of IPV perpetration likelihood. Effectiveness of intervention efforts may be increased by addressing the confluence of these risk factors and/or by delivering just-in-time interventions for this population.

Figure 1. The I^3 model's seven paths predicting IPV perpetration

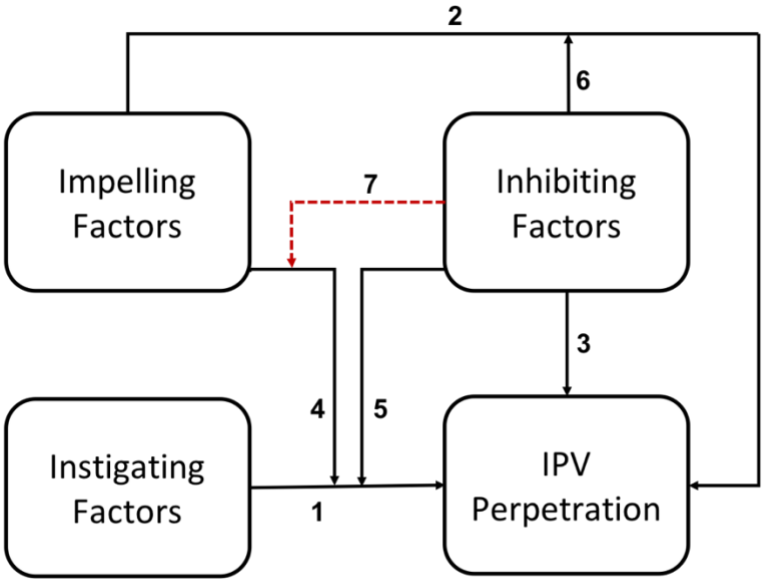


Figure 1. The I^3 model's seven paths predicting IPV perpetration.

Table 1. Demographics

	N = 147
Age	M = 24.8 (*SD* = 3.45)
Sex	
Male	49.7%
Female	50.3%
Gender Identity	
Male	47.6%
Female	46.2%
Non-binary/Transgender/Other	6.2%
Race and Ethnicity	
White/Caucasian	61.4%
Asian	16.6%
Hispanic/Latinx	16.6%
Multiracial/Other	15.0%
Black/African American	3.5%
Native American	2.1%
Hawaiian/Pacific Islander	1.4%
Education Level	
High school graduate or GED	19.3%
Some college	24.1%
College graduate	46.2%
Graduate degree	10.3%
Student Status	
Non-student	49.3%
Part- or full-time student	50.7%

Income	
Less than $10,999	9.2%
$11,000-20,999	7.0%
$21,000-30,999	10.6%
$31,000-40,999	10.6%
$41,000-50,999	8.5%
$51,000-60,999	7.0%
More than $61,000	47.2%
Relationship Status	
Casual relationship or partnership	20.7%
Committed relationship or partnership	79.3%
Relationship Length (Months)	M = 24.9 (*SD* = 17.4)

Table 2. Descriptive characteristics of Aim 2 and 3 variables predicting likelihood of IPV perpetration during daily diary reported by birth sex

	N			
Total daily diary days fully completed	3036			
Total daily diary days partially completed	25			
Total IPV perpetration days	389 (12.5%)			
	Total Sample (N = 147)	Males (n = 74)	Females (n = 73)	*t* test
	M (*SD*)	M (*SD*)	M (*SD*)	
Relationship tension (avg)	1.67 (0.53)	1.72 (0.55)	1.62 (0.50)	4.81***
Relationship tension (daily)	.00 (0.83)	.00 (0.80)	.00 (0.86)	0.01
ER difficulties (avg)	14.11 (4.03)	14.36 (3.88)	13.87 (4.15)	3.31**
ER difficulties (daily)	0.12 (3.01)	-0.01 (2.78)	0.03 (3.21)	-0.38
Distress intolerance (avg)	6.54 (2.53)	6.68 (2.61)	6.41 (2.46)	2.96*
Distress intolerance (daily)	.00 (2.62)	-0.02 (2.43)	0.02 (2.78)	-0.32
Standard drinks (avg)	1.49 (1.18)	1.72 (1.42)	1.28 (0.84)	10.47***
Standard drinks (daily)	.00 (2.09)	.00 (2.32)	.00 (1.83)	.00

Daily diary days completed	20.46 (6.61)	19.96 (6.76)	21.52 (5.52)	-1.52
Drinking days	9.40 (6.01)	9.28 (6.48)	9.52 (5.57)	-0.24
IPV perpetration days	2.63 (4.00)	2.13 (3.44)	3.14 (4.45)	-1.53
Psychological IPV days	2.41 (3.80)	1.85 (3.25)	2.97 (4.23)	-1.79
Physical IPV days	0.24 (0.66)	0.25 (0.60)	0.24 (0.72)	0.13
Sexual IPV days	0.32 (1.91)	0.17 (0.50)	0.47 (2.65)	-0.96
	N (%)	N (%)	N (%)	χ^2 test (1 *df*)
Any IPV perpetration	104 (70.7%)	46 (62.2%)	58 (79.5%)	4.95*
Any psychological IPV	96 (65.3%)	40 (54.1%)	56 (76.7%)	8.00**
Any physical IPV	24 (16.3%)	13 (17.6%)	11 (15.1%)	0.20
Any sexual IPV	18 (12.2%)	9 (12.2%)	9 (12.3%)	0.00

Note. ER = emotion regulation; avg = average level across daily diary period; daily = level on specific day minus average across daily diary period. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 3. Correlations for Aim 2 variables including average levels of I^3 factors across daily diary predicting IPV perpetration during daily diary

	1.	2.	3.	4.	5.
1. Relationship tension	--				
2. Emotion regulation difficulties	.44**	--			
3. Distress intolerance	.43**	.79**	--		
4. Standard drinks	.16**	.22**	.23**	--	
5. IPV perpetration yesterday (yes/no)	.24**	.14**	.17**	.02	--

Note. IPV = intimate partner violence; *$p < .05$. **$p < .01$

Table 4. Results of GEE models examining the influence of average-level (across daily diary period) I^3 factors at daily diary predicting likelihood of IPV perpetration during daily diary (Aim 2)

	Instigation Model		Impellance Model		Inhibition Model		All Factors Model	
	Model 1		Model 2		Model 3		Model 4	
	b	OR (95% CI)	*b*	OR (95% CI)	*b*	OR (95% CI)	*b*	OR (95% CI)
Birth sex	.46**	1.58 (1.19, 2.10)	.37*	1.44 (1.07, 1.94)	.33*	1.40 (1.02, 1.90)	.44*	1.55 (1.16, 2.08)
Day	-.01	0.99 (0.97, 1.00)	-.01	0.99 (0.97, 1.01)	-.02	0.98 (0.96, 1.00)	-.01	0.99 (0.97, 1.00)
Weekend	-.09	0.91 (0.71, 1.16)	-.09	0.92 (0.72, 1.16)	-.10	0.91 (0.72, 1.14)	-.09	0.91 (0.71, 1.16
Relationship tension	1.21***	3.36 (2.65, 4.26)	--	--	--	--	1.05***	2.85 (2.17, 3.75)
Emotion regulation difficulties	--	--	.02	1.02 (0.97, 1.08)	--	--	-.01	1.00 (0.95, 1.05)
Distress intolerance	--	--	.14**	1.15 (1.06, 1.26)	--	--	.07*	1.08 (1.00, 1.18)
Standard drinks	--	--	--	--	.07	1.07 (0.94, 1.22)	-.04	0.96 (0.85, 1.08)

Note. OR = odds ratio; CI = confidence interval; *$p < .05$. **$p < .01$. ***$p < .001$.

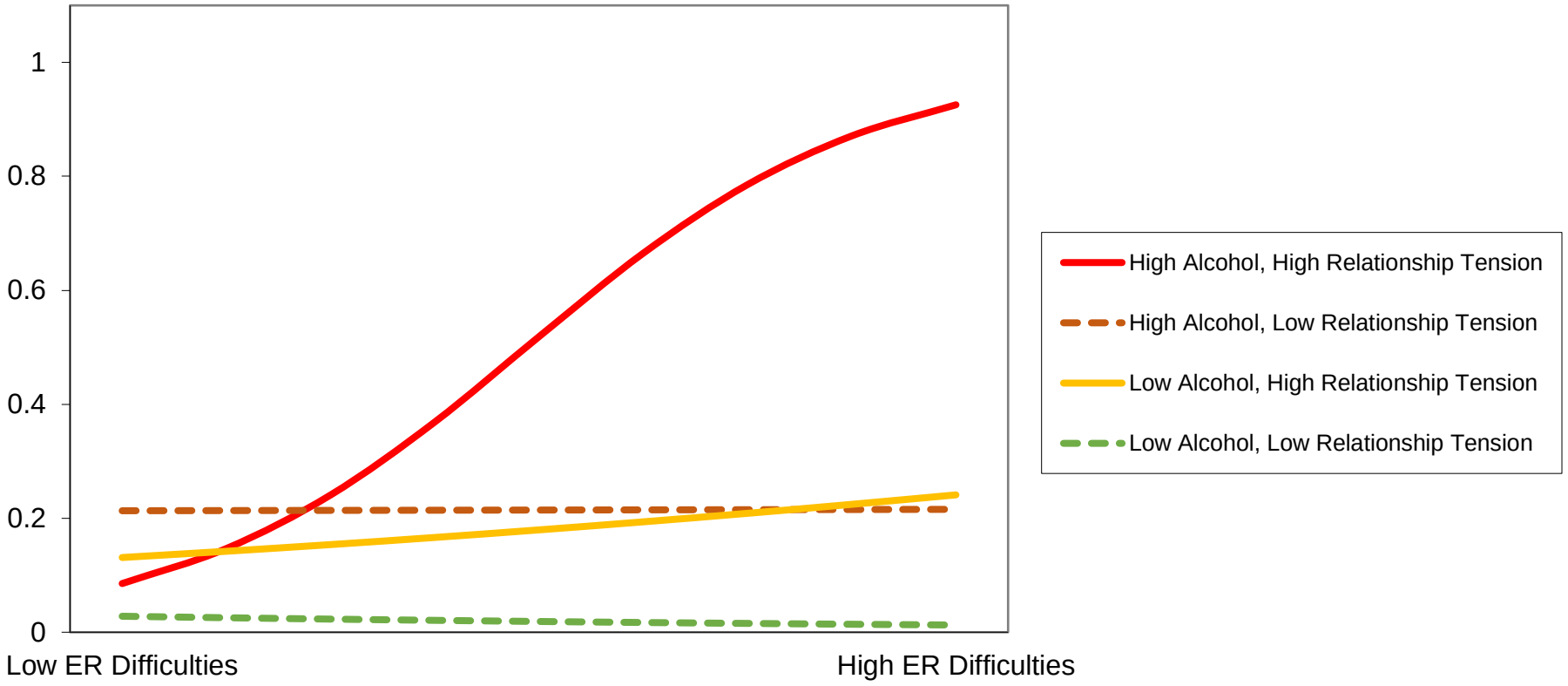
Table 5. Results of GEE model examining the influence of interactions between average-level (across daily diary period) I^3 factors predicting likelihood of IPV perpetration during daily diary (Aim 2)

	Interactions Model	
	Model 5	
	b	OR (95% CI)
Birth sex	.44**	1.55 (1.16, 2.08)
Day	-.01	0.99 (0.97, 1.00)
Weekend	-.08	0.92 (0.72, 1.18)
Relationship tension	3.72**	15.24 (2.37, 98.13)
ER difficulties	-.11	0.89 (0.60, 1.34)
Distress intolerance	.41	1.50 (0.92, 2.45)
Standard drinks	2.08*	8.03 (1.29, 49.86)
Relationship tension x Emotion regulation difficulties	-.07	0.93 (0.76, 1.14)
Relationship tension x Distress intolerance	-.02	0.98 (0.77, 1.26)
Relationship tension x Standard drinks	-1.55***	0.21 (.07, 0.61)

Emotion regulation difficulties x Standard drinks	-.05	0.95 (0.80, 1.13)
Distress intolerance x Standard drinks	-.14	0.87 (0.68, 1.12)
Relationship tension x Emotion regulation difficulties x Standard drinks	.09*	1.10 (1.00, 1.20)
Relationship tension x Distress intolerance x Standard drinks	-.01	0.99 (0.87, 1.12)

Note. OR = odds ratio; CI = confidence interval. *$p < .05$. **$p < .01$. ***$p < .001$.

Figure 2. Average emotion regulation difficulties, relationship tension, and standard drinks across daily diary period interact to predict likelihood of IPV perpetration across daily diary period.



Note. ER = emotion regulation; alcohol = average standard drinks over the daily diary period. Low and high levels refer to -1 *SD* below the mean and +1 *SD* above the mean.

Table 6. Correlations for Aim 3 variables including daily deviations of I^3 factors predicting IPV perpetration during daily diary

	1.	2.	3.	4.	5.
1. Relationship tension	--				
2. Emotion regulation difficulties	.13**	--			
3. Distress intolerance	.15**	.50**	--		
4. Standard drinks	-.02	-.03	-.02	--	
5. IPV perpetration yesterday (yes/no)	.20**	.02	.03	-.02	--

Note. IPV = intimate partner violence; daily deviations of I^3 factors refer to an individual's level of an I^3 factor on a specific day less their average of that factor across the daily diary period. *$p < .05$. **$p < .01$

Table 7. Results of GEE models examining the influence of daily deviations of I^3 factors at daily diary predicting likelihood of IPV perpetration during daily diary (Aim 3)

	Instigation Model		Impellance Model		Inhibition Model		All Factors Model	
	Model 1		Model 2		Model 3		Model 4	
	b	OR (95% CI)	*b*	OR (95% CI)	*b*	OR (95% CI)	*b*	OR (95% CI)
Birth sex	.29	1.34 (0.99, 1.82)	.26	1.29 (0.95, 1.77)	.20*	1.34 (1.00, 1.82)	.25	1.28 (0.93, 1.76)
Day	-.01	0.99 (0.97, 1.01)	-.02	0.98 (0.96, 1.01)	-.02	0.98 (0.97, 1.00)	-.01	0.98 (0.97, 1.01)
Weekend	-.10	0.90 (0.72, 1.14)	-.09	0.91 (0.72, 1.15)	-.03	0.97 (0.77, 1.23)	-.04	0.96 (0.75, 1.22)
Relationship tension	.59***	1.80 (1.62, 2.00)	--	--	--	--	.59***	1.81 (1.62, 2.02)
Emotion regulation difficulties	--	--	-.01	0.98 (0.95, 1.03)	--	--	-.02	0.98 (1.04, 2.02)
Distress intolerance	--	--	.02	1.02 (0.98, 1.07)	--	--	.01	1.00 (0.96, 1.05)
Standard drinks	--	--	--	--	-.05	0.95 (0.90, 1.00)	-.04	0.96 (0.91, 1.01)

Note. OR = odds ratio; CI = confidence interval; daily deviations of I^3 factors refer to an individual's level of an I^3 factor on a specific day less their average of that factor across the daily diary period. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 8. Results of GEE model examining the influence of interactions between daily deviations of I^3 factors predicting likelihood of IPV perpetration during daily diary (Aim 3)

	Interactions Model Model 5	
	b	OR (95% CI)
Birth sex	.24	1.27 (0.92, 1.77)
Day	-.01	0.99 (0.97, 1.01)
Weekend	-.03	0.97 (0.76, 1.23)
Relationship tension	.59***	1.80 (1.61, 2.01)
ER difficulties	-.01	0.99 (0.95, 1.03)
Distress intolerance	.02	1.02 (0.97, 1.06)
Standard drinks	-.04	0.96 (0.91, 1.02)
Relationship tension x Emotion regulation difficulties	-.01	0.99 (0.96, 1.03)
Relationship tension x Distress intolerance	-.02	0.98 (0.95, 1.02)
Relationship tension x Standard drinks	-.05	0.95 (0.90, 1.01)
Emotion regulation difficulties x Standard drinks	.01	1.00 (0.99, 1.02)

Distress intolerance x Standard drinks	.01	1.01 (0.99, 1.04)
Relationship tension x Emotion regulation difficulties x Standard drinks	-.01	0.99 (0.97, 1.01)
Relationship tension x Distress intolerance x Standard drinks	.01	1.01 (0.99, 1.02)

Note. OR = odds ratio; CI = confidence interval; daily deviations of I^3 factors refer to an individual's level of an I^3 factor on a specific day less their average of that factor across the daily diary period. *$p < .05$. **$p < .01$. ***$p < .001$.

Footnote

[1]We also considered that it would be interesting to examine the effects of average levels of I^3 factors across the daily diary period and daily deviations in I^3 factors in the same model. Thus, we ran one model including all covariates, main effects of average levels of I^3 factors, main effects of daily deviations of I^3 factors, as well as two, three-way interactions for average levels of I^3 factors, two, three-way interactions for daily deviations of I^3 factors, and all subsumed two-way interactions. Results in this model were the same as the two separate average-level and daily deviations models presented in this paper.

General Discussion

The present dissertation was comprised of two studies that investigated the impact of relationship tension, regulatory factors, and alcohol use on IPV perpetration among young adults with recent IPV histories. Utilizing the I^3 model as a guiding framework, study one examined the effect of these risk factors on both IPV perpetration history and IPV perpetration aggregated across a daily diary period. Study two expanded on this investigation of distal risk factors for IPV by assessing the same factors day-to-day across 25 daily diary days as proximal predictors of IPV perpetration likelihood. Results across both studies demonstrated that instigating, impelling, and inhibiting factors may interact with each other to predict IPV perpetration, with study two specifically providing support for the perfect storm theory of aggression (Finkel, 2007; Finkel & Eckhardt, 2014).

This dissertation is innovative in several ways, including a move away from siloed studies with regard to sex and type of aggression investigated, the use of cross-sectional, prospective, and daily diary designs to examine novel predictors of IPV perpetration, and a focus on understudied behavior patterns – the extent to which an individual deviates from their own average level of instigation, impellance, and inhibition – as risk factors for perpetrating IPV. Aggression research often occurs in silos; thus, most studies have examined physical and psychological IPV perpetration separately from sexual IPV perpetration (Hamby, 2014; Hamby & Grych, 2013). Perpetrators of one form of aggression are likely to perpetrate other forms of aggression, and many types of interpersonal violence are intercorrelated (Grych & Swan, 2012; Hamby & Grych, 2013). Despite this knowledge, the barrier between subtypes of aggression has persisted, resulting in restricted progress in understanding why some individuals are at greater risk for perpetrating IPV and constraining integrated interventions for perpetrators (Gulati et al.,

2019). The present dissertation aimed to overcome this barrier by examining all three forms of IPV perpetration and comprehensively assessing instigating, impelling, and inhibiting risk factors in both studies, as opposed to disparately. One goal of these methodological innovations was to advance our understanding of the confluence of I^3 factors that predict IPV perpetration and inform next steps in the development and refinement of IPV interventions.

Currently, a majority of IPV treatment is conducted utilizing psychoeducational groups known as the Duluth model for male perpetrators, which asserts that IPV is the result of male socialization and the need for power and control over his female partner (Butters et al., 2020). These types of interventions, which are often implemented via court-mandated batterer intervention programs, have not been effective in reducing IPV. Additionally, because the Duluth model focuses on gender roles and male power and control, it does not address perpetrators of IPV that identify as female or gender or sexual minorities. Interestingly, in a 2013 update by Washington State's Institute for Public Policy, researchers concluded that though they found no effect of the Duluth model on IPV recidivism, they also could not identify any other intervention with enough evidence to replace a Duluth-based approach (Miller et al., 2013). While treatments with individuals arrested for IPV have primarily used the Duluth model, there are also very few interventions for young adults who are not being adjudicated, as is the case with our sample. As a result, there remains a high need for science-informed IPV interventions for both of these populations.

Findings from both studies underscored that general difficulty regulating emotion and/or tolerating distress increased risk for IPV perpetration. Fortunately, there are already established evidence-based interventions, such as Dialectical Behavior Therapy (DBT; Linehan, 2014) that include skills targeting these specific constructs. In fact, although DBT has shown support for

reducing anger and general aggressive behavior among individuals with borderline personality disorder (Frazier & Vela, 2014), its efficacy has not been examined among individuals who perpetrate violence against an intimate partner (Butters et al., 2020). Future work should continue to explore how emotion regulation and distress tolerance strategies can be incorporated into interventions aiming to increase general levels of these regulatory factors among IPV perpetrators. As such, it will be important to measure IPV outcomes over time to ascertain whether teaching these skills reduces frequency or severity of IPV perpetration with different populations.

Importantly, alcohol and aggression scholars continue to highlight the need for individual-level, personalized IPV interventions (Butters et al., 2020) that offer more flexibility and consider alcohol use alongside additional instigating and inhibiting forces (Leonard & Quigley, 2017). For example, IPV interventions will likely look different depending on treatment setting (e.g., college campus vs. court-mandated program). It is important to note that in the current dissertation, instigating, impelling and inhibiting factors interacted in different ways to predict IPV perpetration among a specific population - young adults who engaged in moderate drinking and who reported IPV perpetration in the past three months. Notably, there were also other established risk factors for IPV that were not investigated in the current study, such as trauma, drug use, or personality characteristics, that have the potential to interact with additional I^3 factors to predict IPV risk. Personalized interventions for IPV could use the I^3 model as an organizing framework for comprehensively assessing and understanding an individual's specific I^3 risk factors or considering all combinations of risk in a group treatment setting (Massa et al., 2020).

Last, results of the present dissertation also point to the use of just-in-time interventions for IPV perpetration among individuals who have access to smartphones, such as the young adults included in this sample. For example, results of study two, particularly that emotion regulation was most important when relationship tension and alcohol use were high, and that relationship tension above one's average was associated with greater IPV likelihood the same day, can inform interventions that are administered daily or in response to high-risk situations (e.g., text message or phone interventions). This is in alignment with recent calls for "in the moment" IPV interventions that can be applied during episodes of acute intoxication (Parrott & Eckhardt, 2018). Future research should examine the effectiveness of implementing evidence-based skills targeting regulatory constructs and alcohol use with this type of protocol.

In sum, the current dissertation comprehensively examined risk factors for physical, psychological, and sexual IPV using baseline and daily diary assessments among 150 young adults with IPV histories. Using the I^3 model, we found that instigation, impellance, and inhibition were each associated with IPV perpetration and even interacted to predict IPV perpetration likelihood during a daily diary period. This novel, event-level assessment of the perfect storm theory provides additional ways to augment and refine IPV interventions. The goal of the present dissertation was to conduct basic science research to move the needle forward on avenues for IPV intervention. Next steps in this arena include creating and examining the effectiveness of interventions that a) use the I^3 model as a guiding framework; b) emphasize regulatory factors, alcohol use, and relationship tension, and/or c) use just-in-time interventions approaches with young adults.

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Acknowledgments

Funding for this research was provided by a National Research Service Award from the National Institute on Alcohol Abuse and Alcoholism (F31AA028144) to Natasha K. Gulati. Participant funding was provided by the University of Washington Alcohol and Drug Abuse Institute Small Grant Program (ADAI-0320-4) awarded to Natasha K. Gulati. Training in alcohol research was also funded by a training grant from the National Institute on Alcohol Abuse and Alcoholism (T32AA07455; PI: Mary Larimer, Ph.D.).

This research would not be possible without the guidance of my research advisor, William H. George, Ph.D. and co-advisor, Mary Larimer, Ph.D. at the University of Washington, who have offered countless resources and supervision over the last six years. I would also like to extend a special thank you to Cynthia Stappenbeck, Ph.D., who introduced me to the field of IPV research and has been an unwavering supporter, statistical consultant, and advocate for my work ever since. All three of these individuals, as well as Kelly Cue Davis, Ph.D., have served as members of my project sponsorship team and have spent many generous hours contributing to my development as a researcher and scholar. I would also like to thank my dedicated research assistants who helped execute this project, Christina Nguyen, Sashi Govier, Zola Eaton, and Bridget Leonard.

Last, thank you to my partner, parents, siblings, lab members past and present, and cohort. You have all remained steadfast allies throughout the last decade of doctoral applications and seven years of graduate school. You each continue to inspire my curiosity for science and interest in lifelong learning.