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# Consequences of Revenge Related Pleasure: The Sweet and the Bitter

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## Abstract

Previous research associated revenge with positive feelings. However, the implications of revenge-related positive feelings remain unknown. This research addresses this gap. Building upon the work of Chester and DeWall (2017) on affect improving qualities of revenge, I investigated whether revenge-related positive affect facilitates the desire to *both* harm and to forgive the provocateur. Additionally, I also tested whether extrinsic reward attenuates the effect of provocation on the desire for revenge.

Study 1 found that revenge was related to positive affect, which was positively associated with the desire to hurt and forgive the provocateur. Mediation analyses showed that post-revenge positive affect partially mediated the link between revenge and willingness to forgive but did not mediate the link between revenge and desire to harm the provocateur.

Study 2 demonstrated that provocation (i.e., insulting feedback from another individual) increased negative affect, which then predicted retaliatory aggression. Revenge was unrelated to the positive affect. On the contrary, it was associated with negative affect, which further fostered a desire to hurt, but not forgive the provocateur.

Study 3 found that the relationship between provocation (i.e., insulting feedback from another individual) and intentions toward the provocateur was serially mediated by pre-revenge negative affect, revenge, and post-revenge positive affect. As hypothesized, revenge-related positive affect facilitated desire to harm and forgive the provocateur, but not to avoid them. Nonetheless, revenge was also associated with negative affect, which fueled subsequent intentions toward the provocateur. Study 4 replicated these findings in the context of real-life provocation (i.e., rejection by another individual).

Finally, Study 5 demonstrated that extrinsic reward attenuates the effect of provocation on the desire for revenge. Insulted participants who were led to believe their

provocateur won the reward desired revenge more than insulted participants who were led to believe they won the reward.

These findings indicate that revenge is neither entirely positive nor negative as it simultaneously elicits positive and negative affect. Revenge-related positive affect helps combat provocation-related negative affect, and this positive affect promotes both retribution and reconciliation. Suggesting that revenge is driven by the desire to feel good, this research showed that reaping hedonistic rewards from sources other than revenge inhibits vengeful motivation following the provocation.

*Keywords:* forgiveness, self-regulation, provocation, revenge, reward

## Streszczenie

Wcześniejsze prace wykazały, że zemsta poprawia samopoczucie. Jednakże konsekwencje owej poprawy samopoczucia wynikającego z odwetu pozostają nieznane. Niniejsza praca miała na celu uzupełnić tę lukę. Opierając się na badaniach Davida Chestera i C. Nathana DeWalla (2017) dotyczących poprawy samopoczucia wskutek zemsty, zbadano czy pozytywny afekt związany z zemstą sprzyja chęci *zarówno* rewanżu, jak i wybaczenia krzywdzicielowi. Ponadto przetestowano, czy zewnętrzna nagroda łagodzi wpływ prowokacji na pragnienie zemsty.

Badanie 1 wykazało, że zemsta wiąże się z pozytywnym afektem, który to łączy się z motywacją zarówno do rewanżu, jak i do przebaczenia. Analiza mediacji wykazała, że pozytywny afekt po zemście częściowo pośredniczył w związku pomiędzy zemstą i chęcią przebaczenia krzywdzicielowi. Pozytywny afekt po zemście nie pośredniczył jednak w związku pomiędzy zemstą i chęcią rewanżu.

Badanie 2 wykazało, że prowokacja (tj. obraźliwa informacja zwrotna ze strony innej osoby) rodzi negatywny afekt, który przewiduje agresję. Agresja nie wiązała się jednak z pozytywnym afektem. Wręcz przeciwnie, wiązała się z negatywnym afektem, który przewidywał chęć dalszego rewanżu, ale nie pojednania.

Badanie 3 wykazało, że związek między prowokacją (tj. obraźliwą informacją zwrotna ze strony innej osoby) a intencjami wobec krzywdziciela był kolejno mediowany przez negatywny afekt przed agresją, agresję, oraz pozytywny afekt po agresji. Zgodnie z założeniami, pozytywny afekt po zemście przewidywał chęć zarówno dalszego rewanżu oraz pojednania, był za to niezwiązany z pragnieniem unikania krzywdziciela. Zemsta, jednakże, wiązała się także z negatywnym afektem, który również przewidywał intencje wobec krzywdziciela. W Badaniu 4 dokonano replikacji tych wyników w kontekście odrzucenia przez inną osobę.

Badanie 5 wykazało, że zewnętrzna nagroda łagodzi wpływ obrazy ze strony innej osoby na motywację do rewanżu. Pokrzywdzeni uczestnicy, którym wmówiono, że to oni, a nie ich krzywdziciel, wygrali nagrodę pieniężną, pragnęli rewanżu mniej, niż pokrzywdzeni uczestnicy, którym wmówiono, że ich krzywdziciel wygrał nagrodę pieniężną.

Wyniki tych badań sugerują, że zemsta nie jest ani jednoznacznie pozytywna, ani jednoznacznie negatywna, ponieważ niesie ze sobą jednocześnie pozytywne i negatywne uczucia. Pozytywne uczucia związane z zemstą łagodzą negatywne uczucia związane z krzywdą, tym samym motywując ofiary do dalszego, zarówno, rewanżu i pojednania. Czerpanie przyjemności z czegoś innego niż odwet zmniejsza pragnienie rewanżu w odpowiedzi na krzywdę, co sugeruje, że chęć dobrego samopoczucia jest motorem napędowym zachowań odwetowych.

*Słowa kluczowe:* krzywda, nagroda, samoregulacja, wybaczenie, zemsta

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## 1. Introduction

Social Baseline Theory (SBT; Coan & Sbarra, 2014) proposes that people are social species who, by default, want to be accepted, liked, and welcomed as having relationships is adaptive (e.g., Holt-Lunstad, 2018). They are keen to keep this social baseline by extending social resources, searching for social support, or forming, maintaining, and protecting their social relationships. However, this social baseline is often violated by aversive interpersonal experiences such as, for example, rejection (e.g., Baumeister & Leary, 1995; Eisenberger et al., 2003) or insult (e.g., Bushman & Baumeister, 1998; Chester & DeWall, 2017). Such wrongs bring about inner (i.e., emotional) and outer (i.e., social) disruption, ultimately leaving people motivated to compensate for these deficits. In this vein, compensatory efforts such as help searching or retribution seeking are meant to maintain the social baseline's homeostasis (Gross & Medina-DeVilliers, 2020).

Revenge – *aggression* in response to perceived harm imposed by another person (Chester & Martelli, 2019) – is a common response to social baseline disruption. In fact, revenge helps people regain both external (Gollwitzer et al., 2011; McCullough et al., 2013a; Schnabel & Nadler, 2008) and inner homeostasis (Chester & DeWall, 2016, 2017; Chester et al., 2018). For these reasons (among many others), revenge has been associated with positive feelings (Chester, 2017). Revenge makes people feel good, albeit temporarily. What then are the *consequences* of these positive feelings? Do they foster forgiveness or rather strengthen the desire for further vengeful reinforcement? The presented research addresses this gap. Following the predictions outlined in the affective counterbalancing model (Chester & Martelli, 2019) and the reinforcing model of aggression (Chester et al., 2018; see also Golden et al., 2019), I investigated whether revenge related positive affect fosters desire for *both* retribution and reconciliation. Further, I tested the role of extrinsic reward in vengeance-seeking. More precisely, I examined whether desire for revenge may be diminished if victims

reap hedonistic reward from a source other than revenge. If revenge is indeed driven by desire to feel pleasure, satisfying that desire from a source other than revenge should decrease vengeful motivation.

### 1.1. Prevalence of revenge

Many historical facts indicate that revenge has always been an important motive for human actions. For instance, in the XIV century, Queen Isabella of France deposed her husband, King Edward II of England, in revenge for adultery, disloyalty, and fraud (Jones, 2013). Some historians believe that Empress Catherine the Great arranged the arrest of her husband, Tsar Peter III, to mull over years of marital disappointments (Montefiore, 2017). Joseph Stalin, leader of the Soviet Union, after assassinating his long-term enemy Leon Trotsky allegedly said "*There is nothing sweeter in the world than to plan revenge on an enemy, see it executed and then go to bed to sleep peacefully*" (Bulley, 2003).

Vengeance is still a cause of many forms of aggression worldwide, including homicides (Kubrin & Weitzer, 2003; Zeoli et al., 2015); shootings (Larkin, 2009); thefts (Aquino et al., 2001); arsons (Prins et al., 1985); infidelity (Brewer et al., 2015), and many more including stalking (Maran & Varetto, 2018). Revenge is also a common theme in popular culture (Robson, 2016), as indicated by numerous plays (e.g., *Hamlet*); novels (e.g., *The Count of Monte Cristo*); movies (e.g., *Kill Bill*); series (e.g., *The House of Cards*); and even songs (e.g., *Sweet Revenge*). Revenge seems widespread, yet what revenge is (and is not)?

### 1.2. Definitions of revenge

Revenge has received many definitions. Some scholars claim that revenge is a *motivation* to act aggressively toward the provocateur (Frijda, 1994; McCullough et al., 2013a; Schumann & Ross, 2010). Others argue that revenge is an *act* of aggression against the provocateur (Aquino et al., 2001; Buss, 1961; Chester & Martelli, 2019; Grobbink et al.,

2015)[1]. Regardless of these definitional differences, central to revenge is the infliction of harm in return to perceived harm to well-being (Elshout et al., 2015a). Therefore, revenge has an undoubtedly aggressive character (Jackson et al., 2019)[2].

**Table 1**

*A Summary of the Definitions of Revenge*

| Source | Definition |
|---|---|
| Buss (1961, p. 46) | *"Intense form of aggression that results when avenger has had a chance to mull over rejections, attacks, and disappointments"* |
| Elster (1990, p. 862) | *"The attempt, at some cost or risk to oneself, to impose suffering upon those who have made one suffer, because they have made one suffer"* |
| Stuckless & Goranson (1992, p. 25) | *"Infliction of harm in return for perceived wrong"* |
| Frijda (1994, p. 256) | *"A desire to harm others in response to feeling oneself harmed by them"* |

[1] In this work I use the term *revenge* for an act of aggression in response to perceived provocation, insult, or transgression (Anderson & Bushman, 2002; Stuckless & Goranson, 1992) and the term *desire for revenge* for an intention to harm the provocateur, offender, transgressor (Frijda, 1994).

[2] Revenge is aggression, but not all acts of aggression are acts of revenge. Accordingly, cutting oneself or mocking others are not examples of revenge.

| | |
|---|---|
| McCullough et al. (1998, p. 1587) | *"Motivation to see harm come to the offender"* |
| Aquino et al. (2001, p. 53) | *"An action in response to some perceived harm or wrongdoing by another party that is intended to inflict damage, injury, discomfort, or punishment on the party judged responsible"* |
| Gollwitzer & Denzler (2009, p. 840) | *"Personal response to unjust treatment"* |
| Schumann & Ross (2010, p. 1193) | *"The intention to see the transgressor suffer"* |
| McCullough et al. (2013a, p. 2) | *"The attempt to inflict retaliatory harm upon an individual who is perceived to have provoked the revenge-seeking individual (...). A harm imposed in response to some triggering violation or infliction of harm"* |
| Grobbink et al. (2015, p. 895) | *"A behavior that follows revengefulness"* |
| Chester & Martelli (2019, p. 43) | *"Revenge is retaliatory aggression"* |

### 1.2.1. Facets of revenge

It is worth mentioning that some works (e.g., Nathanson, 2008) suggested that revenge may have different facets, that is, impulsive ("hot") and premeditated ("cold"). For

instance, Buss (1961) distinguished between angry and instrumental retaliatory aggression and argued that the first one does not involve affect; it is automatic. Elshout and colleagues (2015b) differentiated between anger and vengeful driven responses, arguing that revenge is more self-focused (see also van Doorn, 2018). Book and colleagues (2019) found that revenge, compared to reactive aggression, is negatively related to the personality trait of Emotionality, thus concluding that revenge is unsentimental, whereas reactive aggression is an anxious response. More recently, West and colleagues (2021) demonstrated that immediate revenge is preferable over delayed one, indicating that revenge is not necessarily the "dish best served cold". That is, people prefer to take revenge immediately after provocation even if doing so would yield fewer benefits than retaliating after postponement.

### 1.3. Origins of revenge

It is argued that revenge evolved biologically and culturally (Jackson et al., 2019). From the biological perspective, revenge evolved in response to adaptive problems our predecessors faced, such as mate killing or food theft (e.g., Harari, 2014). Retaliating was a beneficial strategy as it allowed humans to protect their resources (Sell et al., 2009) by deterring future threats (McCullough et al., 2013a). Such a biological approach found confirmation in research. For instance, vengefulness – the tendency to seek revenge in response to provocations (Stuckless & Goranson, 1992) – is more common among men than women (Miller et al., 2008), especially those with powerful upper bodies (Sell et al., 2009).

Cultural models, in turn, suggest that internalization of social norms implies coevolution of revenge in situations in which people felt outraged due to personal attacks which violated these social norms (Fehr & Henrich, 2003). Correspondingly, revenge sanctions norm deviant behavior (Mendoza et al., 2014) and fosters cooperation by promoting reciprocity (Fowler, 2005; Gächter et al., 2008; Marlowe et al., 2008). Wrongdoers are punished to ensure that others learn the consequences of violating norms (Carlsmith et al.,

2002). Revenge, therefore, benefits groups but not individuals (Gintis, 2000). It is, indeed, argued that the legal retributive punishment is an act of institutionalized revenge (Struhl, 2015) and evidence shows that revenge is more pervasive in societies without institutional justice systems (Ericksen & Horton, 1992).

Relational Model Theory (Fiske, 1993) proposes that four universal relational categories underlie everyday social interactions across cultures. They include Communal Sharing (i.e., shared relationships based on love, trust, and respect), Authority Ranking (i.e., hierarchic relationships based on power), Market Pricing (i.e., relationships based on ratios such as wages, prices, or interests), and Equality Matching (i.e., relationships based on reciprocity). Revenge is a common manifestation of an Equality Matching relationship as vengeful behavior helps to keep or restore social balance by punishing norm violators (Carlsmith et al., 2002).

From a social perspective, revenge is a product of personological (e.g., certain personality traits, scripts, or beliefs) and situational factors (e.g., provocation by another individual or blockage of goal fulfillment), as well as internal states, including: cognition (e.g., hostile attributions about others), affect (e.g., feelings of pain), and arousal (e.g., feeling excited, energized, or agitated; i.e., General Aggression Model; Anderson & Bushman, 2002). For example, a narcissistic individual (personological factor), when criticized by another person (situational factor), feels triggered (arousal), experiences pain and distress (affect), and interprets the situation as a threat to the ego (cognition). Consequently, the individual retaliates against the provocateur (Bushman, & Baumeister, 1998; Cascio et al., 2015; Chester & DeWall, 2017; DeWall et al., 2009).

## 2. Motives of revenge

### 2.1. Deterrence

From the evolutionary perspective, revenge is argued to be an evolved mechanism meant to prevent or reduce the likelihood of future harm by changing the costs and benefits of the situation in such a way that a revenge-evoking situation becomes an unattractive option (McCullough et al., 2013a; Petersen et al., 2010). People seek revenge to deter future exploitive efforts or induce them to emit benefits for themselves (McCullough et al., 2013b). The possibility of revenge to occur increases when the expected future value of the relationship is low (e.g., a partner is perceived as worthless or the relationship is unsatisfying) and the risk of future exploitation is high (e.g., the partner is a source of threat; McCullough et al., 2010). Thus, the more valuable and less costly the relationship is, the less revenge is likely to happen (Burnette et al., 2012). This corresponds to the valuable relationship hypothesis that people are inclined to maintain bonds with precious partners (Rusbult, 1980).

In line with evolutionary reasoning, revenge is a deliberative action, that is, one makes a decision to seek revenge decisions ditching personal benefits against the benefits of another individual (i.e., welfare tradeoff ratio; Delton & Robertson, 2016). People seek revenge having calculated gains and losses. Affect – if occurs – is not a fuel for revenge but rather a secondary motive. For these reasons, the evolutionary approach was subject to criticism. For instance, O'Connor and Adams (2012) argued that emotions drive the decision to pursue revenge (see Darley & Pittman, 2003; Lerner et al., 2015). Growing research on the role of positive and negative affect in revenge seeking (Chester, 2017; Chester & DeWall, 2017) aligns with their reasoning.

### 2.2. Dominance

In general, people desire to feel respected (Kruglanski et al., 2021). By retaliating, they aim to change their perception of themselves so that they won't be treated the same way

again (McCullough et al., 2001). Revenge may then be a strategy for saving face and promoting dominance, particularly in honor cultures (Cohen et al., 1996; Jackson et al., 2019). Research shows that revengeful activities in close relationships are associated with a need for dominance (Yoshimura, 2007). Furthermore, revengeful motivation was found to mediate gender differences in physical aggression (Wilkowski et al., 2012), which is associated with dominance (Fonberg, 1988; Francis, 1988; Holekamp & Strauss, 2016). Dispositional tendency to search for revenge in response to harm imposed by others (Stuckless & Goranson, 1992) was linked to social dominance orientation and the importance of power values (McKee & Feather, 2008).

**2.3. Empowerment**

People intuitively approve of revenge taken by victims (Gollwitzer et al., 2016) and tend to see punishment as necessary for victims to leave the transgression behind (e.g., Carlsmith & Darley, 2008). Revenge is indeed a way of empowering oneself after a painful experience of wrongdoing (Foster & Rusbult, 1999, Schumann & Walton, 2022). For instance, Strelan and colleagues (2013) demonstrated that chronically powerless people are more prone to seek revenge than chronically powerful people. Transgression usually causes a loss of status, respect, and reputation, and revenge is a way of regaining them (Shnabel & Nadler, 2015). Thus, people seek revenge to restore their sense of power (Nadler & Shnabel, 2008), and revenge is particularly empowering when the offender's intent to hurt the victim is strong (Strelan et al., 2020). However, recent research (Fischer et al., 2022) shows that victims need more than empowerment to reconcile. They want to learn that the offender understood the punishment-related message, which is described as “moral change” in the transgressor (see also Funk et al., 2014). In this vein, revenge is effective if it has influenced wrongdoer’s beliefs about the transgression they had brought upon.

### 2.4. Justice

Considerable amount of research shows that revenge is a way of restoring social justice (Carlsmith & Darley, 2008; Cropanzano et al., 2003; Folger et al., 2005; Gollwitzer, 2009; Tripp et al., 2007). When wronged, people recognize a disparity between desired and actual level of justice, and their present state and the state of the transgressor (Worthington, 2006). This disparity, sometimes referred to as moral outrage (Darley & Pittmann, 2003), motivates them to give transgressors "what they deserve" (Aquino et al., 2006). Revenge then signals that a particular behavior will not be unpunished (McCullough et al., 2001) and the wrongdoer needs to be "taught a lesson" (Baumeister, 1997). By retaliating, revenge seekers make the wrongdoers pay for violating social norms (Gollwitzer, 2009; Miller, 2001; Tripp et al., 2007). In this vein, revenge can be the right thing to do as it allows people to build, maintain, or terminate their social relationships (Fiske & Rai, 2015).

The belief in the just-world – a notion that world is just place in which everyone gets what they deserve and deserves what they get (Lerner & Miller, 1978) – is related to the motivation to seek revenge (Ferguson & Kamble, 2012; Kaiser et al., 2004) and to the past revengeful behaviors (Ferrari & Emmons, 1994). Furthermore, feelings of injustice were found to mediate the link between the number of previous traumatic events and the desire for revenge (Goldner et al., 2019). Revenge driven by a sense of justice is satisfactory when the offender learns why the revenge had been taken against them (i.e. understanding hypothesis) rather when the avenger sees the offender in pain (i.e. comparative suffering hypothesis; Gollwitzer et al., 2011; Sjöström & Gollwitzer, 2015; Sjöström et al., 2018). Although some authors argue that revenge is satisfactory when the amount of pain between avenger and offender is balanced (e.g., Frijda, 1994), seeing the offender in pain was shown not to decrease anger or increase satisfaction (Gollwitzer et al., 2011). Recent findings, however,

demonstrated that seeing the offender in pain (compared to anger, calmness and sadness) reduces retaliatory aggression (Eder et al., 2020).

**2.5. Self-regulation**

Experience of transgression brings upon negative feelings (Berkowitz, 1989; Chester & DeWall, 2017) and people seek revenge to redress these feelings (Boon et al., 2009), often driven by emotions (O'Connor & Adams, 2012); particularly anger (Barber et al., 2005; Wilkowski et al., 2012). Anger is an approach emotion (Harmon-Jones, 2003), which arises in response to a displeasing violation of what the individual takes for granted (Frijda, 1986). Consequently, anger is associated with motivation to hurt others (Sukhodolsky et al., 2001; Wilkowski & Robinson, 2008). As anger is (usually) an unpleasant emotion (Harmon-Jones, 2013)[3], people may be driven to retaliate to get rid of angry feelings. Indeed, the accessibility of aggressive thoughts was proven to lower as a result of revenge (Denzler et al., 2009). In addition, revenge was shown to help people regain an affective balance, previously disrupted due to revenge-provoking situations (Chester & DeWall, 2017).

Chester and DeWall (2017) demonstrated that participants who believed that expressing aggressive behavior is driven by the desire to experience positive affect, were more aggressive after experiencing social exclusion. Participants were provoked, reported their current negative and positive affect, were given a chance to aggress, and then again reported their current negative and positive affect. Provoked participants repaired their mood through revenge. Moreover, the extent of the mood repair correlated with the extent of revenge. These findings indicate that revenge is not only a self-regulation strategy, but also a hedonically driven behavior aimed at maximizing pleasure and minimizing pain (Tamir,

[3] Context may influence whether emotions are positively or negatively valenced (Cohen-Chen et al., 2020).

2016). This research addresses this line of work and proposes that revenge not only brings victims back to emotional balance, but that these improvements in affect predict subsequent intentions toward the transgressor.

### 2.5.1. Pleasure of revenge

#### 2.5.1.1. Self-report evidence

Overall, people believe in the cathartic use of aggression (Bushman, 2002; Bushman et al., 1999; Geen & Quanty, 1977). They expect aggression to bring them relief from feelings of pain (Bushman et al., 2001) and such a belief motivates them to act aggressively in response to provocations (Chester & DeWall, 2016, 2017). Positive affect, a subjectively pleasant feeling (Watson & Tellegen, 1985), is in fact an important correlate of revenge (Chester, 2017). Recent meta-analysis shows that satisfaction experienced during aggression is a strong predictor of aggression (Hyatt et al., 2019). Furthermore, sticking pins in the doll representing the wrongdoer is associated with higher scores on measures of positive affect (Chester & DeWall, 2017; Chester et al., 2019) and mild and moderate aggression is rated as a gratifying experience (Ramírez et al., 2005). This indicates that people, to some extent, associate impulsive aggression with pleasure (Ramirez et al., 2005). As such, they may derive pleasure from aggression except at extreme intensities.

#### 2.5.1.2. Physiological evidence

Revenge is correlated with neural signature of approach motivation, which has been related to reward (Carver & Harmon-Jones, 2009). Anger in response to provocation increases revenge-related reward positivity amplitudes (RewP) in order to seek revenge opportunities. Exacting revenge is associated with momentary signatures related to RewP (Threadgill & Gable, 2020). Revenge was also shown to reduce heart rate in response to distress (Verona & Sullivan, 2008). Participants who aggressed exhibited reductions in heart

rate which suggests that aggression may ease the pain of distress. These findings provide further evidence that revenge is a rewarding experience.

#### 2.5.1.3. Neuroimaging evidence

Revenge is also linked to the increased activity in the brain regions associated with reward processing such as nucleus accumbens (Chester & DeWall, 2016; Singer et al., 2006), dorsal (de Quervain et al., 2004; Krämer et al., 2007), and ventral striatum (Brüne et al., 2013). Respectively, increased activity of the nucleus accumbens was correlated with the desire to retaliate against a person who did not obey the rules of the Prisoner's Dilemma game (Singer et al., 2006). Greater nucleus accumbens activity was also an indicator of greater aggression to provocation (Chester & DeWall, 2016). More specifically, rejected individuals administered louder and longer aversive noise blasts against their provocateur in the competitive reaction time task. Aggression was followed by greater nucleus accumbens activity. De Quervain and colleagues (2004) observed that participants with more activity in the dorsal striatum were more inclined to incur greater costs for the sake of deterring defectors in an economic exchange. Moreover, it transpires that administering a noise blast as a response to provocation (Chester & DeWall, 2016) also results in greater activity in the dorsal striatum, which implies that participants anticipated a reward for taking revenge on their opponents (Krämer et al., 2007). Activation of the ventral striatum occurred with exercising justice for the unfair behavior in a Dictator Game, which leads to the conclusion that revenge is likely a satisfactory experience (Brüne et al., 2013).

### 2.5.2. Displeasure of revenge

It is noteworthy to mention that some research found revenge to be unpleasant rather than pleasant experience. Carlsmith and colleagues (2008) showed that people have a certain expectation that exacting revenge will improve their mood, whereas the reality proves the contrary. The reason for this is the fact that revenge makes them think about transgression

more, which is referred to as the “revenge paradox”. This particular research, however, made use of the free rider paradigm to provoke people to seek revenge. Thus, an act of revenge was performed against an individual who violated the group-based norm of fairness, not against an individual who deliberately harmed the participant. Retributive punishment does not arise from hedonic motives (Gollwitzer & Bushman, 2012), as retaliatory aggression does (Chester, 2017). It is instead motivated by a desire to correct future behavior of wrongdoers (Gollwitzer et al., 2011; Schumann & Ross, 2010; Zaibert, 2006). Such acts of aggression motivated by desire to help others (e.g., improve their behavior) have recently been labeled as prosocial aggression (West et al., 2022).

Hedonic expectations towards revenge are argued to be rooted in its deterring function, specifically protection of threatened ingroup interests (e.g., Fehr & Gächter, 2002). In line with these considerations, Lambert and colleagues (2014) predicted that Americans, particularly those primed with strong national attitudes, might desire revenge against Osama bin Laden due to expected increase in positive affect. Contrary to their expectations, reminding participants of the assassination, that is an act of revenge, made them more angry. Participants not only inaccurately detected their emotional response to the recent act of revenge, but also assumed that the revenge made them less angry than it in reality did. It is, however, important to stress that participants did not take revenge by themselves but were reminded of revenge against the terrorist and anger is often a reaction to a terrorism related information (e.g., Giner-Sorolla & Maitner, 2013).

#### 2.5.2.1. Bittersweet model of revenge

In an attempt to integrate seemingly contradictory findings on the affective nature of revenge, Eadeh and colleagues (2017) proposed a bittersweet model of revenge. According to the bittersweet model of revenge, revenge simultaneously elicits positive feelings above and beyond the elicitation of negative affect. Stated more simply, revenge makes people feel *both*

bad (e.g., anxious and angry) and good (e.g., happy and satisfied). In this vein, consequences of revenge are neither always positive nor always negative. This research addresses this line of work by proposing that consequences of feeling good from retaliating may also be both "sweet" and "bitter". More precisely, revenge related positive affect may foster both antisocial (desire for revenge) and prosocial (desire for forgiveness) intentions toward the provocateur.

## 3. Predictors of revenge

### 3.1. Biological

Genetic factors contribute to about half of the variance in aggressive behavior (Moffitt, 2005). People with genotypes that code for decreased dopaminergic brain activity are prone to aggressive behavior (Chester et al., 2016), which highlights the rewarding properties of aggressive behavior.

### 3.2. Personological

#### 3.2.1. Aggressiveness

People differ in terms of how aggressive they tend to be. Trait aggression (Buss & Perry, 1992) is a highly heritable predisposition to respond to various situations with aggression (Denson et al., 2014). Trait aggression comprises tendencies toward physical and verbal aggression, as well as anger and hostility (Buss & Perry, 1992) and, broadly speaking, reflects a facet of antagonism (low agreeableness; Chester & West, 2020). Hence, it comes as no surprise that aggressive people tend to act more aggressively in response to provocations (Anderson & Bushman, 2001; c.f., Bushman, 1995) and are more likely to seek revengeful encounters (Chester & DeWall, 2018).

#### 3.2.2. Narcissism

Narcissism is a reliable predictor of vengeful behaviors (Kjærvik & Bushman, 2021; Rasmussen, 2016). People who exhibit narcissism (i.e., desire continuous external validation

of one's inflated self-view; Crocker & Park, 2004) aggress in response to ego threatening information (e.g., Baumeister et al., 1996; Ferriday et al., 2011; Twenge & Campbell, 2003). This is because such information causes discrepancy between their idealized self-image and the external appraisals (Baumeister et al., 2000). Narcissists tend to also be envious (Krizan & Johar, 2012) and hateful (Rhodewalt & Morf, 1995), and people who possess such traits are more inclined to have revenge motivations (Berry et al., 2005). Moreover, narcissism is related to aggressiveness (e.g., Lambe et al., 2018) and vindictiveness (Brown, 2004; Exline et al., 2004; Fatfouta et al., 2015).

#### 3.2.3. Sadism

Growing body of research on the phenomenon of everyday sadism[4] (Buckels et al., 2013) shows that some people (i.e., sadists) simply enjoy hurting others for fun (Pfattheicher et al., 2020). Sadism is characterized by a tendency to enjoy harming others for the sake of own pleasure (e.g., Nell, 2006). This enjoyment comes from anticipated pleasure from imposing harm upon another person (Dietz et al., 2011), as well as from observing the victim of aggression experiencing pain (Chester et al., 2019). People who exhibit sadism seek to harm not only their perpetrators, but also innocent targets (Buckels et al., 2013; Chester et al., 2019). As sadists expect aggression to make them feel good (O'Meara et al., 2013) and tend to experience intense (but brief) pleasure during aggression (Chester et al., 2019), they are particularly prone to vengeance seeking (Chester & DeWall, 2018).

[4] This perspective proposes that sadism has, similarly as narcissism, Machiavellianism and psychopathy, a subclinical nature. In this vein, sadism is a cluster of personality traits that appear in non-clinical and non-criminal populations.

### 3.3. Environmental

#### 3.3.1. Temperature

Previous research demonstrated that under some conditions high temperatures increase likelihood of acts of aggression (i.e., heat-aggression hypothesis; Anderson et al., 2000). Heat brings about irritability (Baron & Bell, 1976) and increases hostility (Anderson, 1989), consequently resulting in aggression. Fields studies show that violent crimes increase with temperature (Anderson, 2001). Moreover, hotter regions of the world are associated with more aggression (Anderson, 2001).

#### 3.3.2. Socioeconomic status

Low subjective socioeconomic status is reliably associated with greater physical (Greitemeyer & Sagioglu, 2016) and retaliatory aggression (Field & Chhim, 2008). In this vein, revenge may be a way of empowering oneself after being deprived of desirable attributes such as social status (Walker & Pettigrew, 1984).

## 4. Revenge-related positive affect and intentions toward the provocateur

### 4.1. What is affect?

Affect is any experience of feeling spanning from simple to complex sensations (Barrett & Bliss-Moreau, 2009; Barrett & Russell, 1999; Russell, 2003). In general, affect is used as an indicator of subjectively pleasant (i.e., positive affect) or subjectively unpleasant (i.e., negative affect) experience that arises in response to stimuli (Frijda, 2000; Harmon-Jones & Harmon-Jones, 2021; Watson et al., 1999). Affect changes in response to environmental stimuli and influences both cognition and behavior (Russell, 2003). Positive affect varies in arousal ranging from low (e.g., tranquility) to high (e.g., euphoria) arousals (Barrett & Bliss-Moreau, 2009; Barrett & Russell, 1999). Revenge-related positive affect ranges from medium (e.g., satisfaction from giving provocateurs what they deserve) to high (e.g., inebriate aggressive pleasure from punching the transgressor in their face; Chester,

2017; Chester et al., 2019). In this work, I focus on affect as an affective state, not a dispositional affective trait. More directly, I refer to transient positive affective states associated with aggression.

### 4.2. Revenge-related positive affect and vengeful intentions

Vengeful pleasure is an approach-related state (Tunison et al., 2019) and approach motivation – the impulse to go toward (Harmon-Jones et al., 2013) – is directed toward the actions perceived as rewarding (Gray, 1970). Aggression shows prevalence among individuals who seek rewards in environment (Chester et al., 2016; Derefinko et al., 2011; Wilson & Scarpa, 2011) and is associated with activity in the dopaminergic reward network (Brüne et al., 2013; Chester & DeWall, 2016; Krämer et al., 2007). As such, revenge related positive affect may magnify desire for vengeance. Retaliatory aggression may then have addictive-like qualities. Yet why positive affect experienced after revenge would predict increases in motivation to seek more revenge?

#### 4.2.1. Reinforcing model of aggression

The reinforcing model of aggression (Chester et al., 2018) proposes that intense positive affect experienced during and immediately after aggressive behavior promotes future acts of aggression. Behaviors are reinforced when positive affect is experienced in anticipation, during, and after the action (Berridge & Kringelbach, 2008; Hyman & Malenka, 2001) and aggression is robustly associated with positive affect (Chester, 2017; Chester et al., 2021). Specifically, aggression is associated with intense positive affect experienced during aggressive acts, which is referred to as “aggressive pleasure” (Chester et al., 2019). Since the positive affect surrounds aggressive behavior (Chester et al., 2021), revenge has the potential to be addictive-like analogically as, for example, sexual pleasure (Golden et al., 2017).

Neural mechanisms of aggression are argued to parallel those entangled in drug addictions (Golden & Shaham, 2018). The striatum – part of the brain reward circuit linked to

revenge seeking (de Quervain et al., 2004) – contributes to compulsion development (Robbins & Everitt, 1996). Nucleus accumbens, another part of the brain reward circuit reliably associated with vengeful behaviors (Chester & DeWall, 2016; Couppis & Kennedy, 2008; Singer et al., 2006), was found to add on to substance addictions (DiChiara et al., 2004). Research on animals shows that aggressive behavior among mice is compulsive as modulated by reward mechanisms (Golden et al., 2017). More specifically, Golden and colleagues (2017) found that mice were not only motivated to obtain opportunities to aggress, but also showed vulnerability to relapse during aggression abstinence period. In turn, Couppis and Kennedy (2008) demonstrated that aggression among mice can be vanquished when dopamine receptor antagonists are injected in ventral striatum (part of the reward circuitry). Thus, revenge may increase the likelihood of responses that produce them, leading to subsequent revenge-taking (Everitt & Robbins, 2005). In other words – people may not get enough revenge once they taste its pleasure.

#### 4.2.1.1. Sensation seeking, behavioral addictions, and aggression

Sensation seeking, facet of impulsivity (Cyders et al., 2014) that is the tendency to seek immediate rewards in the environment (Whiteside & Lynam, 2001), is a reliable predictor of engagement in various addictions including alcoholism (Zhao et al., 2019) and gambling (Coventry & Brown, 1993). Sensation seeking is also associated with aggression (Bresin, 2019; Derefinko et al., 2011). For instance, reduced dopaminergic brain activity has been linked to aggression through sensation seeking (Chester et al., 2016). Sensation seeking facilitates harming others for the sake of pleasure (Pfattheicher et al., 2020). In addition, sensation seeking was linked to political violence including violent extremism (Schumpe et al., 2020). Recent longitudinal study adds on this evidence, showing that sensation seeking predicts engagement in aggressive encounters over the course of months (Mrozinski et al.,

2022). These findings provide additional evidence that revenge has potential to be compulsive as driven by reward-seeking.

### 4.3. Revenge-related positive affect and benevolent intentions

However, there are reasons to expect that revenge-related positive affect may also foster benevolent outcomes. Broadly speaking, positively-valenced affective states are related to prosociality (Fredrickson, 1998; Ma et al., 2017). For instance, experiencing emotions such as awe (Piff et al., 2015), compassion (Ashar et al., 2016), or gratitude (Tsang, 2006) facilitates prosocial behavior. Positive affective state of humility reduces aggressive motivation (Summerell et al., 2020) and facilitates intergroup affirmative actions (Eker et al., 2022), whereas hope enhances peacemaking (Cohen-Chen et al., 2014). In addition, people who tend to experience positive emotions on a general basis (Shiota et al., 2006) tend to be less aggressive (Mrozinski et al., 2021) and more prone to admit wrongness (Fetterman et al., 2019). Altogether, this evidence suggests that experience of positively-valence affective states makes people more prosocial and less antisocial. In this vein, vengeful pleasure may be harnessed to promote forgiveness.

#### 4.3.1. Affective counterbalancing model

People can accomplish their intrapersonal and interpersonal goals through emotion regulation, the "process in which they try to change existing emotion into a desired emotion" (Tamir, 2016, p. 199; see also Gross, 1998). One of the goals of emotion regulation is the desire to resume a balanced affective state (Tamir, 2016). Such hedonic motives in emotion regulation are aimed at optimizing the amount of experienced pleasure and pain (Erber & Erber, 2000; Tamir, 2016). The pleasure from revenge often is temporarily effective in restoring people's affective states to their pre-transgression levels (Chester & DeWall, 2017). More directly, revenge helps victims regain affective balance brought about by the transgression.

Forgiveness is often considered an exemplary response to wrongdoing (e.g., McCullough, 2008). However, forgiveness does not come easily as it entails change of one's attitudes from malevolent to benevolent ones (Förster et al., 2019). What often prevents people from forgiving is the persisting negative affect present after transgression (Lawler et al., 2005; Rohde-Brown & Rudestam, 2011; Worthington, 2006). Relatedly, what enables forgiveness is the elimination of the negative affect related to transgression, followed by the occurrence of the positive affect, thus allowing forgiveness to unravel (Worthington et al., 2007). For instance, receiving apologies from a transgressor can foster reconciliation. This is because, apology-related positive affect counterbalances transgression-related negative affect (Worthington & Wade, 1999).

In line with these considerations, Chester and Martelli (2019) proposed the affective counterbalancing model, which posits that revenge related positive affect may combat transgression related negative affect and ultimately promote reconciliation. More precisely, retaliating may help people restore affective balance disturbed by provocation, and this affect improvement may motivate them to "bury the hatchet". Thus, the malicious tendency to inflict revenge upon another individual may be in the service of reconciliation processes.

### 4.4. Overview of the present research

The present research aimed to answer two research questions.

**First research question concerns the relationship between revenge-related positive affect and subsequent intentions toward the provocateur.** I sought to replicate past work that linked revenge to improvements in affect (Chester & DeWall, 2017). Building upon these findings, I then sought to test the conjoined hypotheses that vengeful pleasure would be linked to greater subsequent intentions for revenge *and* forgiveness.

Drawing from the works linking retaliatory aggression with pleasure (Chester, 2017; Chester & DeWall, 2016; Chester et al., 2019; Golden et al., 2017; Golden & Shaham, 2019;

Mahadevia et al., 2021) and the role of reward-related learning in facilitating behaviors (Berridge & Kringelbach, 2008; Hyman & Malenka, 2001; Hyman et al., 2006), I hypothesized that revenge-related positive affect would predict subsequent increases in the desire to harm the transgressor (Hypothesis 1.1). Thus, I aimed to investigate whether retaliatory aggression can be compulsive. Compulsive behaviors are both rewarding (experienced as pleasurable) and reinforcing (behaviors associated with such compulsions tend to be repeated; Hyman & Malenka, 2001).

Building upon the research which shows that revenge helps victims regain their affective balance disrupted by aversive experience of transgression (Chester & DeWall, 2016, 2017), I hypothesized that the positive affect from revenge will predict increases in subsequent desire to forgive the provocateur (Hypothesis 1.2). Thus, I aimed to empirically test the affective counterbalancing model, which states that revenge-related improvements in affect facilitate forgiving intentions towards the transgressor (Chester & Martelli, 2018). The affective counterbalancing model has not yet been empirically tested and the present research aims to provide the first empirical evidence for this model.

**Second research question concerns whether extrinsic reward reduces desire for revenge in response to provocation.**

If revenge is driven by desire to feel good (Chester, 2017), then reaping hedonistic rewards from another source should reduce motivation for vengeance. Such reward, by bringing about intensive positive feelings, should be satisfactory enough to inhibit the desire for revenge. Anticipating the upcoming reward is pleasurable as it fires dopamine neurons and subsequently releases dopamine (Schultz et al., 1993; Waelti et al., 2001). Dopamine was shown to facilitate aggression among mice (Mahadevia et al., 2021) and dopamine receptor gene polymorphisms indirectly influence human aggression (Chester et al., 2016). Moreover, revenge is reliably associated with heightened activity in the brain regions linked with reward

processing (Brune et al., 2013; Chester & DeWall, 2016; de Quervain et al., 2004). Last but not least, reaping unexpected rewards increases dopaminergic activity (Arias-Carrión et al., 2010). Building on these findings concerning the role of hedonic rewards in motivating and persevering aggressive behavior, I hypothesized that the extrinsic reward should attenuate the effect of provocation on the desire to harm the provocateur (Hypothesis 2).

**Study 1** examined whether revenge elicits a positive affect, which further predicts desire to both harm and to forgive the transgressor. This study was of correlational nature and was conducted on a sample of participants who declared experience of interpersonal transgression four weeks before the study.

**Studies 2-4** investigated whether revenge related positive affect promotes desire to harm and to forgive the provocateur in an experimental design. Participants were provoked, reported their current positive and negative affect, were given an opportunity to retaliate, again reported their current positive and negative affect, and expressed to what extent they wished to act in a certain way toward the provocateur. Thus, Studies 2-4 tested whether pre-aggression negative affect, aggression, and post-aggression positive affect serially mediated the effect of provocation on subsequent intentions toward the provocateur.

**Study 5** investigated whether extrinsic reward attenuates the effect of provocation on the desire for revenge. This study was of experimental nature and included manipulating both provocation (insulting feedback versus praising feedback) and the target of the extrinsic reward (reward for participant versus reward for partner).

## 5. Current Research

### 5.1. Study 1. Role of positive affect in the relationship between revenge and intentions toward the provocateur

Study 1 tested Hypotheses 1.1 and 1.2 in a cross-sectional design. Thus, I tested whether positive affect mediated the relationship between an act of revenge and desire to harm (H 1.1.) and to forgive (H 1.2) the provocateur.

#### 5.1.1. Method

##### 5.1.1.1. Participants

Fritz and MacKinnon (2007) recommend sample sizes of at least 148 participants to detect an indirect effect consisting of two paths with standardized coefficients of .24. Respectively, participants consisted of 145 American adults (93 male, 52 female; age: *M* = 35.68; *SD* = 11.36, range: 21-70) recruited from Amazon Mechanical Turk (https://www.mturk.com/). I required workers to have a 99% approval rate on all previous Amazon Mechanical Turk tasks. Participants' ethnical composition was 72.4%, White American, 13.8% Asian American, 9% African American, 3.4% 'Other' and 1.4% Native American. Participants were compensated with $0.75.

##### 5.1.1.2. Measures

**Revenge** was measured as the number of pins stuck in the doll symbolizing the provocateur, that is, using the Voodoo Doll Task (i.e., VDT; DeWall et al., 2013). Voodoo Doll Task is a measure of symbolic aggression based on the tendency people have to attribute magical properties to objects (DeWall et al., 2013). Participants are asked to ascribe characteristics of real individuals to an inanimate doll. Then, they are told to type the number of pins they would like to stick in it (0-51). Higher number of pins indicates greater aggression. VDT shows excellent reliability and corresponds to other measures of aggression (DeWall et al., 2013). It displays proper reliability in the laboratory (DeWall et al., 2013) and

over the Internet (Bushman et al., 2014) both in interpersonal (Chester & DeWall, 2017) and intergroup context (Dyduch-Hazar & Mrozinski, 2019; Golec de Zavala et al., 2020; Lantos, 2020). Responses in this task do not represent real aggression as the target of aggression is not directly harmed. There exists, however, a cognitive, emotional and behavioral overlap between the meaning of actual and symbolic forms of aggression (Chester & DeWall, 2017). In general, 43 participants (29.7%) did not stick any pin in the doll (i.e. did not take revenge) and 102 participants (70.3%) stuck more than one pin (i.e. took revenge). Thus, the majority of participants symbolically retaliated against their transgressors.

**Positive affect** was assessed by asking participants to what extent they felt "pleased", "positive", and "satisfied" after marking their response to the Voodoo Doll Task (Carlsmith et al., 2008). Participants gave their answers using a scale ranging from 1 (*not at all*) to 5 (*very much*).

**Intentions toward the provocateur** were measured using the Decisional Forgiveness Scale (i.e., DFS; Worthington et al., 2007). **Desire to harm** the provocateur was assessed with 4-item Inhibition of harmful intention subscale (e.g., "I intend to try to hurt him or her in the same way he or she hurt me"). By reversing the scores, I created a measure of desire to harm the provocateur. **Desire to forgive** the provocateur was measured with 4-item Prosocial intention subscale (e.g., "If I see him or her, I will act friendly"). Participants indicated their agreement using a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

#### 5.1.1.3. Procedure

Study was conducted via Qualtrics (https://www.qualtrics.com/). After providing their informed consent, participants completed demographic questionnaire including questions about gender, sex, and ethnicity. Then they were asked to recall a situation when someone hurt them (e.g., having an argument with a partner or being undeservedly criticized by a boss) and instructed to think about that particular individual when completing all instruments. First,

participants completed the Voodoo Doll Task. After being displayed an image of a doll and informed that it represents the person who has harmed them, they were asked to type a number of pins (0-51) they would like to stick in the doll. After typing the number of pins, participants were asked to what extent they felt rewarded. Finally, participants expressed their current intentions towards the transgressor, were thanked, and compensated.

### 5.1.2. Results

#### 5.1.2.1. Transformation of revenge measure

Kolmogorov-Smirnov test showed that the distribution of the number of pins did not meet the assumption of normality, $k(145) = .293$, $p < .001$, and the distribution of pins was heavily skewed (skewness = 1.31, kurtosis = .259). To reduce the positive skewness of the voodoo doll pin count, I applied logarithmic transformation (after adding 1 to all values to get rid of zeroes) as recommended by Chester and Lasko (2018). Logarithmic transformation is a data transformation method used to “normalize”" skewed or kurtotic distributions in order to carry out parametric statistics. Thus, log transformation replaces each variable x with a log(x) after adding 1 to all values to allow for the transformation of 0 values. This approach reduces problems with skew and kurtosis in aggression data (Chester et al., 2019). The logarithmic transformation reduced skewness of the voodoo doll pin count (see Table 2).

**Table 2**

*Distribution Statistics For the Voodoo Doll Pins Counts After Logarithmic Transformation. Parenthesized Values Represent Distribution Statistics Prior to Transformation*

| Statistics | Study 1 | Study 3 | Study 4 |
|---|---|---|---|
| Skewness | .055 (1.31) | .66 (1.90) | .53 (1.83) |
| Kurtosis | -1.32 (.259) | -.99 (2.61) | -1.32 (2.37) |

#### 5.1.2.2. Descriptive statistics and zero-order correlations

Reliability of Prosocial intentions subscale of the Decisional Forgiveness Scale was unsatisfactory (e.g., Cortina, 1993). Post-revenge positive affect was associated with both desire to harm, $r = .27$, $p < .001$, and to forgive, $r = .21$, $p < .001$. I also observed that revenge significantly correlated with desire to harm, $r = .54$, $p < .001$, but was unrelated to the desire to forgive, $r = -.16$, $p = .055$. Descriptive statistics and zero-order correlations between study variables are summarized in Table 3.

**Table 3**

*Descriptive Statistics and Zero-Order Correlations Between Variables, Study 1 (N = 145)*

| Variable | *M* | *SD* | *α* | 1. | 2. | 3. |
|---|---|---|---|---|---|---|
| 1. Revenge (transformed) | .77 | .61 | - | - | | |
| 2. Positive affect | 3.20 | 1.23 | .92 | .31*** | - | |
| 3. Desire to harm the provocateur | 2.48 | 1.05 | .84 | .54*** | .27*** | - |
| 4. Desire to forgive the provocateur | 2.96 | .86 | .62 | -.16 | .21*** | -.03 |

*** $p < .001$.

#### 5.1.2.3. Mediation analyses

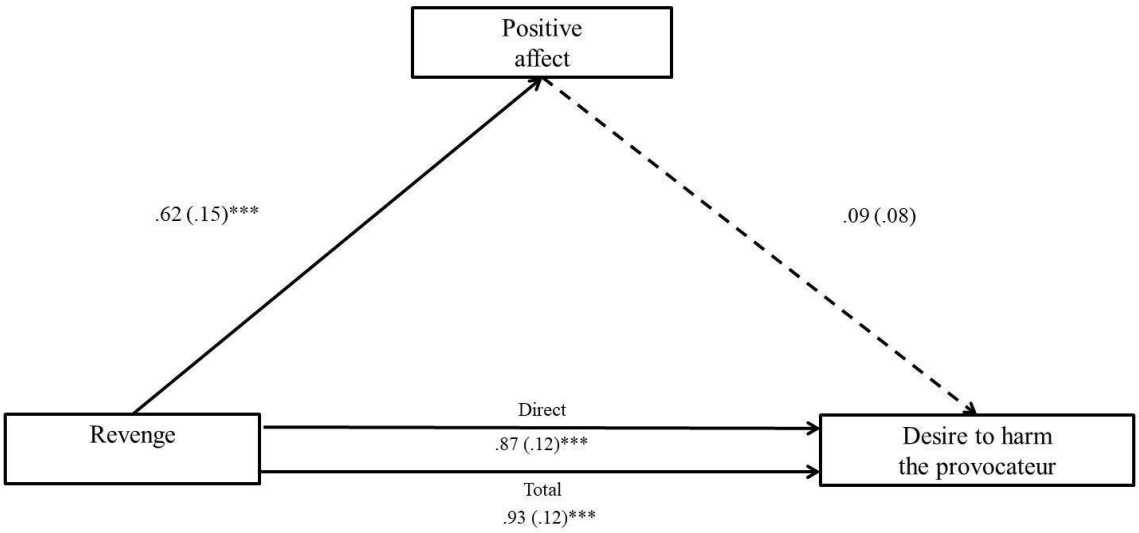
In order to test Hypothesis 1.1 and Hypothesis 1.2, I conducted two mediation analyses with revenge as independent variable, post-revenge positive affect as mediator, and desire to harm (Model 1) and to forgive the provocateur (Model 2) as dependent variables. To test these hypotheses, I used PROCESS 3.5 macro for SPSS (Model 4; Hayes, 2017) with 10, 000 bootstrap samples and 95% bias-corrected bootstrap confidence intervals.

Mediation model with the **desire to harm** the provocateur as outcome was significant, $F(2, 142) = 31.82$, $p < .001$ and explained 31% variance in criterion variable

(Figure 1). The total effect was significant, $b = .93$, $SE = .12$, $p < .001$, 95% CI [.698; 1.172], so was the direct effect, $b = .87$, $SE = .12$, $p < .001$, 95% CI [.626; 1.12]. I observed a positive and significant association between revenge and positive affect, $b = .62$, $SE = .15$, $p < .001$, 95% CI [.312; .940], yet lack of association between positive affect and desire to harm the provocateur, $b = .09$, $SE = .06$, $p = .12$, 95% CI [-.028; 22]. The indirect effect was insignificant, $b = .06$, $SE = .04$, 95% CI [-.016; .177]. Thus, revenge was associated with positive affect, but these positive feelings were unrelated to subsequent desire to seek revenge. Hypothesis 1.1 was not supported.

**Figure 1**

*Mediation Model From Study 1, Whereby The Direct Effect of Revenge on Desire to Harm the Provocateur Is Mediated by Positive Affect (N = 145)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant.

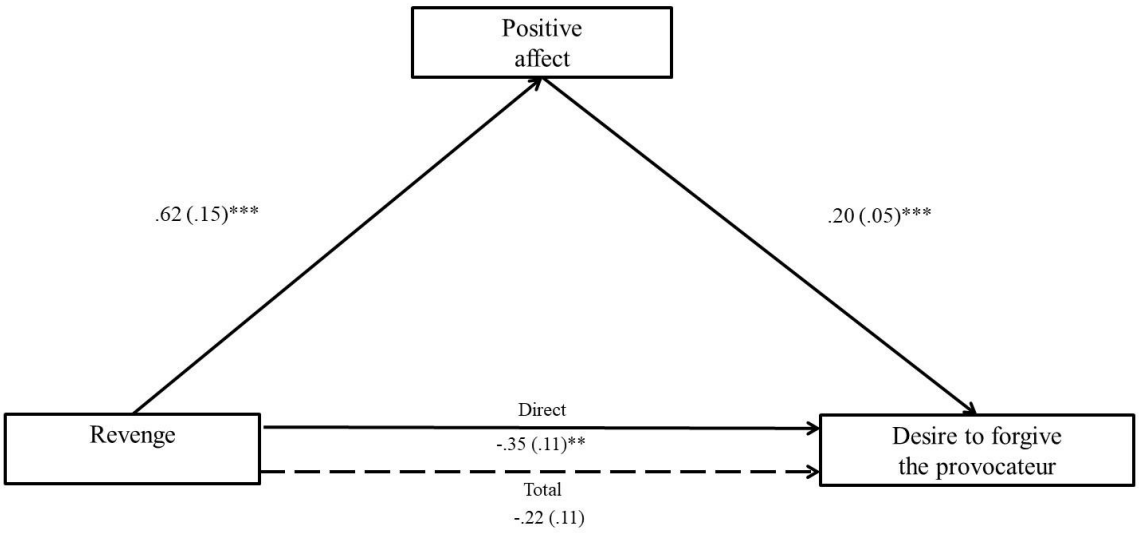
******* $p < .001$.

Mediation model with the **desire to forgive** the provocateur as outcome was also significant, $F(2, 142) = 8.22$, $p < .001$ and explained 10% variance in criterion variable

(Figure 2). The total effect was insignificant, $b$ = -.22, $SE$ = .11, $p$ = .055, 95% CI [-.451; .004]. Direct effect was significant, $b$ = -.35, $SE$ = .11, $p$ = .003, 95%CI [-.583; - .121]. As hypothesized, the association between revenge related positive affect and desire to forgive the provocateur was significant, $b$ = .20, $SE$ = .05, $p$ < .001, 95%CI [.090; .321]. Contrary to Model 1, the indirect effect was significant, $b$ = .13, $SE$ = .05, 95%CI [.039; .246]. Thus, Hypothesis 1.2 was confirmed.

**Figure 2**

*Mediation Model From Study 1, Whereby The Direct Effect of Revenge on Desire to Forgive the Provocateur Is Mediated by Positive Affect (N = 145)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant.

** $p$ < .01, ******* $p$ < .001.

### 5.1.3. Discussion

Study 1 showed that revenge is likely to be an important motive of human actions (reflected by percentage of participants who retaliated) and is related to self-reported positive affect. The more pins stuck in the doll representing the provocateur, the higher positive affect

participants reported afterwards. These results corroborate previous research linking aggression to positive affect (e.g., Chester, 2017). Correlational analysis showed that aggression-related positive affect was associated with both desire to harm and to forgive the provocateur. Interestingly, vengeful and forgiving intentions were unrelated ($p$ = .647), which is unexpected as these two motivations tend to be negatively related to each other (e.g., Worthington et al., 2007). Indirect effects revealed that positive affect mediated the link between revenge and desire to forgive, but not the link between revenge and desire to harm the provocateur. Thus, Hypothesis 1.2 was confirmed, but not Hypothesis 1.1. These results suggest that feeling good from retaliating may foster kindhearted behavior toward wrongdoers, thus providing initial support for the affective counterbalancing hypothesis (Chester & Martelli, 2019). However, it needs to be stressed that mediation was only partial as the direct effect did not become insignificant once mediator was included (Baron & Kenny, 1986).

Despite some contributions, these findings are limited because of their correlational nature. Though measures were presented in fixed order, correlations do not allow for the establishment of a causal sequence of variables (e.g., Giner-Sorolla, 2016). Moreover, I did not evoke a revenge seeking (i.e., all participants wanted to seek revenge upon their real-world transgressor) and I did not assess the pre-aggression affect. Therefore it is unclear whether revenge *improved* participants' affect or merely the symbolic harm to the provocateur was pleasurable. Moreover, participants could recall various aversive interpersonal experiences (or not recall them at all). Study 2 aimed to address these limitations in an experimental design using a different measure of aggression.

## 5.2. Study 2: Role of revenge-related positive affect in the relationship between provocation and subsequent intentions toward the provocateur

Study 2 examined whether aggression in response to provocation restores affective balance disrupted by the provocation, thus facilitating the desire to harm and to forgive the provocateur. More precisely, I tested whether the effect of provocation on the desire to harm and to forgive the provocateur was serially mediated by pre-aggression negative affect, aggression, and post-aggression positive affect. Thus, Study 2 tested Hypothesis 1.1 and 1.2 in an experimental design.

Aggression is often a reaction to insult (Denson et al., 2011; DeWall et al., 2011) or criticism (Bushman & Baumeister, 1998; Chester & DeWall, 2017). Thus, to experimentally induce revenge-seeking, I simulated an aversive social interaction using a well-established procedure of social feedback essay task (Bushman & Baumeister, 1998; Chester & DeWall, 2017; Chester et al., 2015; Chester et al., 2018; DeWall et al., 2012; Konrath et al., 2006). In this procedure participants receive either positive (praising) or negative (insulting) feedback on their essays from a non-existing individual. I used an analogical social feedback essay task procedure to the procedure described by Chester and DeWall (2017, Study 5) to attempt to replicate (and extend) their findings on the rewarding function of revenge. Provocation was therefore operationalized as insulting feedback from another individual.

In order to quantify aggressive behavior, I used the Competitive Reaction Time Task (i.e., CRTT), one of the most frequently used measures of aggression (West et al., 2021), which builds upon the well-known Taylor Aggression Paradigm (Taylor, 1967). In this paradigm, aggression is measured as both duration and intensity of aversive noise blasts administered to another individual. Because publications using this measure reported more than 150 different quantification strategies (see https://www.flexiblemeasures.com/crtt/), I employed the standardized version of the CRTT (Chester & Lasko, 2018) to overcome issues

of operationalizing aggression within this paradigm in multiple ways (Elson et al., 2014), therefore causing the "*p*-hacking" (Warburton & Bushman, 2019). Pre-aggression and post-aggression affect were in turn assessed using items from research introducing the bittersweet model of revenge (Eadeh et al., 2017).

### 5.2.1. Method

#### 5.2.1.1. Participants

Sample size was approximated based on power analysis using G*Power 3.1 (Faul et al., 2007) and Fritz and MacKinnon (2007) recommendation for sample sizes required to detect indirect effects. I used the F test family for linear multiple regression to estimate the sample size with G*Power 3.1. Power was calculated based on effect size (f2 = 0.09), four predictor variables, target power of .80 and alpha level of .05. This estimation yielded a minimum sample size of 132 participants. Fritz and MacKinnon (2007) recommend sample sizes of at least 148 participants to detect an indirect effect consisting of two paths with standardized regression coefficients of .24 when using bias-corrected bootstrapping. Participants were 163 SWPS University students (124 female, 38 male; 1 preferred not to disclose their gender; age: $M$ = 28.28, $SD$ = 8.23; range: 19-56) recruited using SONA Research System. I excluded data from seven participants who, at the end of the experiment, reported being suspicious about the presence of another participant. Final analyses were therefore performed on 156 participants (117 female, 38 male, 1 preferred not to disclose their gender; age: $M$ = 28.41; $SD$ = 8.36, range: 19-56). Participants were compensated with partial research credits.

#### 5.2.1.2. Measures

**Aggression** was assessed as both intensity and duration of a noise blast used by participants against their partners in the CRTT (Chester & Lasko, 2018). Answers for both intensity and duration were coded on a scale ranging from 0 (60 dB; 0 seconds) to 10 (105

dB; 5 seconds). I scored aggression by calculating the mean of all 50 individual measurements of the task (2 settings per trial x 25 trials; Chester & Lasko, 2018).

**Positive and negative affect** were measured by asking participants to what extent they currently felt: ”happy”, " pleased”, and “positive” (positive affect), “angry’, “anxious”, “dejected”, “irate”, “mad”, “nervous”, “sad”, “unhappy”, and “worried” (negative affect; Eadeh et al., 2017). Items were translated to Polish for the purpose of this experiment. Participants gave their answers on a scale ranging from 1 (*not at all*) to 5 (*very much*).

**Intentions toward the provocateur** were assessed as in Study 1, using the Decisional Forgiveness Scale (i.e., DFS; Worthington et al., 2007). **Desire to harm** the provocateur was assessed using the 4-item subscale Inhibition of harmful intentions of the DFS. As in Study 1, I reversed scores in this subscale, thus creating a measure of harmful intentions. **Desire to forgive** the provocateur was measured using the 4-item subscale of Prosocial intentions of the DFS. Items were translated to Polish for the purpose of this experiment. Participants indicated their agreement using a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

#### 5.2.1.3. Procedure

The experiment was carried out using Qualtrics (https://www.qualtrics.com/). After providing their informed consent, participants gave their age and gender. Then, they were informed that they would get to interact with another SONA Research Panel participant in a task which supposedly measured skills in describing events people have to mentally visualize. Participants then wrote an essay (800 character minimum, “Please write the essay as best as you can”) about a time they were very angry (Bushman & Baumeister, 1998; Chester & DeWall, 2017; Chester et al., 2018), which they were informed would be exchanged over the Internet with another SONA participant who was allegedly completing the same study. When participants submitted their essays, they passively viewed a 25-s

loading screen and then saw a prewritten essay about their partner's experience at a house party:

*"The situation took place recently. My partner and I were invited to a party by my cousin. I didn't want to go because I don't like house parties with staying over. But my partner persuaded me, and finally I agreed to go there. I regretted it - the party was hopeless. I went with him, but spent most of the time alone. He spent the party playing foosball with my cousin and her friends. Around midnight I saw them making out in the kitchen. It made me angry as hell. I yanked at them, broke a glass of wine, and ran out into the garden. The worst thing about this situation was that I couldn't go home on my own. Too drunk to drive and no Uber available! Like it or not, I had to stay at this idiotic party until the morning and come back home with my boyfriend. Horrible situation. After all, I dumped him."*

Participants then evaluated this essay in terms of composition, correctness, grammar, punctuation, and writing style on a scale ranging from 1 (*poor*) to a 7 (*excellent*) scale. Participants were also given an option to comment on their partner's essay. Many of the participants left comments such as: "*I hope you will meet a more suitable partner for yourself*", "*Well written, but the noun 'partner' occurred five times!*", *"I feel very sorry for you, but the essay could be written better"*, "*I imagine that it had to be a very uncomfortable situation"*, or "*Several repetitions and colloquial style. But, overall, the essay was nicely written*". Depending upon the random assignment, participants either received 10/35 points and a comment "One of the worst essays I have EVER read..." (negative feedback condition, $N = 74$) or 30/35 points and a comment "Great essay!!!" (positive feedback condition, $N = 82$).

After completing the essay task, participants reported their current positive and negative affect (Eadeh et al., 2017) which served both as a manipulation check and measure of pre-aggression affect (Chester & DeWall, 2017). Participants then took part in the

Competitive Reaction Time Task (Chester & Lasko, 2018) allegedly with their partner who supposedly evaluated their essays. Participants were informed the aim of the task was to assess their responsiveness after a cognitively effortful task (i.e., writing an essay). They were told that they would compete with their partner in clicking the cursor on the appearing figure and their job was to be faster than their opponent. Participants were informed the task consists of 25 trials and for each of the 25 trials, participants were told that if they win, their partner will hear the noise blast they have set, and, if they lose, they will hear a noise blast that their fictitious partner has set for them.

Before participants started the task, they could listen to the sample noise blast recordings of different duration and intensity. Participants were then asked to set the intensity (60-105 dB, 5 decibels increments) and duration (0-5 seconds; 0.5 seconds increments) of a noise blast that will serve as punishment for their fictitious partner. Participants had an option not to administer any noise. Regardless of winning or losing, participants were always displayed the duration and intensity of the noise blast their fictitious partner allegedly set for them. Participants lost a given trial approximately 50% of time. Wins and losses were randomized across trials but I held this random order across all participants as Chester and Lasko (2018). After the CRTT, participants again reported their positive and negative affect (Eadeh et al., 2017) and responded to the Decisional Forgiveness Scale (Worthington et al., 2007). Then, participants were probed (no one guessed the purpose of the experiment), debriefed, and granted research credits.

### 5.2.2. Results

#### 5.2.2.1. Descriptive statistics and zero-order correlations

Descriptive statistics are summarized in Table 4. In general, all measures showed sufficient reliability. However, Prosocial intentions subscale of the Decisional Forgiveness Scale showed, as in Study 1, unsatisfactory reliability. Specifically, in the negative social

feedback condition, its reliability was low compared to reliability of other measures.

Zero-order correlations between study variables are presented in Table 5. Aggression was positively correlated with post-aggression negative affect, but unrelated to post-aggression positive affect ($p$ = .15). Unexpectedly, post-aggression positive affect was unrelated to subsequent intentions towards the provocateur.

**Table 4**

*Descriptive Statistics, Study 2*

| Variable | Overall | | | Negative social feedback condition | | | Positive social feedback condition | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***M*** | ***SD*** | ***α*** | ***M*** | ***SD*** | ***α*** | ***M*** | ***SD*** | ***α*** |
| Pre-aggression positive affect | 3.86 | 1.66 | .89 | 2.65 | 1.35 | .81 | 4.95 | 1.06 | .76 |
| Pre-aggression negative affect | 2.57 | 1.57 | .95 | 3.33 | 1.67 | .95 | 1.89 | 1.10 | .92 |
| Aggression | 4.15 | 2.38 | .98 | 4.94 | 2.53 | .98 | 3.44 | 2.00 | .97 |
| Post-aggression positive affect | 3.53 | 1.40 | .84 | 3.49 | 1.44 | .85 | 3.57 | 1.38 | .84 |
| Post-aggression negative affect | 2.58 | 1.37 | .93 | 2.63 | 1.54 | .95 | 2.53 | 1.21 | .90 |
| Desire to harm the provocateur | 2.09 | .89 | .78 | 2.31 | .91 | .81 | 1.89 | .82 | .73 |
| Desire to forgive the provocateur | 3.80 | .73 | .61 | 3.58 | .70 | .51 | 4.00 | .72 | .64 |

**Table 5**

*Zero-Order Correlations Between Study Variables, Study 2 (N = 156)*

| Variable | 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|---|
| 1. Pre-aggression positive affect | - | | | | | |
| 2. Pre-aggression negative affect | -.60*** | - | | | | |
| 3. Aggression | -.29*** | .44*** | - | | | |
| 4. Post-aggression positive affect | .25*** | -.03 | .10 | - | | |
| 5. Post-aggression negative affect | -.14 | .51*** | .35*** | -.14 | - | |
| 6. Desire to harm the provocateur | -.26*** | .41*** | .58*** | .11 | .40*** | - |
| 7. Desire to forgive the provocateur | .28*** | -.33*** | -.36*** | .04 | -.38*** | -.61*** |

*** $p < .001$.

#### 5.2.2.2. Manipulation check

Participants who received insulting feedback reported they felt greater negative affect (negative social feedback condition: $M = 3.33$, $SD = 1.68$, positive social feedback condition: $M = 1.89$, $SD = 1.10$, $t(154) = 6.37$, $d = 1.01$, $p < .001$), and lesser positive affect (negative social feedback condition: $M = 2.65$, $SD = 1.34$, positive social feedback condition: $M = 4.95$, $SD = 1.06$, $t(154) = -11.93$, $d = 1.90$, $p < .001$), than participants who received praising social feedback. The provocation manipulation was therefore effective.

#### 5.2.2.3. Moderation analysis

To examine the extent to which aggression repaired the impaired affect of provoked participants, I ran a 2 (insult vs. praise) x 2 (negative vs. positive valence) x 2 (pre-aggression affect vs. post-aggression affect) mixed-effects general linear model. I observed significant three-way Negative social feedback X Valence X Pre/Post interaction (Table 6).

**Table 6**

*Summary Statistics For the Mixed-Effects General Linear Model From Study 2 on Participants' Affect Reports (Model df = 1, 154)*

| Effect | *F* | *p* | $\eta^2_p$ |
|---|---|---|---|
| Negative social feedback (between) | 3.58 | .06 | .023 |
| Valence (within) | 53.78 | <.001 | .259 |
| Pre/Post (within) | 5.33 | .02 | .033 |
| Negative social feedback X Valence | 45.24 | <.001 | .227 |
| Negative social feedback X Pre/Post | 11.50 | <.001 | .069 |
| Valence X Pre/Post | 1.72 | .19 | .011 |

| | | | |
|---|---|---|---|
| Negative social feedback X Valence X Pre/Post | 89.81 | <.001 | .368 |

Simple main effects revealed significant differences in pre-aggression and post-aggression positive, $F(1, 154) = 6.91$, $p < .01$, $\eta^2_p = .043$, and negative, $F(1, 154) = 12.20$, $p < .001$, $\eta^2_p = .073$, affect among insulted participants (Table 7). That is, among participants who received negative social feedback, positive affect significantly increased (Figure 3) and negative affect significantly decreased (Figure 4) after aggression. In turn, among praised participants, positive affect significantly decreased after aggression, $F(1, 154) = 156.37$, $p < .001$, $\eta^2_p = .504$ (Figure 3), whereas negative affect significantly increased, $F(1, 154) = 19.83$, $p < .001$, $\eta^2_p = .114$ (Figure 4). Aggression increased positive affect and decreased negative affect among insulted participants, which indicates that revenge repaired participants' affective balance as in Chester and DeWall (2017).

**Table 7**

*Descriptive Statistics for Positive and Negative Affect Assessed Before and After Aggression From Study 2, by Condition (N = 156)*

| **Condition** | **Pre/Post** | **Valence** | ***M*** | ***SE*** | ***95%CI*** |
|---|---|---|---|---|---|
| Negative social feedback | Pre Aggression | Positive | 2.65 | .14 | [2.37; 2.93] |
| | | Negative | 3.33 | .16 | [3.01; 3.65] |
| | Post Aggression | Positive | 3.49 | .16 | [3.16; 3.81] |
| | | Negative | 2.63 | .16 | [2.31; 2.95] |
| Positive social feedback | Pre Aggression | Positive | 4.95 | .13 | [4.69; 5.22] |
| | | Negative | 1.89 | .15 | [1.58; 2.20] |
| | Post Aggression | Positive | 3.57 | .15 | [3.26; 3.88] |
| | | Negative | 2.53 | .15 | [2.23; 2.83] |

**Figure 3**

*Evidence From Study 2 for Increased Positive Affect Among Insulted Participants After an Instance of Aggression. Lines Represent Group Averages, and Error Bars Represent ± 1 Standard Error of the Mean (N = 156)*

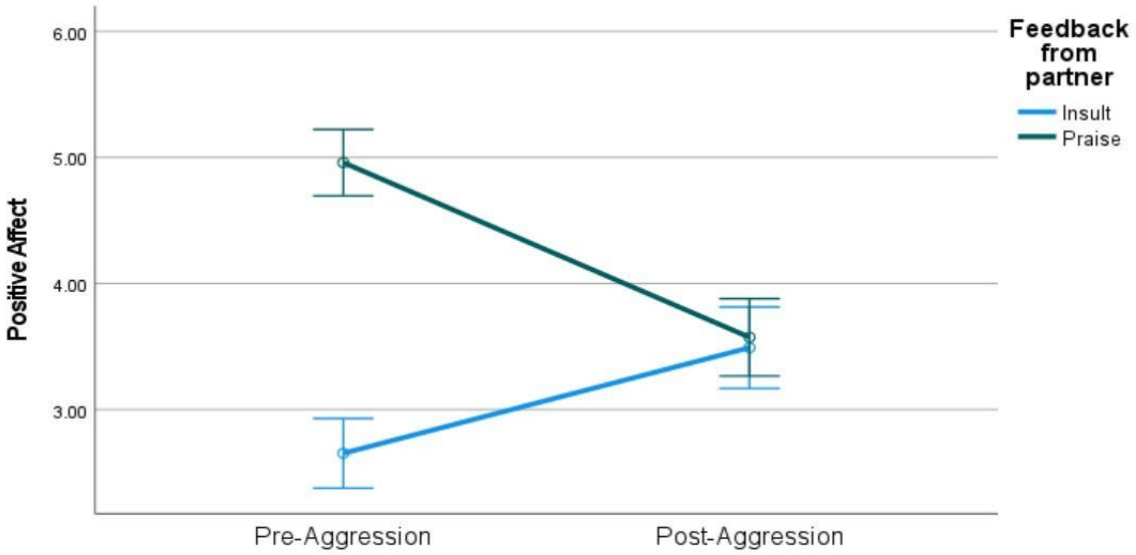
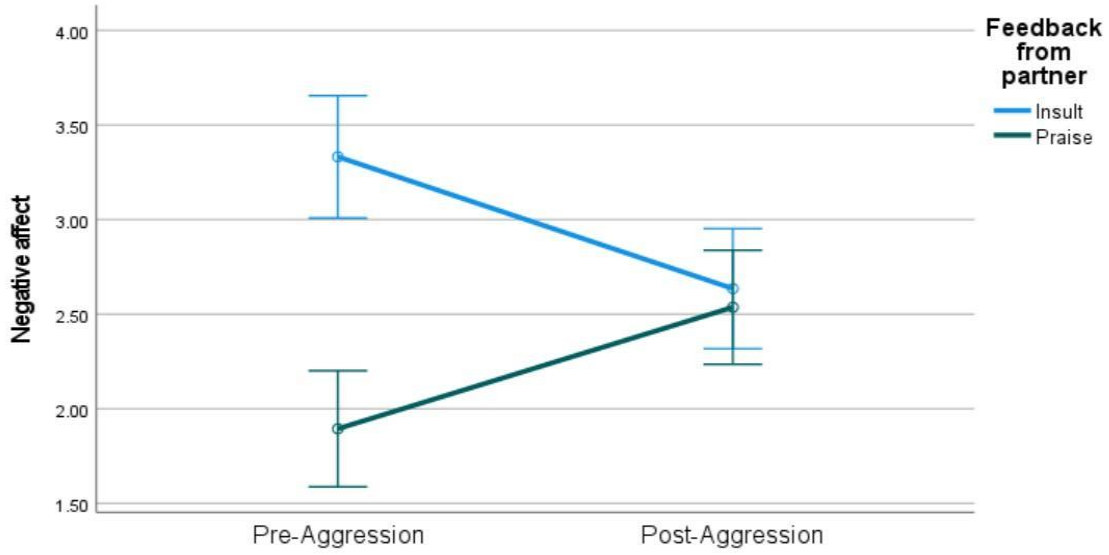



**Figure 4**

*Evidence From Study 2 for Decreased Negative Affect Among Insulted Participants After an Instance of Aggression. Lines Represent Group Averages, and Error Bars Represent ± 1 Standard Error of the Mean (N = 156)*



#### 5.2.2.4. Serial mediation analyses

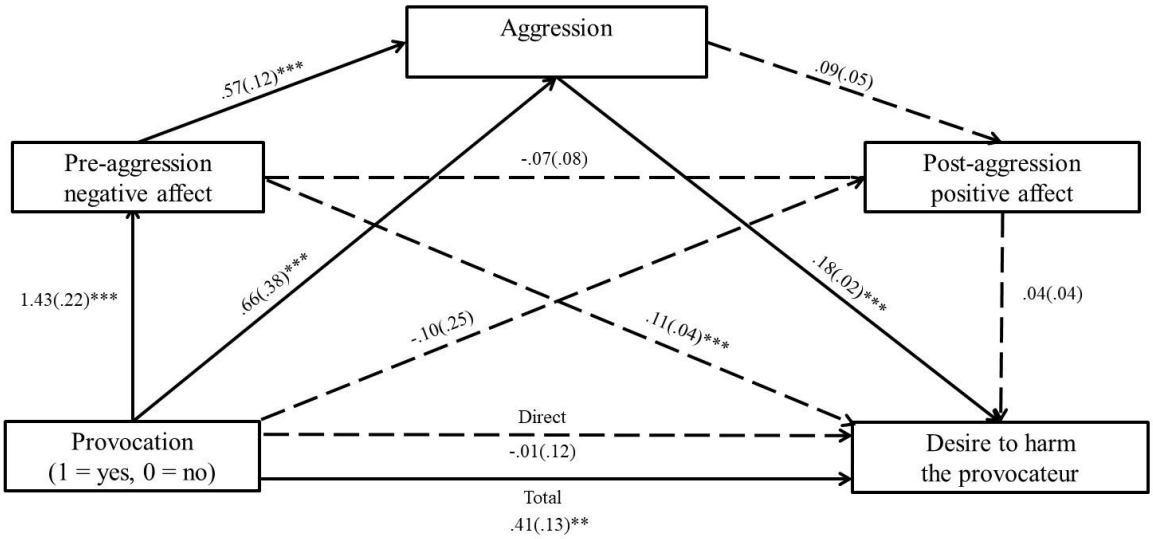
##### 5.2.2.4.1. Provoked and unprovoked participants

To test whether pre-aggression negative affect, aggression quantified as duration and intensity of aversive noise blasts, and post-aggression positive affect serially mediated the effect of provocation on the desire to harm (Model 1) and to forgive (Model 2) the provocateur, I ran serial mediation models using PROCESS 3.5 macro for SPSS (Model 6; Hayes, 2017) with 10,000 bias-corrected and 95% bias-corrected bootstrap confidence intervals. This analysis was carried out on both provoked and unprovoked participants (c.f., Chester & DeWall, 2017; Chester et al., 2019) to examine whether hypothesized relationships occurred due to provocation.

First, I examined whether provocation resulted in negative affect, which then predicted acts of aggression, which then predicted positive affect, which then predicted the **desire to harm** the provocateur. This model explained 37.8% of the variance in the criterion variable, $F(4, 151) = 22.96$, $p < .001$ (Figure 5). As expected, provocation increased negative affect, $b = 1.43$, $SE = .22$, $p < .001$, 95%CI [.991; 1.88], which subsequently predicted greater aggression, $b = .57$, $SE = .12$, $p < .001$, 95%CI [.335; .817]. The path from aggression to positive affect was positive, albeit failed to reach significance, $b = .09$, $SE = .05$, $p = .081$, 95%CI [-.014; .196]. Contrary to my predictions, the path from post-aggression positive affect to the desire to harm the provocateur was insignificant, $b = .04$, $SE = .04$, $p = .263$, 95%CI [-.035; .127]. Total effect was positive and significant, $b = .41$, $SE = .13$, $p = .003$, 95%CI [.139; .689], but direct effect, $b = -.01$, $SE = .12$, $p = .88$, 95%CI [-.275; .236] and total indirect effect of pre-aggression negative affect, aggression, and post-aggression positive affect were insignificant, $b = .003$, $SE = .004$, 95%CI [-.002; .015]. Hypothesis 1.1 was therefore not supported. All indirect effects are summarized in Table 8.

**Figure 5**

*Serial Mediation Model From Study 2 Whereby the Direct Effect of Provocation on Desire to Harm the Provocateur Was Serially Mediated by Pre-Aggression Negative Affect, Aggression and Post-Aggression Positive Affect (N = 156)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant.

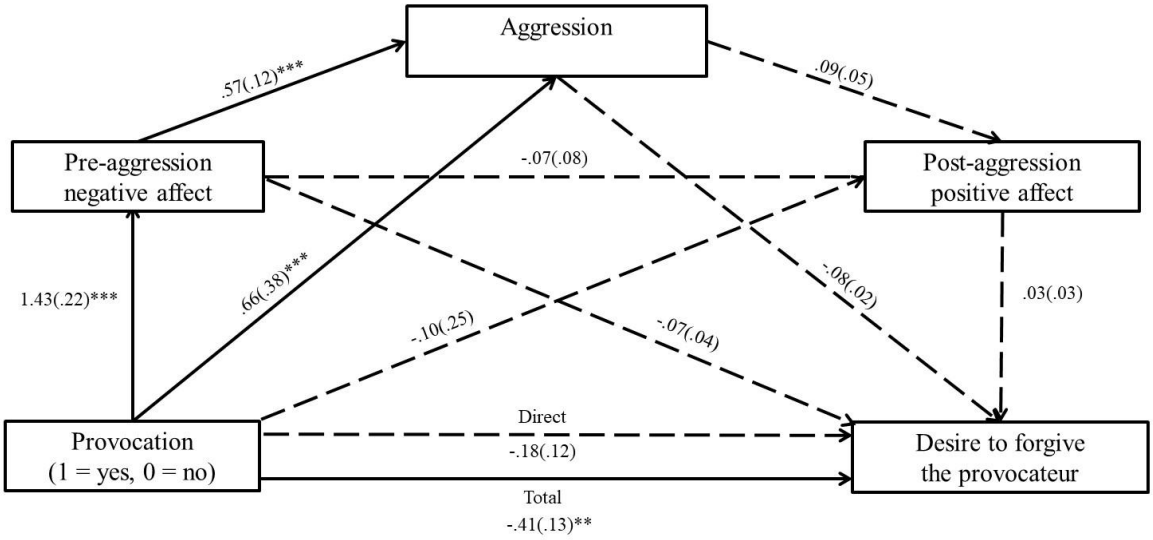
** $p < .01$, *** $p < .001$.

Next, I tested whether provocation resulted in negative affect, which then predicted acts of aggression, which then predicted positive affect, which ultimately predicted the **desire to forgive** the provocateur. This model explained 18.6% of the variance in the criterion variable, $F(4, 151) = 8.66$, $p < .001$ (Figure 6). Contrary to my predictions, the path from post-aggression positive affect to the desire to forgive the provocateur was insignificant, $b = .03$, $SE = .03$, $p = .40$, 95%CI [-.044; .108]. Total effect was significant, $b = -.41$, $SE = .13$, $p < .001$, 95%CI [-.636; -.188]. However, the direct effect was not significant, $b = -.18$, $SE = .12$, $p = .13$, 95%CI [-.424; .058], so was the total indirect effect of pre-aggression negative affect, aggression, and post-aggression positive affect, $b = .002$, $SE = .003$, 95%CI [-.003;

.012]. Hypothesis 1.2 was therefore not confirmed. All indirect effects are summarized in Table 8.

**Figure 6**

*Serial Mediation Model From Study 2 Whereby the Direct Effect of Provocation on Desire to Forgive the Provocateur Was Serially Mediated by Pre-Aggression Negative Affect, Aggression and Post-Aggression Positive Affect (N = 156)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant.

** $p$ <.01, *** $p$ < .001.

**Table 8**

*Summary of Indirect Effects, Study 2 (N = 156)*

| **Desire to Harm the Provocateur (Model 1)** | | | | **Desire to Forgive the Provocateur (Model 2)** | | | |
|---|---|---|---|---|---|---|---|
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** | **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | .16 | .07 | [.019; .320] | X > M1 > Y | -.10 | .07 | [-.241; .041] |
| X > M2 > Y | .12 | .07 | [.019; .320] | X > M2 > Y | -.05 | .03 | [-.138; .011] |
| X > M3 > Y | -.005 | .01 | [-.040; .024] | X > M3 > Y | -.003 | .01 | [-.034; .019] |
| X > M1 > M2 > Y | .15 | .05 | [.060; .283] | X > M1 > M2 > Y | -.06 | .03 | [-.144; -.014] |
| X > M1 > M3 > Y | -.005 | .009 | [-.029; .008] | X > M1 > M3 > Y | -.003 | .01 | [-.034; .019] |
| X > M2 > M3 > Y | .002 | .004 | [-.003; .013] | X > M2 > M3 > Y | .002 | .003 | [-.002; .011] |
| X > M1 > M2 > M3 > Y | .003 | .005 | [-.002; .016] | X > M1 > M2 > M3 > Y | .002 | .003 | [-.002; .011] |
| **Total indirect effect** | **.43** | **.10** | **[.231; .656]** | **Total indirect effect** | **-.22** | **.08** | **[-.391; -.073]** |

*Note*. X = provocation (1 = yes, 0 = no); M1 = pre-aggression negative affect; M2 = aggression; M3 = post-aggression positive affect; Y = desire to harm (Model 1) and to forgive (Model 2) the provocateur. Analyses were conducted on both provoked and unprovoked participants.

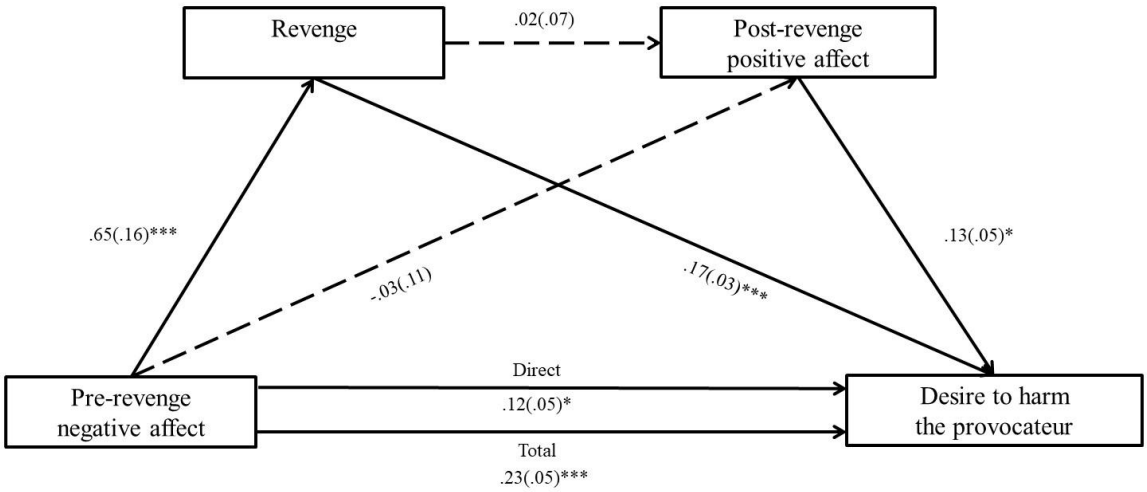
#### 5.2.2.4.2. Provoked participants

In addition, I tested whether revenge-related positive affect predicted subsequent revengeful and forgiving intentions only among provoked participants. To do so, I used PROCESS 3.5 macro for SPSS (Model 6; Hayes, 2017) with 10,000 bias-corrected and 95% bias-corrected bootstrap confidence intervals.

First, I examined whether pre-revenge negative affect predicted acts of revenge, which then predicted post-revenge positive affect, which then predicted the **desire to harm** the provocateur. This model explained 43.8% of the variance in the criterion variable, $F(3, 70) = 18.23$, $p < .001$ (Figure 7). Pre-revenge negative affect predicted revenge, $b = .65$, $SE = .16$, $p < .001$, 95%CI [.338; .975], but revenge did not predict increases in positive affect, $b = .02$, $SE = .07$, $p = .760$, 95%CI [-.124; .170]. However, the path from post-revenge positive affect to the desire to harm the provocateur was significant, $b = .13$, $SE = .05$, $p = .026$, 95%CI [.016; .244]. Total, $b = .23$, $SE = .05$, $p < .001$, 95%CI [.124; .352], and direct effect were significant, $b = .12$, $SE = .05$, $p = .021$, 95%CI [.018; .233]. Total indirect effect of pre-revenge negative affect, revenge, and post-revenge positive affect was insignificant, $b = .001$, $SE = .007$, 95%CI [-.013; .018]. Indirect effects are summarized in Table 9.

**Figure 7**

*Serial Mediation Model From Study 2 Whereby the Direct Effect of Pre-Revenge Negative Affect on Desire to Harm the Provocateur Was Serially Mediated by Revenge and Post-Revenge Positive Affect (N = 74)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant. Analysis was conducted only among provoked participants.

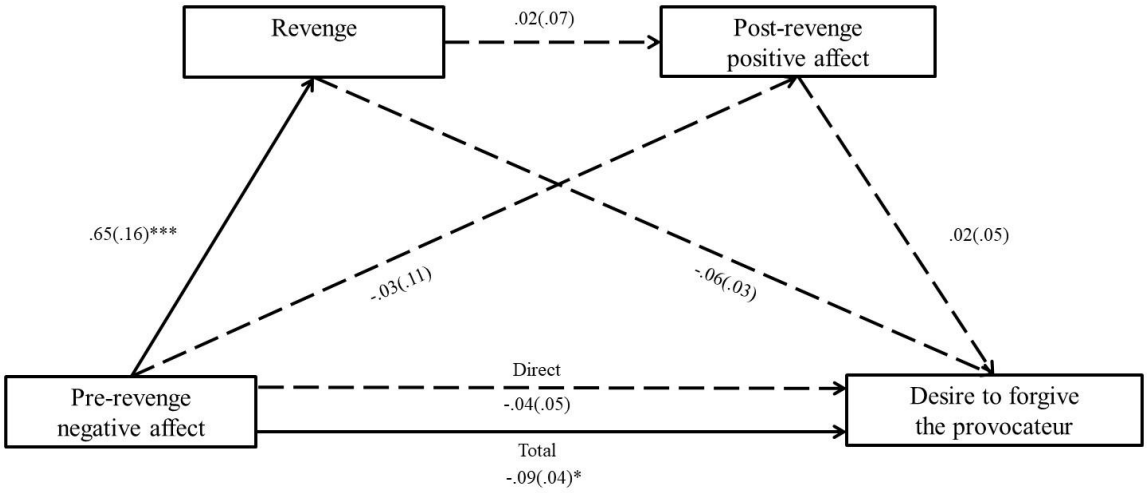
* $p$ <.05, *** $p$ < .001.

Second, I examined whether pre-revenge negative affect predicted acts of revenge, which then predicted post-revenge positive affect, which then predicted the **desire to forgive** the provocateur. This model explained 9.6% of the variance in the criterion variable, $F(3, 70) = 18.23$, $p = .066$ (Figure 8). Revenge was unrelated to forgiving intentions, $b = -.06$, $SE = .03$, $p = .062$, 95%CI [-.132; .003], so was post-revenge positive affect, $b = .02$, $SE = .05$, $p = .718$, 95%CI [-.089; .129]. Total effect was marginally significant, $b = -.09$, $SE = .04$, $p = .057$, 95%CI [-.183; .002]. Direct effect was insignificant, $b = -.04$, $SE = .05$, $p = .358$, 95%CI [-.150; .055], so was total indirect effect of pre-revenge negative affect, revenge, and

post-revenge positive affect was insignificant, $b$ = .0003, $SE$ = .003, 95%CI [-.006; .006]. Indirect effects are presented in Table 9.

**Figure 8**

*Serial Mediation Model From Study 2 Whereby the Direct Effect of Pre-Revenge Negative Affect on Desire to Forgive the Provocateur Was Serially Mediated by Revenge and Post-Revenge Positive Affect (N = 74)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant. Analysis was conducted only among provoked participants.

* $p$ = .057; *** $p$ < .001

**Table 9**

*Summary of Indirect Effects, Study 2 (N = 74)*

| **Desire to Harm the Provocateur (Model 1)** | | | | **Desire to Forgive the Provocateur (Model 2)** | | | |
|---|---|---|---|---|---|---|---|
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** | **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | .11 | .04 | [.041; .204] | X > M1 > Y | -.04 | .02 | [-.096; .009] |
| X > M2 > Y | -.005 | .01 | [-.037; .031] | X > M2 > Y | -.008 | .007 | [-.020; .010] |
| X > M1 > M2 > Y | .001 | .007 | [-.013; .017] | X > M1 > M2 > Y | .0003 | .003 | [-.006; .006] |
| **Total indirect effect** | **.11** | **.04** | **[.029; .208]** | **Total indirect effect** | **-.04** | **.02** | **[-.100; .008]** |

*Note.* X = pre-revenge negative affect; M1 = revenge; M2 = post-revenge positive affect; Y = desire to harm (Model 1) and to forgive (Model 2) the provocateur. Analyses were conducted only among provoked participants.

### 5.2.3. Discussion

Study 2 demonstrated that increased negative affect in response to provocation (i.e., insulting feedback from another individual) motivates aggressive behavior. The worse participants felt after the provocation, the more they were aggressive. This evidence aligns with previous works highlighting the role of aversive affective states in inspiring aggression (Berkowitz, 1989; Donahue et al., 2014). Contrary to my predictions, aggression was not associated with a positive affect. This lack of significant association is likely because the study was underpowered. For instance, the association between revenge and positive affect was strong in Study 1 (which tested a simple mediation model), but in Study 2 (which tested the serial mediation model) the association between aggression and positive affect did not reach significance ($p$ = .08). In fact, Chester and DeWall (2017, Study 5) tested a serial mediation model (with two sequential mediators) on a sample of 156 participants. Sample size estimation for this study was an approximation which comprised computing required sample size for linear multiple regression models (G*Power 3.1; Faul et al., 2007) with recommendations of Fritz and McKinnon (2007). However, none of these estimating methods directly applies to a model including three sequential mediators. To rule out the possibility that lack of significant associations occurred due to low sample size, I doubled the number of participants for prospective Studies 3 and 4.

However, the alternative explanation for the lack of expected association between aggression and positive affect is the measurement of aggression itself. More specifically, participants were exposed to two sources of frustration: feedback given by another individual and noise blasts administered by another individual. Exposure to a sort of continuous source of frustration, irritation, and pain from noise blasts increased the credibility of the procedure, but could also have confounded the prior effect of provocation. Relatedly, in Study 1 which used the simple Voodoo Doll Task procedure, the association between revenge and positive

affect was significant. To eliminate this possibility, in Study 3 I followed the analogical provocation manipulation procedure, but replaced the Competitive Reaction Time Task with the Voodoo Doll Task, thus simplifying the procedure.

Although Study 2 did not provide evidence for the hypothesized relationship between post-aggression positive affect and subsequent intentions toward the provocateur, it still replicated findings of Chester and DeWall (2017, Study 5) on aggressive mood improvement. That is, positive affect increased and negative affect decreased after an act of revenge. I observed the opposite effect among participants who received positive social feedback - their positive affect decreased and negative affect increased after aggression. Thus, revenge restored participants' affective balance previously disrupted by the aversive interpersonal experience.

Serial mediation analyses conducted only among provoked participants revealed that revenge did not elicit a positive affect, yet feelings of satisfaction and pleasure predicted desire for revenge, but not the desire to forgive. However, it needs to be stressed that these analyses were performed on a sample of merely 74 participants. This sample size likely did not have sufficient statistical power to detect meaningful effects. Yet this significant relationship suggests that hypothesized associations could be unraveled on a larger sample.

Despite some contributions, Study 2 had several limitations. First, as mentioned earlier, it could be underpowered. Second, the Decisional Forgiveness Scale, particularly Prosocial intentions subscale, showed unsatisfactory reliability. Therefore, in Studies 3 and 4, I employed the Transgression-Related Interpersonal Motivations (i.e., TRIM-18; McCullough et al., 2006) for assessing intentions toward the provocateur. Using TRIM-18 would allow me to examine whether the hypothesized relationships between revenge-related positive affect and subsequent intentions toward the provocateur are *specific* to vengeful and forgiving intentions. Third, the Competitive Reaction Time Task took place over the Internet, not in the

laboratory. Although I used a standardized version of this task (Chester & Lasko, 2018), I could not control participants' volume settings to the extent I could do this in the laboratory. This (and the CRTT procedure itself) could have affected the results. Though participants were instructed not to turn the volume off unless experiencing distress, it is unclear to what extent they followed the instruction. Hence, in Studies 3 and 4 I used the Voodoo Doll Task (DeWall et al., 2013) for assessing aggression, which is widely used in Internet research (Chester & DeWall, 2017; Chester et al., 2019; Chester et al., 2014; Dyduch-Hazar & Mrozinski, 2019; Golec de Zavala et al., 2020).

### 5.3. Study 3. Role of revenge-related positive affect in the relationship between provocation and subsequent intentions toward the provocateur: Replication

Study 3 tested Hypotheses 1.1 and 1.2 in experimental design. Thus, I examined whether pre-aggression negative affect, aggression, and post-aggression positive affect serially mediated the effect of provocation on the desire to harm, to forgive, and to avoid the provocateur. As in Study 2, provocation was operationalized as the insulting feedback on the written essay (Bushman & Baumeister, 1998) and positive and negative affect were assessed as in Eadeh and colleagues (2017). However, three changes were made.

First, aggression was quantified using the Voodoo Doll Task (DeWall et al., 2013) instead of the Competitive Reaction Time Task (Chester & Lasko, 2018) to rule out the possibility that comprehensive CRTT procedure confounded the effect of provocation manipulation on aggression. Second, intentions toward the provocateur were assessed with the Transgression-Related Interpersonal Motivations (i.e., TRIM-18, McCullough et al., 2006). Hence, I assessed not only desire to harm and to forgive the provocateur, but also desire to avoid the provocateur in order to examine whether revenge related positive affect specifically fosters vengeance and forgiveness. Third, data was collected on a larger sample to rule out the possibility that null effects in Study 2 were due to insufficient sample size.

### 5.3.1. Method

#### 5.3.1.1. Participants

Given that Fritz and MacKinnon (2007) recommend sample sizes of at least 148 participants to detect an indirect effect consisting of two paths with standardized coefficients of .24 and 368 participants when one of the paths for the indirect effect is as low as .14, I aimed for sample sizes of approximately 250-300 participants in Studies 3 and 4. Such sample size would also be twice as large as the sample size in study carried out by Chester and DeWall (2017), which I sought to extend. Sample consisted of 301 adults (182 male, 118 female, 1 preferred not to disclose their gender; age: $M$ = 33.76, $SD$ = 9.94, range: 19-67) recruited from the Amazon Mechanical Turk pool of workers in exchange for 1.50$. Participants were required to have a 99% acceptance rate on all previous Amazon Mechanical Turk tasks. None of the participants reported being suspicious of the presence of their partner. However, I excluded data from 59 participants because their essays were nonsensical (e.g., "*Mental visualization is a process in which people imagine things…", "Athletes imagine being angry when competing to visualize their success...",* or *"Take an object, for example a glass and imagine it reflects your thoughts..."*). Final analyses were therefore performed on 242 participants (141 male, 100 female, 1 preferred not to disclose their gender; age: $M$ = 34.10, $SD$ = 10.43, range: 19-67). Participants' ethnical composition was 51.2% White American, 32.6% Asian American, 9.9% African American, 4.1% 'Other', 1.2% Native American, 0.8% Native Hawaiian.

#### 5.3.1.2. Measures

**Aggression** was measured as the number pins stuck in the doll representing the provocateur (i.e., Voodoo Doll Task; DeWall et al., 2013).

**Positive and negative affect** was assessed as in Study 2, by asking participants to what extent they currently felt "happy", "pleased", and "positive" (positive affect), "angry",

"anxious", "dejected", "irate", "mad", "nervous", "sad", "unhappy", "worried" (negative affect; Eadeh et al., 2017). Participants gave their answers on a scale ranging from 1 (*not at all*) to 5 (*very much*).

**Intentions toward the provocateur** were assessed using the 18-item Transgression Related Interpersonal Motivations (i.e., TRIM-18; McCullough et al., 2006), which measures three motivations toward the provocateur. **Desire to harm** the provocateur was assessed using 5-item Revenge motivations subscale (e.g., "I will make him/her pay"). **Desire to forgive** the provocateur was measured using 6-item Benevolence motivations subscale (e.g., "I want us to bury the hatchet and move forward with our relationship"). **Desire to avoid** the provocateur was assessed using 7-item Avoidance motivations subscale (e.g., "I am trying to keep as much distance between us as possible"). Answers were coded on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

#### 5.3.1.3. Procedure

The experiment was conducted via Qualtrics (https://www.qualtrics.com/). After consenting, participants gave their age, gender, and ethnicity. Then they were told that they would get to interact with another Amazon Mechanical Turk worker in the task which supposedly measured participants' skills in describing events they have to mentally visualize. I used a social feedback task (Bushman & Baumeister, 1998; Chester & DeWall, 2017) to experimentally simulate an unpleasant social interaction. The procedure was exactly the same as the one employed in Study 2. Participants wrote an essay (800 character minimum) about a time they were very angry, which they were informed would be exchanged over the Internet with another Amazon Mechanical Turk worker who was allegedly completing the same study. When participants submitted their essays, they passively viewed a 25-s loading screen and then saw a prewritten essay about their partner's experience at a house party during New Year's Eve. Participants then evaluated this essay along five criteria: composition,

correctness, grammar, punctuation, and writing style on a scale ranging from 1 (*poor*) to a 7 (*excellent*) scale. As in Study 2, many participants commented on their partner's essay, e.g.: "*I really like essays like this one, it helps get my thoughts out and I feel like I have others to explain my life too!"*, "*I could really understand the anger felt by this writer!", "My feelings for what happened*", "*I liked how direct they were with their sentences and words. I felt the anger*", or "*You should have dumped him!!!*". After passively viewing a 25-s loading screen, participants viewed five bar graphs that showed the scores in all five dimensions and general score. Depending on the research condition participants were randomly allocated to, they received either negative (10/35 points) or positive (30/35 points) feedback on their essays. A comment from the fictitious partner was displayed below each bar graph and it either stated "one of the worst essays that I have ever read..." (negative social feedback condition) or "great essay!!!" (positive social feedback condition). Once participants completed this task, they responded to measures of positive and negative affect, which served both as a manipulation check and measure of pre-aggression affect. Participants then marked their responses to the Voodoo Doll Task (an alleged measure of mental visualization abilities; DeWall et al., 2013) and then again reported their positive and negative affect. Then participants completed TRIM-18 (McCullough et al., 2006). Finally, participants were probed (no one guessed the purpose of the experiment), debriefed, and compensated.

### 5.3.2. Results

#### 5.3.2.1. Transformation of aggression measure

As in Study 1, Kolmogorov-Smirnov test demonstrated that distribution of voodoo pins was not normal, $k(242) = .30$, $p < .001$, as the distribution of pins was heavily skewed (skewness = 1.90, kurtosis = 2.61). Logarithmic transformation (after adding 1 to all values to transform 0 values) reduced skewness (Chester & Lasko, 2018). Results are presented in Table 2.

#### 5.3.2.2. Descriptive statistics and zero-order correlations

Descriptive statistics are summarized in Table 10. All measures showed satisfactory reliability. Zero-order correlations between study variables are presented in Table 11. Aggression was positively correlated with both post-aggression positive and post-aggression negative affect (Eadeh et al., 2017). Moreover, post-aggression positive affect was positively related to the desire to harm and to forgive the provocateur, but was unassociated with the desire to avoid the provocateur.

#### 5.3.2.3. Manipulation checks

As in Study 2, participants who received insulting feedback reported that they felt greater negative affect (negative feedback condition: $M = 2.68$, $SD = 1.01$, positive feedback condition: $M = 2.19$, $SD = 1.08$, $t(240) = 3.65$, $d = .46$, $p < .001$), and lesser positive affect (negative feedback condition: $M = 2.52$, $SD = 1.26$, positive feedback condition: $M = 3.73$, $SD = 1.01$, $t(240) = -8.27$, $d = 1.05$, $p < .001$) than participants who received praising feedback. Manipulation of provocation was therefore effective.

**Table 10**

*Descriptive Statistics, Study 3*

| Variable | Overall | | | Negative social feedback condition | | | Positive social feedback condition | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***M*** | ***SD*** | ***α*** | ***M*** | ***SD*** | ***α*** | ***M*** | ***SD*** | ***α*** |
| Pre-aggression positive affect | 3.12 | 1.18 | .92 | 2.52 | 1.26 | .93 | 3.73 | 1.01 | .85 |
| Pre-aggression negative affect | 2.43 | 1.07 | .94 | 4.56 | 2.68 | .92 | 2.19 | 1.08 | .95 |
| Aggression (transformed) | .72 | .63 | - | .83 | .66 | - | .62 | .58 | - |
| Post-aggression positive affect | 3.12 | 1.18 | .90 | 2.84 | 1.18 | .90 | 3.39 | 1.12 | .88 |
| Post-aggression negative affect | 2.22 | 1.08 | .95 | 4.78 | 2.33 | .94 | 2.12 | 1.14 | .96 |
| Desire to harm the provocateur | 2.56 | 1.16 | .90 | 2.54 | 1.15 | .90 | 2.58 | 1.17 | .90 |
| Desire to forgive the provocateur | 3.34 | .83 | .83 | 3.28 | .83 | .84 | 3.41 | .82 | .80 |
| Desire to avoid the provocateur | 3.05 | 1.10 | .92 | 3.31 | .95 | .88 | 2.80 | 1.18 | .93 |

**Table 11**

*Zero-Order Correlations Between Study Variables, Study 3 (N = 242)*

| Variable | 1. | 2. | 3. | 4. | 5. | 6. | 7. |
|---|---|---|---|---|---|---|---|
| 1. Pre-aggression positive affect | - | | | | | | |
| 2. Pre-aggression negative affect | -.09 | - | | | | | |
| 3. Aggression (transformed) | .09 | .46*** | - | | | | |
| 4. Post-aggression positive affect | .71*** | .06 | .18** | - | | | |
| 5. Post-aggression negative affect | .09 | .88*** | .49*** | .06 | - | | |
| 6. Desire to harm the provocateur | .29*** | .60*** | .56*** | .30*** | .64*** | - | |
| 7. Desire to forgive the provocateur | .25*** | .21*** | .07 | .22*** | .30*** | .21*** | - |
| 8. Desire to avoid the provocateur | -.07 | .58*** | .44*** | .001 | .55*** | .65*** | .04 |

* * $p < .01$, *** $p < .001$

#### 5.3.2.4. Moderation analysis

As in Study 2, I examined the extent to which aggression repaired the impaired affect of provoked participants, running a 2 (negative vs. positive social feedback) x 2 (negative vs. positive valence) x 2 (pre-aggression affect vs. post-aggression affect) mixed-effects general linear model. I observed significant three-way Negative social feedback X Valence X Pre/Post interaction (Table 12).

**Table 12**

*Summary Statistics For the Mixed-Effects General Linear Model From Study 3 on Participants' Affect Reports (Model df = 1, 240)*

| Effect | *F* | *p* | $\eta^2_p$ |
|---|---|---|---|
| Negative social feedback (between) | 7.02 | .009 | .028 |
| Valence (within) | 77.21 | <.001 | .243 |
| Pre/Post (within) | 17.47 | <.001 | .068 |
| Negative social feedback X Valence | 46.74 | <.001 | .163 |
| Negative social feedback X Pre/Post | 13.68 | <.001 | .054 |
| Valence X Pre/Post | 6.87 | .009 | .028 |
| Negative social feedback X Valence X Pre/Post | 38.56 | <.001 | .138 |

Simple main effects revealed significant differences in pre-aggression and post-aggression positive, $F(1, 240) = 16.60$, $p < .001$, $\eta^2_p = .065$, and negative, $F(1, 240) = 58.55$, $p < .001$, $\eta^2_p = .196$, affect among insulted participants (Table 13). That is, among participants who received insulting feedback, positive affect significantly increased (Figure

9) and negative affect significantly decreased (Figure 10) after aggression. In turn, among praised participants, positive affect significantly decreased after aggression, $F$ (1, 240) = 18.01, $p < .001$, $\eta^2_p = .070$, whereas negative affect did not significantly change, $F(1, 240) = 2.00$, $p = 158$, $\eta^2_p = .008$. This evidence indicates that aggression increased positive affect and decreased negative affect among insulted participants. Thus, revenge repaired participants' affective balance as demonstrated by Chester and DeWall (2017). This evidence corroborates findings from Study 2.

**Table 13**

*Descriptive Statistics for Positive and Negative Affect Assessed Before and After Aggression From Study 3, by Condition (N = 242)*

| **Condition** | **Pre/Post** | **Valence** | ***M*** | ***SE*** | ***95%CI*** |
|---|---|---|---|---|---|
| Negative social feedback | Pre Aggression | Positive | 2.52 | .10 | [2.31; 2.72] |
| | | Negative | 2.68 | .09 | [2.49; 2.87] |
| | Post Aggression | Positive | 2.84 | .10 | [2.64; 3.05] |
| | | Negative | 2.33 | .09 | [2.13; 2.52] |
| Positive social feedback | Pre Aggression | Positive | 3.73 | .10 | [3.53; 3.94] |
| | | Negative | 2.19 | .09 | [2.00; 2.37] |
| | Post Aggression | Positive | 3.39 | .10 | [3.19; 3.60] |
| | | Negative | 2.12 | .10 | [1.93; 2.32] |

**Figure 9**

*Evidence From Study 3 for Increased Positive Affect Among Insulted Participants After an Instance of Aggression. Lines Represent Group Averages, and Error Bars Represent ± 1 Standard Error of the Mean (N = 242)*

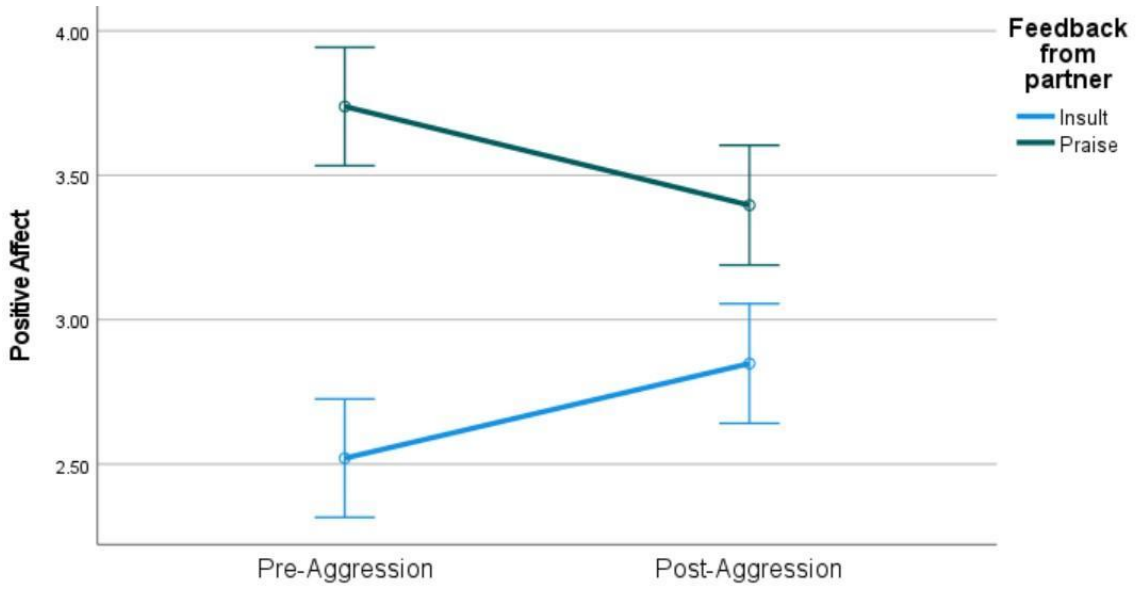
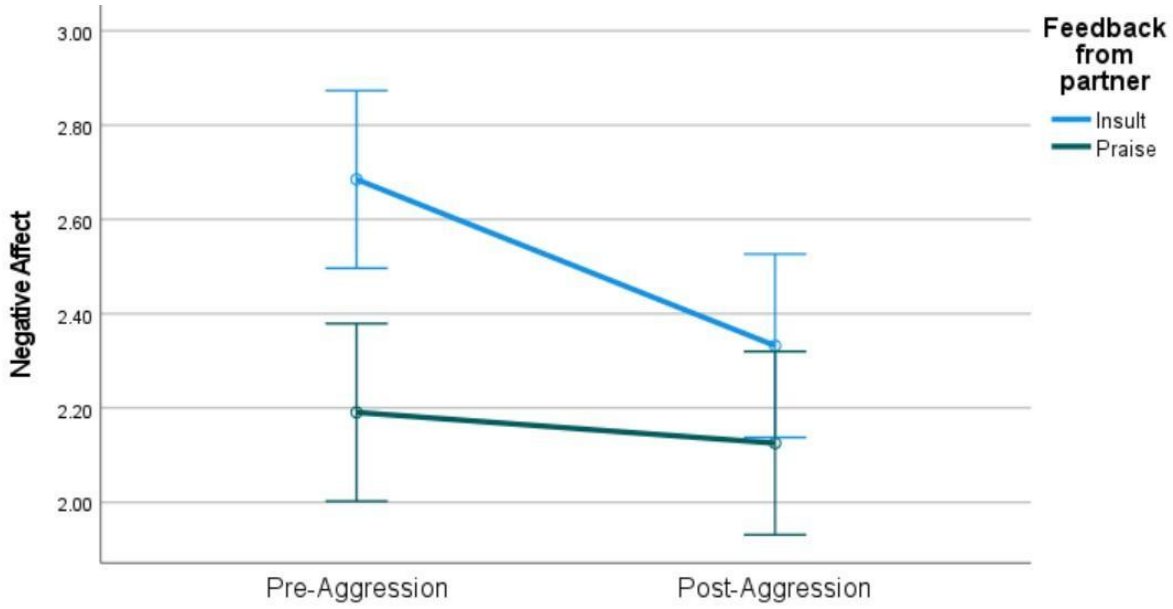



**Figure 10**

*Evidence From Study 3 for Decreased Negative Affect Among Insulted Participants After an Instance of Aggression. Lines Represent Group Averages, and Error Bars Represent ± 1 Standard Error of the Mean (N = 242)*



#### 5.3.2.5. Serial mediation analyses

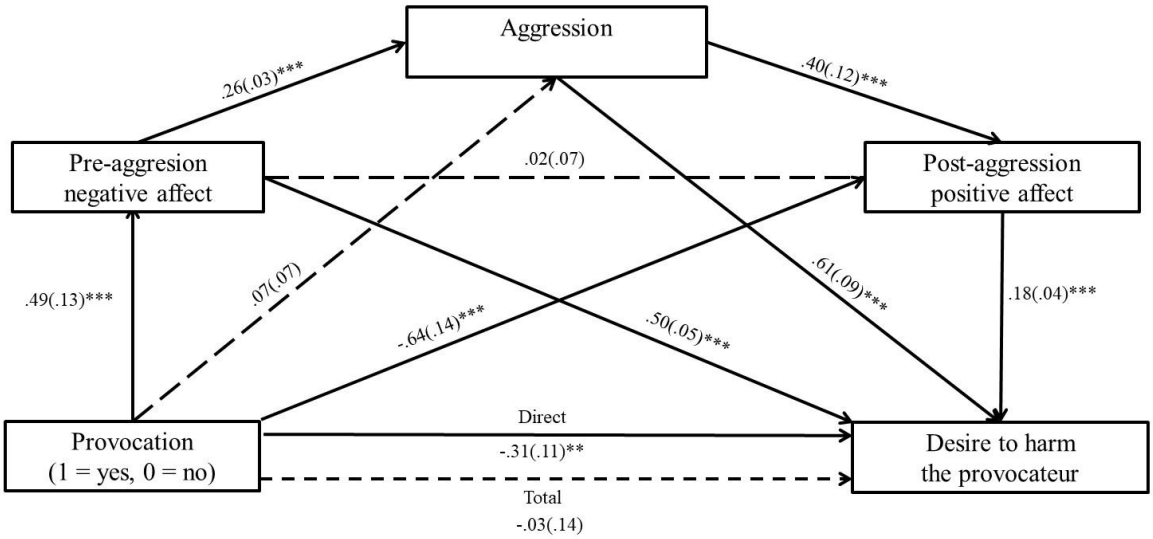
##### 5.3.2.5.1. Provoked and unprovoked participants

To test whether pre-aggression negative affect, aggression, post-aggression positive affect serially mediated the effect of provocation on the desire to harm (Model 1), to forgive (Model 2), and to avoid (Model 3) the provocateur, I ran serial mediation models using PROCESS 3.5 macro for SPSS (Model 6; Hayes, 2017) with 10,000 bias-corrected and 95% bias-corrected bootstrap confidence intervals. As in Study 2, I first run analyses on all participants (both provoked and unprovoked) to see whether hypothesized relationships occurred due to provocation.

First, I examined whether provocation resulted in negative affect, which then predicted acts of aggression, which then predicted positive affect, which then predicted the **desire to harm** the provocateur. The model was significant and explained 53% of the variance in the criterion variable, $F(4, 237) = 66.99$, $p < .001$. As predicted, provocation increased negative affect, $b = .49$, $SE = .13$, $p < .001$, 95%CI [.227; .760], which then predicted aggression, $b = .26$, $SE = .03$, $p < .001$, 95%CI [.197; .333], which subsequently predicted positive affect, $b = .40$, $SE = .12$, $p < .001$, 95%CI [.153; .664] (Figure 11). Post-aggression positive affect predicted increases in subsequent desire to harm the provocateur, $b = .18$, $SE = .04$, $p < .001$, 95%CI [.089; .271]. Total effect was insignificant, $b = -.03$, $SE = .14$, $p = .80$, 95%CI [-.331; .258]. However, direct effect, $b = -.31$, $SE = .11$, $p = .004$, 95%CI [-.532; -.097], and total indirect effect of pre-aggression negative affect, aggression, and post-aggression positive affect were significant, $b = .27$, $SE = .11$, 95%CI [.045; .507]. Thus, receiving negative social feedback made participants feel bad. The worse they felt, the more they were aggressive. The more they were aggressive, the better they felt, and the more they desired to harm their provocateur. Hypothesis 1.1 was therefore confirmed. All indirect effects are summarized in Table 14.

**Figure 11**

*Serial Mediation Model From Study 3 Whereby the Direct Effect of Provocation on Desire to Harm the Provocateur Was Serially Mediated by Pre-Aggression Negative Affect, Aggression and Post-Aggression Positive Affect (N = 242)*




*Note.* Values represented unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant.

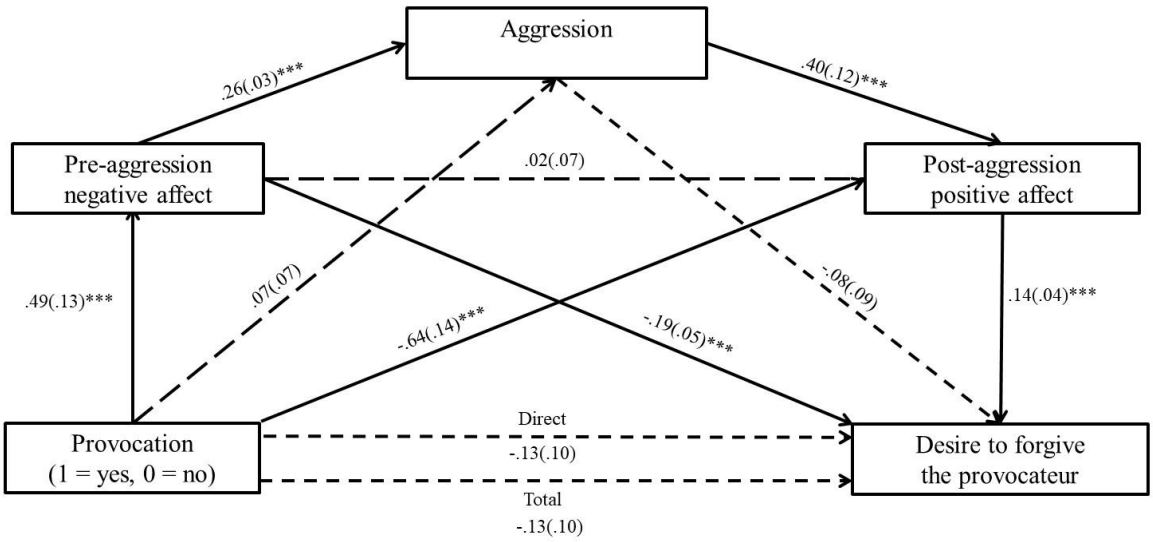
*** $p < .001$. ** $p < .01$.

Second, I examined whether provocation resulted in increased negative affect, which then predicted aggression, which then predicted positive affect, which then predicted the **desire to forgive** the provocateur. This model was significant and explained 10.2% of the variance in the criterion variable, $F(4, 237) = 6.79$, $p < .001$ (Figure 12). In line with my expectations, post-aggression positive affect predicted desire to forgive the provocateur, $b = .14$, $SE = .04$, $p < .001$, 95%CI [.053; .233]. Total effect was insignificant, $b = -.13$, $SE = .10$, $p = .19$, 95%CI [-.348; .073], so was the direct effect, $b = -.13$, $SE = .10$, $p = .20$, 95%CI [-.353; .077], and total indirect effect of pre-aggression negative affect, aggression, and post-aggression positive affect, $b = .004$, $SE = .05$, 95%CI [-.120; .107]. Thus, the better

participants felt after retaliating, the more they desired to forgive their provocateur. Hypothesis 1.2 was confirmed. All indirect effects are presented in Table 14.

**Figure 12**

*Serial Mediation Model From Study 3 Whereby the Direct Effect of Provocation on Desire to Forgive the Provocateur Was Serially Mediated by Pre-Aggression Negative Affect, Aggression and Post-Aggression Positive Affect (N = 242)*




*Note.* Values represented unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant.

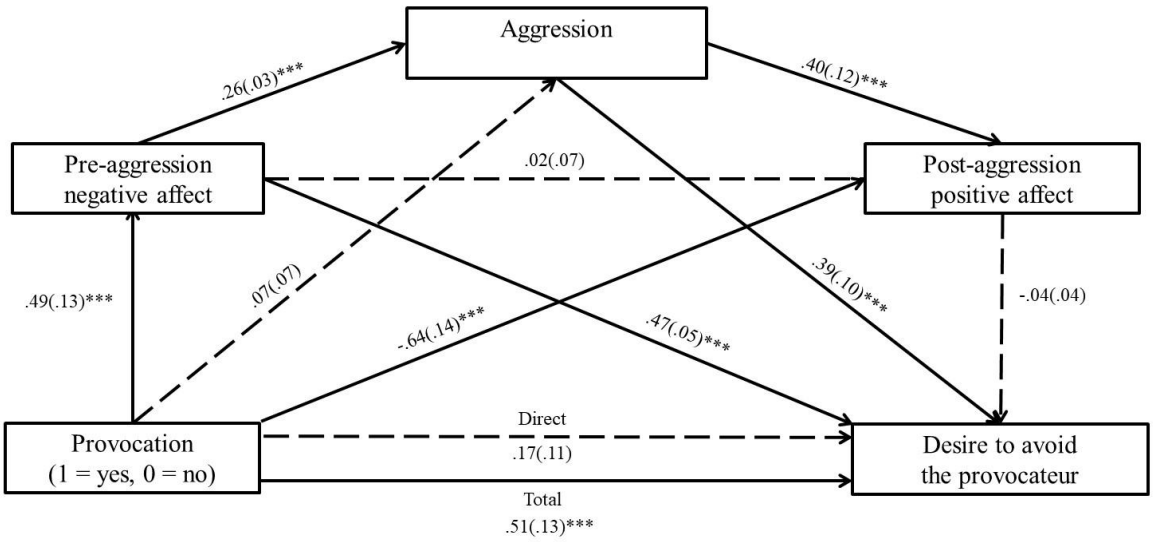
*** $p < .001$.

Third, I examined whether provocation increased negative affect, which then predicted aggression, which then predicted positive affect, which then predicted the **desire to avoid** the provocateur. This model explained 38.8% of the variance in the criterion variable, $F(4, 237) = 37.71$, $p < .001$ (Figure 13). Post-aggression positive affect was unrelated to the desire to avoid the provocateur, $b = -.04$, $SE = .04$, $p = .34$, 95%CI [-.145; .051]. Total effect was significant, $b = .51$, $SE = .13$, $p < .001$, 95%CI [.241; .786], so was the total indirect effect of pre-aggression negative affect, aggression, and post-aggression positive affect, $b =$

.34, *SE* = .09, 95%CI [.163; .531]. Direct effect was, however, insignificant, *b* = .17, *SE* = .11, *p* = .15, 95%CI [-.064; .406]. All indirect effects are summarized in Table 14.

**Figure 13**

*Serial Mediation Model From Study 3 Whereby the Direct Effect of Provocation on Desire to Avoid the Provocateur Was Serially Mediated by Pre-Aggression Negative Affect, Aggression and Post-Aggression Positive Affect (N = 242)*




*Note.* Values represented unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant.

*** $p < .001$.

**Table 14**

*Summary of Indirect Effects, Study 3 (N = 242)*

| **Desire to Harm the Provocateur (Model 1)** | | | |
|---|---|---|---|
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | .24 | .07 | [.109; .407] |
| X > M2 > Y | .04 | .07 | [-.041; .144] |
| X > M3 > Y | -.11 | .04 | [-.207; -.043] |
| X > M1 > M2 > Y | .08 | .02 | [.034; .141] |
| X > M1 > M3 > Y | .002 | .008 | [-.015; .019] |
| X > M2 > M3 > Y | .005 | .007 | [-.004; .023] |
| X > M1 > M2 > M3 > Y | .005 | .007 | [.002; .022] |
| **Total indirect effect** | **.27** | **.11** | **[.045; .512]** |
| **Desire to Forgive the Provocateur (Model 2)** | | | |
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | .09 | .03 | [.034; .174] |
| X > M2 > Y | -.006 | .01 | [-.044; .012] |
| X > M3 > Y | -.09 | .04 | [-.190; -.022] |
| X > M1 > M2 > Y | -.01 | .01 | [-.043; .017] |

| | | | |
|---|---|---|---|
| X > M1 > M3 > Y | .001 | .006 | [-.012; .016] |
| X > M2 > M3 > Y | .004 | .006 | [-.003; .020] |
| X > M1 > M2 > M3 > Y | .007 | .004 | [.001; .019] |
| **Total indirect effect** | **.004** | **.05** | **[-.120; .108]** |

**Desire to Avoid the Provocateur (Model 3)**

| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
|---|---|---|---|
| X > M1 > Y | .23 | .07 | [.101; .386] |
| X > M2 > Y | .03 | .03 | [-.023; .102] |
| X > M3 > Y | .03 | .03 | [-.039; .103] |
| X > M1 > M2 > Y | .05 | .02 | [.016; .096] |
| X > M1 > M3 > Y | -.0006 | .003 | [-.009; .005] |
| X > M2 > M3 > Y | -.001 | .002 | [-.008; .003] |
| X > M1 > M2 > M3 > Y | -.002 | .002 | [-.010; .003] |
| **Total indirect effect** | **.34** | **.09** | **[.163; .531]** |

*Note.* X = provocation (1 = yes, 0 = no), M1 = pre-aggression negative affect, M2 = aggression, M3 = post-aggression positive affect, Y = desire to harm (Model 1), to forgive (Model 2), to avoid (Model 3) the provocateur. Analyses were conducted on both provoked and unprovoked participants.

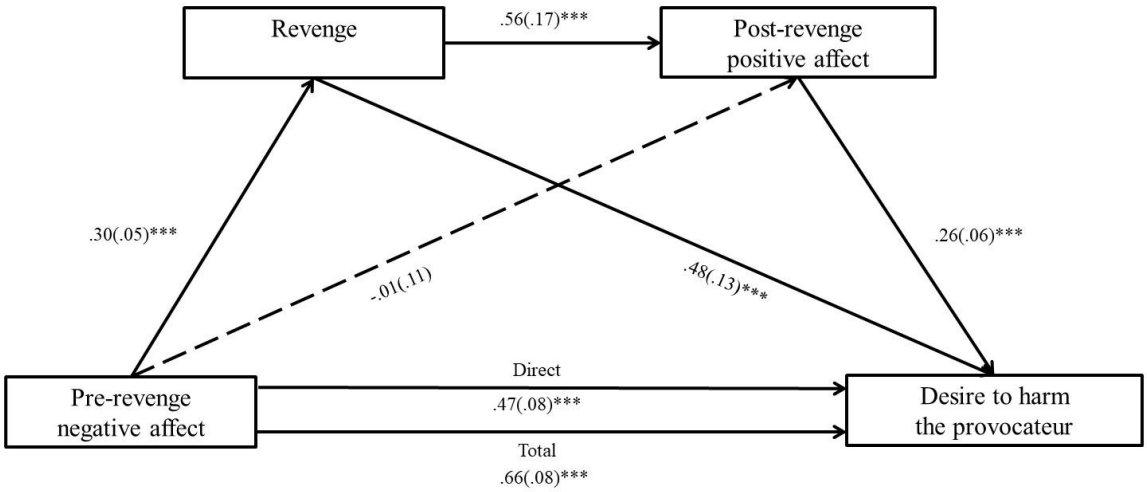
#### 5.3.2.5.1. Provoked participants

As in Study 2, I additionally tested whether revenge-related positive affect predicted subsequent revengeful, benevolent, and avoidant intentions only among provoked participants. I used PROCESS 3.5 macro for SPSS (Model 6; Hayes, 2017) with 10,000 bias-corrected and 95% bias-corrected bootstrap confidence intervals.

First, I examined whether pre-revenge negative affect predicted acts of revenge, which then predicted post-revenge positive affect, which then predicted the **desire to harm** the provocateur. This model explained 51.4% of the variance in the criterion variable, $F(3, 170) = 41.35$, $p < .001$ (Figure 14). Pre-revenge negative affect predicted revenge, $b = .30$, $SE = .05$, $p < .001$, 95%CI [.201; .410] and act of revenge predicted increases in positive affect, $b = .56$, $SE = .17$, $p < .001$, 95%CI [.216; .916]. The path from post-revenge positive affect to the desire to harm the provocateur was significant, $b = .26$, $SE = .06$, $p < .001$, 95%CI [.136; .397]. Total effect was significant, $b = .66$, $SE = .08$, $p < .001$, 95%CI [.495; .828], so was direct effect, $b = .47$, $SE = .08$, $p < .001$, 95%CI [.309; .635]. Total indirect effect of pre-revenge negative affect, revenge, and post-revenge positive affect was significant either, $b = .04$, $SE = .02$, 95%CI [.013; .092]. All indirect effects are summarized in Table 15.

**Figure 14**

*Serial Mediation Model From Study 3 Whereby the Direct Effect of Pre-Revenge Negative Affect on Desire to Harm the Provocateur Was Serially Mediated by Revenge and Post-Revenge Positive Affect (N = 121)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant. Analysis was conducted only among provoked participants.

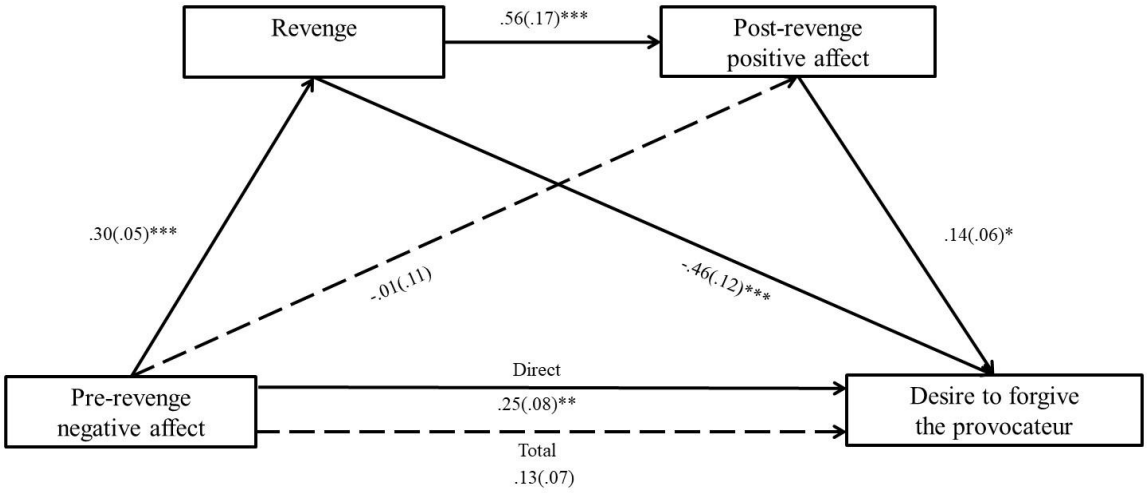
*** $p < .001$.

Second, I examined whether pre-revenge negative affect predicted acts of revenge, which then predicted post-revenge positive affect, which then predicted the **desire to forgive** the provocateur. This model explained 13.6% of the variance in the criterion variable, $F(3, 170) = 6.15$, $p < .001$ (Figure 15). Act of revenge was related to lesser forgiving intentions, $b = -.46$, $SE = .13$, $p < .001$, 95%CI [-.714; -.209], but post-revenge positive affect was related to greater forgiving intentions, $b = .14$, $SE = .06$, $p = .026$, 95%CI [.016; .269]. Total effect was insignificant, $b = .13$, $SE = .07$, $p = .069$, 95%CI [-.011; .283], but direct effect was significant, $b = .25$, $SE = .08$, $p < .01$, 95%CI [.096; .412]. Total indirect effect of pre-revenge

negative affect, revenge, and post-revenge positive affect was significant, $b$ = .02, $SE$ = .01, 95%CI [.001; .058]. All indirect effects are presented in Table 15.

**Figure 15**

*Serial Mediation Model From Study 3 Whereby the Direct Effect of Pre-Revenge Negative Affect on Desire to Forgive the Provocateur Was Serially Mediated by Revenge and Post-Revenge Positive Affect (N = 121)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant. Analysis was conducted only among provoked participants.

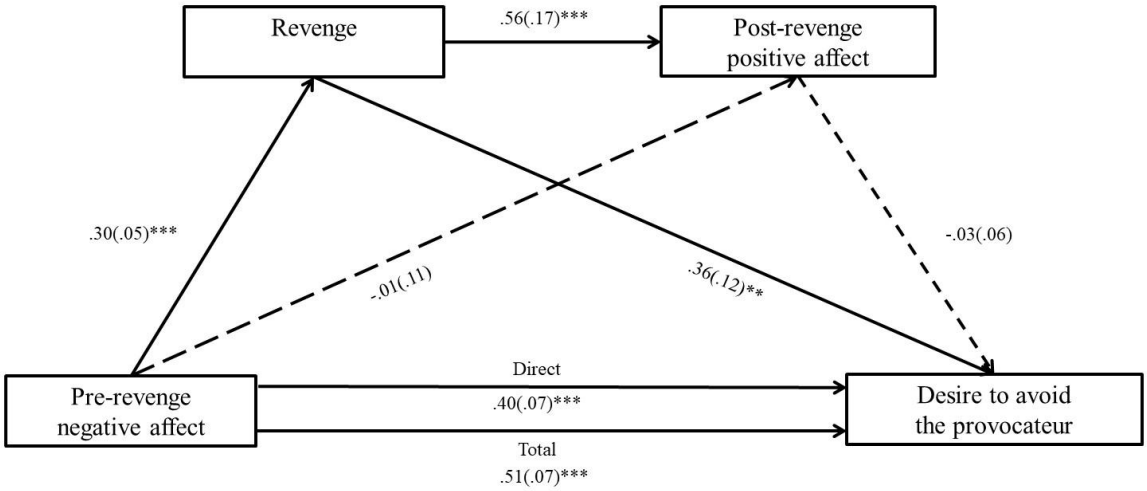
* $p$ < .05,** $p$ < .01, *** $p$ < .001

Third, I examined whether pre-revenge negative affect predicted acts of revenge, which then predicted post-revenge positive affect, which then predicted the **desire to avoid** the provocateur. This model explained 34.9% of the variance in the criterion variable, $F$(3, 170) = 20.91, $p$ < .001 (Figure 16). Act of revenge was related to avoiding intentions, $b$ = .36, $SE$ = .12, $p$ < .01, 95%CI [.112; .611], but the post-revenge positive affect was unrelated to avoiding intentions, $b$ = -.03, $SE$ = .06, $p$ = .551, 95%CI [-.162; .087]. Total effect was significant, $b$ = .51, $SE$ = .07, $p$ < .001, 95%CI [.372; .655], so was direct effect, $b$ = .40, $SE$ =

.07, $p < .001$, 95%CI [.253; .656]. Total indirect effect of pre-revenge negative affect, revenge, and post-revenge positive affect was insignificant, $b = -.006$, $SE = .01$, 95%CI [-.03; .015]. All indirect effects are summarized in Table 15.

**Figure 16**

*Serial Mediation Model From Study 3 Whereby the Direct Effect of Pre-Revenge Negative Affect on Desire to Avoid the Provocateur Was Serially Mediated by Revenge and Post-Revenge Positive Affect (N = 121)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant. Analysis was conducted only among provoked participants.

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

**Table 15**

*Summary of Indirect Effects, Study 3 (N = 121)*

| **Desire to Harm the Provocateur (Model 1)** | | | |
|---|---|---|---|
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | .14 | .05 | [.058; .254] |
| X > M2 > Y | -.004 | .03 | [-.071; .073] |
| X > M1 > M2 > Y | .04 | .02 | [.013; .092] |
| **Total indirect effect** | **.19** | **.06** | **[.073; .326]** |
| **Desire to Forgive the Provocateur (Model 2)** | | | |
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | -.14 | .04 | [-.243; -.059] |
| X > M2 > Y | -.002 | .02 | [-.040; .044] |
| X > M1 > M2 > Y | .02 | .01 | [.001; .058] |
| **Total indirect effect** | **-.11** | **.04** | **[-.211; -.038]** |
| **Desire to Avoid the Provocateur (Model 3)** | | | |
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | .11 | .04 | [.035; .198] |
| X > M2 > Y | .0006 | .009 | [-.017; .023] |

| | | | |
|---|---|---|---|
| X > M1 > M2 > Y | -.006 | .01 | [-.032; .014] |
| **Total indirect effect** | **.10** | **.04** | **[.031; .191]** |

*Note.* X = pre-revenge negative affect, M1 = revenge, M2 = post-revenge positive affect, Y = desire to harm (Model 1), to forgive (Model 2), to avoid (Model 3) the provocateur. Analyses were conducted only among provoked participants.

### 5.3.3. Discussion

As in Study 2, provocation (i.e., insulting feedback from another individual) increased negative affect, which then predicted greater aggression (indicated by the number of pins stuck in the doll representing the provocateur), thus providing additional evidence that feelings of pain and frustration motivate aggressive behavior (e.g., Berkowitz, 1989). Moreover, greater number of pins stuck in the doll representing the provocateur was associated with greater positive affect, which corresponds to the previous works linking aggression with pleasure (Chester, 2017). These findings also align with recent work of Eder and colleagues (2021) showing that momentary pleasure from revenge ameliorates negative affect. Provoked participants were irritated and nervous (negative affect) before aggression, yet happy and pleased (positive affect) afterwards, which indicates that revenge brought participants back to the affective balance. As in Study 2, I observed an increase in positive affect and decrease in negative affect after aggression among provoked participants. Such effects did not occur among unprovoked participants - their positive affect decreased after aggression, whereas negative affect did not significantly change. Thus, Study 3 replicated findings of Chester and DeWall (2017), consequently providing additional empirical evidence that revenge is a motivated self-regulatory action.

Importantly, Study 3 demonstrated that post-aggression positive affect facilitates subsequent desire to harm and to forgive the provocateur, but not avoid the provocateur. This evidence aligns with the reinforcing model of aggression (Chester et al., 2018), which

proposes that pleasure experienced during aggression reinforces future acts of aggression. This evidence also shows that revenge related positive affect facilitates forgiveness, which corresponds to the affective counterbalancing model (Chester & Martelli, 2019). Revenge, by bringing positive affect, allowed forgiveness to unfold.

In addition, results showed that post-aggression positive affect was unrelated to desire to avoid the provocateur. This evidence supports my predictions that aggression-related positive affect specially facilitates both vengeance and forgiveness. The lack of association between post-aggression positive affect and desire to avoid the provocateur aligns with research showing that reward is an approach rather than avoidance oriented state (Harmon-Jones et al., 2013; Tunison et al., 2019). Serial mediation analyses conducted only among provoked participants provided an additional empirical evidence that revenge elicits positive affect, which then predicts subsequent vengeful and forgiving intentions, but is unrelated to avoiding intentions.

Interestingly, the total effect of provocation on desire to avoid the provocateur was positive, which overlaps with previous works showing that people withdraw from aversive social experiences (Ren et al., 2021). This effect may possibly explain the lack of significant total effect of provocation on desire to harm the provocateur. Overall, Study 3 supported Hypotheses 1.1 and 1.2, namely revenge related positive affect fosters desire to harm and to forgive. However, it remains unclear whether revenge related positive affect fosters desire to harm and to forgive the provocateur also in context of real life wrong. Consequently, Study 4 aimed to replicate these findings in context of real life rather than situationally evoked provocation using a different way of measuring positive and negative affect.

### 5.4. Study 4. Role of revenge-related positive affect in the relationship between provocation and subsequent intentions toward the provocateur: Replication

Study 4 tested Hypotheses 1.1 and 1.2 in an experimental design. Thus, I examined whether pre-aggression negative affect, aggression, and post-aggression positive affect serially mediated the effect of provocation on the desire to harm, to forgive, and to avoid the provocateur. I sought to replicate findings of Study 3 using a different method of evoking revenge-seeking (Gardner et al., 2000) and assessing positive and negative affect (Carlsmith et al., 2008).

Desire to belong is a fundamental human need (Baumeister & Leary, 1995) – people, by default, want to be accepted by others (Coan & Sbarra, 2013). Social rejection is a painful experience (Eisenberger et al., 2003) which impairs self-regulation (Baumeister et al., 2005) and often produces aggression (DeWall & Bushman, 2011; DeWall et al., 2009; Leary et al., 2006; Rajchert et al., 2017). Rejected individuals aggress out of desire to feel good – to restore their emotional balance, previously disrupted by aversive experience of rejection by another individual (Chester & DeWall, 2017). Therefore, provocation was operationalized as rejection by another individual.

I aimed to replicate findings of Study 3 using a less direct method of evoking revenge-seeking to further generalize the results across a situational context. For this reason, I did not use a virtual ball toss game Cyberball (Williams & Jarvis, 2006) for inducing feelings of interpersonal rejection. In this paradigm participants are led to believe they interact with two other individuals in tossing a ball, whilst in reality both the partners and the ball tosses are preprogrammed. Instead, I asked participants to write about a previously experienced instance of social rejection or social acceptance (Chester & DeWall, 2017; Gardner et al., 2000; Maner et al., 2007). Although this research does not solely focus on mechanisms of social rejection but on the mechanisms of revenge, I employed the Need Threat Scale (Williams, 2009) as a manipulation check as this is a valid measure of feeling socially rejected (see Chester & Lasko, 2021). Positive and negative affect were measured as in

Carlsmith and colleagues (2008, Study 1). By using these items, I aimed to further bind together previous approaches to study affective consequences of revenge.

### 5.4.1. Method

#### 5.4.1.1. Participants

Participants were recruited from Amazon Mechanical Turk worker's pool in exchange for $1.50. I required workers to have more than 100 HITs completed and a 99% approval rate on all previous MTurk tasks. Overall, 332 adults (181 male, 151 female; age: *M* = 39.38; *SD* = 12.22, range: 18-75) participated. However, I excluded data from 37 participants who did not follow instruction in the recall task. These include participants who wrote unrelated content or pasted the task instruction (e.g., *"According to Nathan DeWall, social rejection is a painful experience that produces distress"* or *"All people want to belong. Social belonging is a universal human need"*). Analyses were therefore made on the sample of 295 participants (157 male, 138 female; age: *M* = 39.47; *SD* = 12.53, range: 18-75). Participant's ethnical composition was 74.2% White American, 9.8% African American, 9.5% Asian American, 5.8% Other, and 0.7% Native American.

#### 5.4.1.2. Measures

**Manipulation check** was performed using the 30-item Need Threat Scale (Williams, 2009). The first 20 items assess to what extent the experience of rejection threatened the needs of belonging, control, meaningful existence and self-esteem (5 items per subscale). The next 8 items assess positive and negative affect (4 items each) and the last two items serve as explicit manipulation checks ("I felt ignored" and "I felt excluded").

**Aggression** was quantified as in Studies 1 and 3, that is, as the number of pins stuck in the doll representing the provocateur (i.e., Voodoo Doll Task; DeWall et al., 2013).

**Positive and negative affect** were assessed by asking participants to what extent they currently felt "pleased", "positive" and "satisfied" (positive affect) and "irritated", "negative"

and “vengeful” (negative affect; Carlsmith et al., 2008). Participants gave their answers on a scale ranging from 1 (*not at all*) to 5 (*very much*).

**Intentions toward the provocateur** were assessed as in Study 3, using TRIM-18 (McCullough et al., 2006). Thus, the **desire to harm** the provocateur was measured with 5-item Revenge motivations subscale, the **desire to forgive** the provocateur was assessed with 6-item Benevolence motivations subscale, and the **desire to avoid** the provocateur was measured with 7-item Avoidance motivations subscale. Participants answered using a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

#### 5.4.1.3. Procedure

Experiment was carried out using Qualtrics (https://www.qualtrics.com/). After providing their informed contest, participants reported their gender, age and ethnicity. Then, they were randomly allocated to one of the two research conditions: interpersonal rejection versus interpersonal acceptance. To induce feelings of rejection and acceptance, participants were asked to write an essay (500 characters minimum) about a time they were either rejected or accepted by another individual (Gardner et al., 2000). Participants were informed the purpose of writing the essay was to examine their personal-event memory. Once participants completed their essays, they reported their current affect (Carlsmith et al., 2008) and then marked their responses in Need Threat Scale (Williams, 2009), which served as a manipulation check (Chester & DeWall, 2017). Then, participants completed the Voodoo Doll Task (DeWall et al., 2013), which supposedly measured participants’ mental visualization abilities. Participants were displayed an image of a doll, informed that the doll represented the individual from their essay, and asked to type the number of pins (0-51) they would like to stick in the doll. After typing the number of pins they wanted to stick in the doll, participants again reported their current affect (Carlsmith et al., 2008) and responded to

TRIM-18 (McCullough et al., 2006). Finally, participants were probed (no one guessed the purpose of the experiment), debriefed and compensated.

### 5.4.2. Results

#### 5.4.2.1. Transformation of aggression measure

As in previous studies, Kolmogorov–Smirnov test showed that the distribution of the number of pins did not meet the assumption of normality, $k(295) = .29$, $p < .001$, as it was heavily skewed (skewness = 1.83, kurtosis = 2.37). Logarithmic transformation (after adding 1 to all values to transform 0 values) reduced skewness of the voodoo doll pin count (Chester & Lasko, 2018). Results are presented in Table 2.

#### 5.4.2.2. Descriptive statistics and zero-order correlations

All measures exhibited excellent reliability. Descriptive statistics for study variables are presented in Table 16. As the data from two participants were missing in the TRIM-18, all analyses were performed on 293 participants. Zero-order correlations between study variables are presented in Table 17. Aggression was positively associated with post-aggression negative affect, but unrelated to post-aggression positive affect ($p = .191$). Moreover, aggression was positively correlated with desire to harm and to avoid the provocateur, but was unrelated to the desire to forgive the provocateur ($p = .283$). Post-aggression positive affect was, in turn, positively associated with desire to forgive and negatively related to desire to avoid the provocateur. Surprisingly, I observed no relationship between post-aggression positive affect and desire to harm the provocateur ($p = .234$).

**Table 16**

*Descriptive Statistics, Study 4*

| Variable | Overall | | | Social rejection condition | | | Social acceptance condition | | |
|---|---|---|---|---|---|---|---|---|---|
| | ***M*** | ***SD*** | ***α*** | ***M*** | ***SD*** | ***α*** | ***M*** | ***SD*** | ***α*** |
| Pre-aggression positive affect | 3.29 | 1.30 | .94 | 2.66 | 1.29 | .93 | 3.93 | .96 | .91 |
| Pre-aggression negative affect | 1.97 | 1.11 | .87 | 2.46 | 1.11 | .82 | 1.47 | .87 | .90 |
| Aggression (transformed) | .52 | .63 | - | .76 | .65 | - | .27 | .51 | - |
| Post-aggression positive affect | 3.31 | 1.21 | .93 | 2.92 | 1.18 | .92 | 3.71 | 1.11 | .94 |
| Post-aggression negative affect | 1.93 | 1.08 | .85 | 2.31 | 1.09 | .80 | 1.54 | .93 | .87 |
| Desire to harm the provocateur | 2.06 | 1.07 | .90 | 2.32 | 1.11 | .91 | 1.79 | .96 | .88 |
| Desire to forgive the provocateur | 3.09 | .99 | .85 | 3.25 | .88 | .86 | 2.93 | 1.04 | .86 |
| Desire to avoid the provocateur | 2.58 | 1.25 | .94 | 3.44 | .91 | .85 | 1.70 | .92 | .93 |

**Table 17**

*Zero-Order Correlations Between Study Variables, Study 4 (N = 293)*

| Variable | 1. | 2. | 3. | 4. | 5. | 6. | 7. |
|---|---|---|---|---|---|---|---|
| 1. Pre-aggression positive affect | - | | | | | | |
| 2. Pre-aggression negative affect | -.48*** | - | | | | | |
| 3. Aggression (transformed) | .52*** | -.21*** | - | | | | |
| 4. Post-aggression positive affect | -.24*** | .74*** | -.07 | - | | | |
| 5. Post-aggression negative affect | .78*** | -.30*** | .60*** | -.26*** | - | | |
| 6. Desire to harm the provocateur | .62*** | -.02 | .62*** | .07 | .65*** | - | |
| 7. Desire to forgive the provocateur | .05 | .14* | .06 | .15** | .13* | .16* | - |
| 8. Desire to avoid the provocateur | .65*** | -.44*** | .55*** | -.29*** | .63*** | .59*** | .05 |

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

#### 5.4.2.3. Manipulation check

To examine the effectiveness of the social rejection manipulation, I compared averaged responses to each subscales of Need Threat Scale using t-Test. Results revealed that rejected participants reported that they felt more rejection, more threat to basic psychological needs, lesser positive affect, and greater negative affect than accepted participants (Table 18). Thus, manipulation of social rejection was effective.

**Table 18**

*Manipulation Check Data From the Need Threat Scale of Study 4, by Condition (N = 293)*

| Threat | Accepted *M* (*SD*) | Rejected *M* (*SD*) | Rejected > Accepted | *α* | *d* |
|---|---|---|---|---|---|
| Belonging threat | 1.81 (.84) | 3.89 (.86) | *t*(293) = 20.88*** | .91 | 2.44 |
| Control threat | 2.58 (.66) | 3.87 (.87) | *t*(293) = 14.29*** | .78 | 1.67 |
| Meaningful existence threat | 1.87 (.84) | 3.57 (.98) | *t*(293) = 15.84*** | .89 | 1.86 |
| Self-esteem threat | 2.01 (.87) | 3.85 (1.09) | *t*(293) = 15.87*** | .93 | 1.86 |
| Positive affect | 4.15 (.81) | 2.06 (1.20) | *t*(293) = -17.32*** | .96 | 2.04 |
| Negative affect | 1.50 (.88) | 3.45 (1.02) | *t*(293) = 17.39*** | .93 | 2.04 |
| Felt rejection | 1.55 (1.06) | 4.08 (.91) | *t*(293) = 21.90*** | .92 | 2.56 |

*** $p < .001$.

#### 5.4.2.4. Moderation analysis

Next, I examined the extent to which aggression repaired the affect of rejected participants. I ran a 2 (rejection vs. acceptance) x 2 (negative vs. positive valence) x 2 (pre-aggression affect vs. post-aggression affect) mixed-effects general linear model. As in

Studies 2 and 3, I observed significant three-way Social rejection X Valence X Pre/Post interaction (Table 19).

**Table 19**

*Summary Statistics For the Mixed-Effects General Linear Model From Study 4 on Participants' Affect Reports (Model df = 1, 291)*

| Effect | *F* | *p* | $\eta^2_p$ |
|---|---|---|---|
| Social rejection (between) | 1.12 | .290 | .004 |
| Valence (within) | 223.17 | <.001 | .434 |
| Pre/Post (within) | .265 | .607 | .001 |
| Social rejection X Valence | .87 | .350 | .003 |
| Social rejection X Pre/Post | 7.91 | .005 | .026 |
| Valence X Pre/Post | 110.60 | <.001 | .275 |
| Social rejection X Valence X Pre/Post | 19.40 | <.001 | .063 |

Simple main effects revealed significant differences in pre-aggression and post-aggression positive, $F(1, 291) = 14.03$, $p < .001$, $\eta^2_p = .049$, and negative, $F(1, 291) = 7.06$, $p < .01$, $\eta^2_p = .024$, affect among rejected participants (Table 20). That is, among rejected participants, positive affect significantly increased (Figure 17) and negative affect significantly decreased (Figure 18) after aggression. In turn, among accepted participants, positive affect significantly decreased after aggression, $F(1, 291) = 9.06$, $p < .01$, $\eta^2_p = .030$, whereas the negative affect did not significantly change, $F(1, 291) = .88$, $p = .343$, $\eta^2_p = .003$. Aggression increased positive affect and decreased negative affect among insulted

participants. As such, aggression repaired the affective balance of rejected participants as in Chester and DeWall (2017).

**Table 20**

*Descriptive Statistics for Positive and Negative Affect Assessed Before and After Aggression, by Condition (N = 293)*

| **Condition** | **Pre/Post** | **Valence** | ***M*** | ***SE*** | ***95%CI*** |
|---|---|---|---|---|---|
| Social rejection | Pre Aggression | Positive | 2.66 | .09 | [2.47; 2.84] |
| | | Negative | 2.46 | .08 | [2.30; 2.62] |
| | Post Aggression | Positive | 2.93 | .09 | [2.74; 3.11] |
| | | Negative | 2.31 | .08 | [2.15; 2.47] |
| Social acceptance | Pre Aggression | Positive | 3.94 | .10 | [3.75; 4.13] |
| | | Negative | 1.47 | .08 | [1.31; 1.64] |
| | Post Aggression | Positive | 3.72 | .09 | [3.53; 3.91] |
| | | Negative | 1.53 | .08 | [1.36; 1.69] |

**Figure 17**

*Evidence From Study 4 for Increased Positive Affect Among Rejected Participants After an Instance of Aggression. Lines Represent Group Averages, and Error Bars Represent ± 1 Standard Error of the Mean (N = 293)*

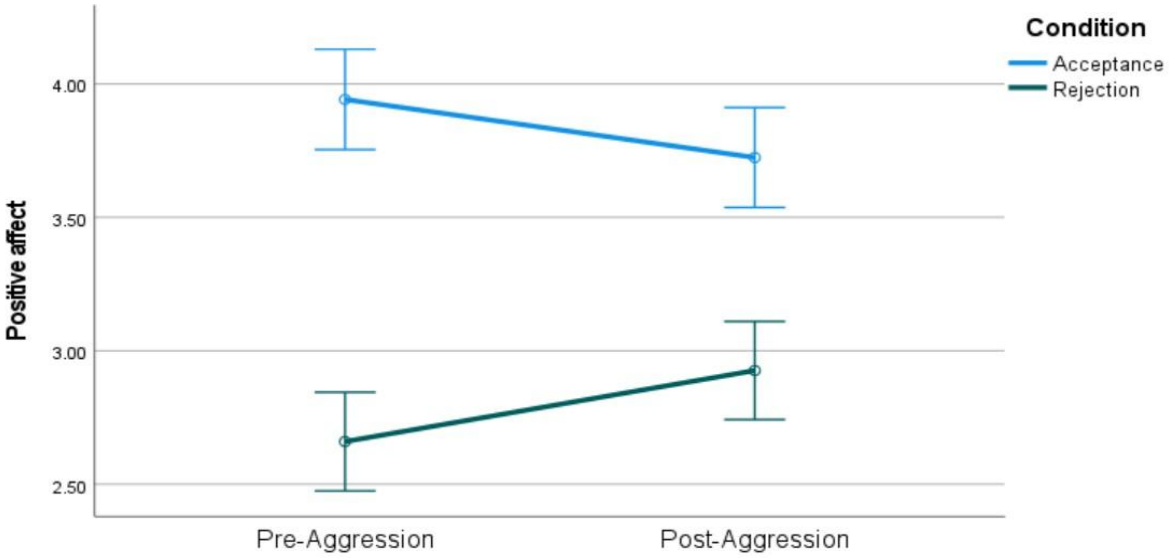
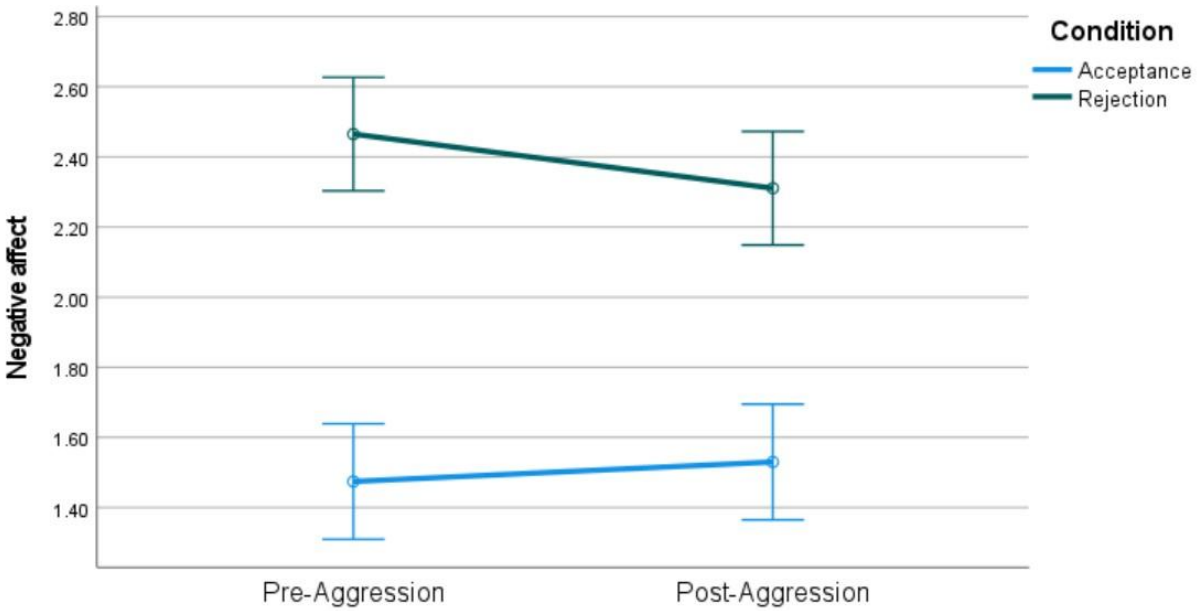



**Figure 18**

*Evidence From Study 4 for Decreased Negative Affect Among Rejected Participants After an Instance of Aggression. Lines Represent Group Averages, and Error Bars Represent ± 1 Standard Error of the Mean (N = 293)*



#### 5.4.2.5. Serial mediation analyses

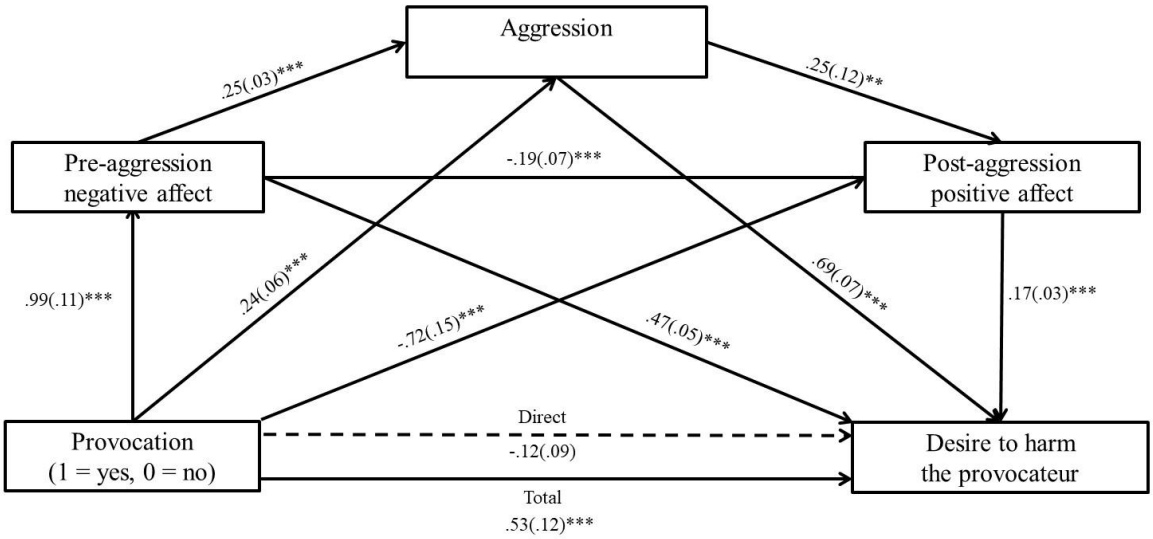
##### 5.4.2.5.1. Provoked and unprovoked participants

To test the mechanism from provocation, through aggression-related affect improvement to subsequent intentions toward the provocateur, I used bootstrapped serial mediation models with 10,000 bias-corrected and accelerated bootstrap samples (PROCESS 3.5 macro for SPSS, Model 6; Hayes, 2017). I modeled several indirect effects whereby the direct effect of provocation on the desire to harm (Model 1), to forgive (Model 2), and to avoid the provocateur (Model 3) was serially mediated by pre-aggression negative affect, aggression, and post-aggression positive affect. As in Study 2 and 3, I first run this analysis on all participants (both provoked and unprovoked ones).

First, I examined whether provocation elicited negative affect, which then predicted acts of aggression, which subsequently predicted positive affect, which then predicted the **desire to harm** the provocateur. The model was significant and explained 55.6% of the variance in the criterion variable, $F(4, 288) = 90.40$, $p < .001$ (Figure 19). As predicted, provocation elicited negative affect, $b = .99$, $SE = .11$, $p < .001$, 95%CI [.759; 1.22], which subsequently predicted aggressive behavior, $b = .25$, $SE = .03$, $p < .001$, 95%CI [.190; .313]. Aggression predicted increases in positive affect, $b = .25$, $SE = .12$, $p = .03$, 95%CI [.014; .502] and post-aggression positive affect predicted the desire to harm the provocateur, $b = .17$, $SE = .03$, $p < .001$, 95%CI [.104; .251]. Total effect was significant, $b = .53$, $SE = .12$, $p < .001$, 95%CI [.291; .771], so was the total indirect effect of pre-aggression negative affect, aggression, and post-aggression positive affect, $b = .65$, $SE = .09$, 95%CI [.472; .853]. Direct effect was, in turn, insignificant, $b = -.12$, $SE = .09$, $p = .20$, 95%CI [-.321; .070]. Thus, negative affect drove participants to aggression. Aggression predicted positive affect, which then predicted increases in subsequent vengeful intentions. Hypothesis 1.1 was confirmed. All indirect effects are summarized in Table 21.

**Figure 19**

*Serial Mediation Model From Study 4 Whereby the Direct Effect of Provocation on Desire to Harm the Provocateur Was Serially Mediated by Pre-Aggression Negative Affect, Aggression and Post-Aggression Positive Affect (N = 293)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant.

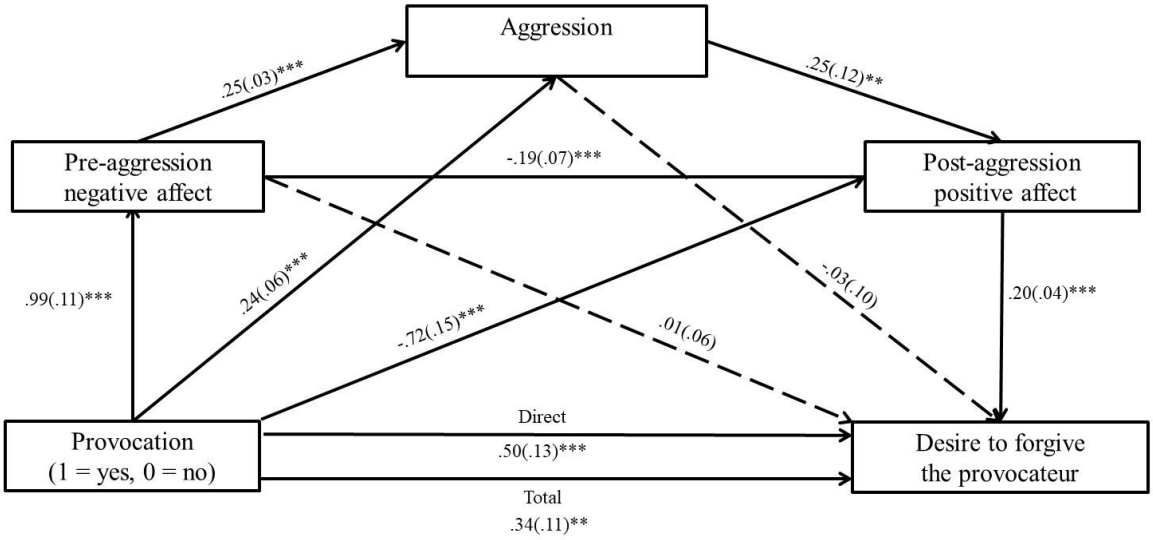
** $p = .03$, *** $p < .001$.

Second, I examined whether provocation resulted in negative affect, which then predicted acts of aggression, which then predicted positive affect, which then predicted the **desire to forgive** the provocateur. This model was significant and explained 8.2% of the variance in the criterion variable, $F(4, 288) = 6.43$, $p < .001$ (Figure 20). As predicted, post-aggression positive affect predicted the desire to forgive the provocateur, $b = .20$, $SE = .04$, $p < .001$, 95%CI [.102; .298]. Total effect was significant, $b = .34$, $SE = .11$, $p = .003$, 95%CI [.116; .565], so was the direct effect, $b = .50$, $SE = .13$, $p < .001$, 95%CI [.248; .768], and total indirect effect of pre-aggression negative affect, aggression, and post-aggression positive affect, $b = -.16$, $SE = .08$, 95%CI [-.334; -.018]. Thus, the better participants felt after

aggression, the more they desired to forgive their provocateur. Hypothesis 1.2 was confirmed. All indirect effects are summarized in Table 21.

**Figure 20**

*Serial Mediation Model From Study 4 Whereby the Direct Effect of Provocation on the Desire to Forgive the Provocateur Was Serially Mediated by Pre-Aggression Negative Affect, Aggression and Post-Aggression Positive Affect (N = 293)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant.

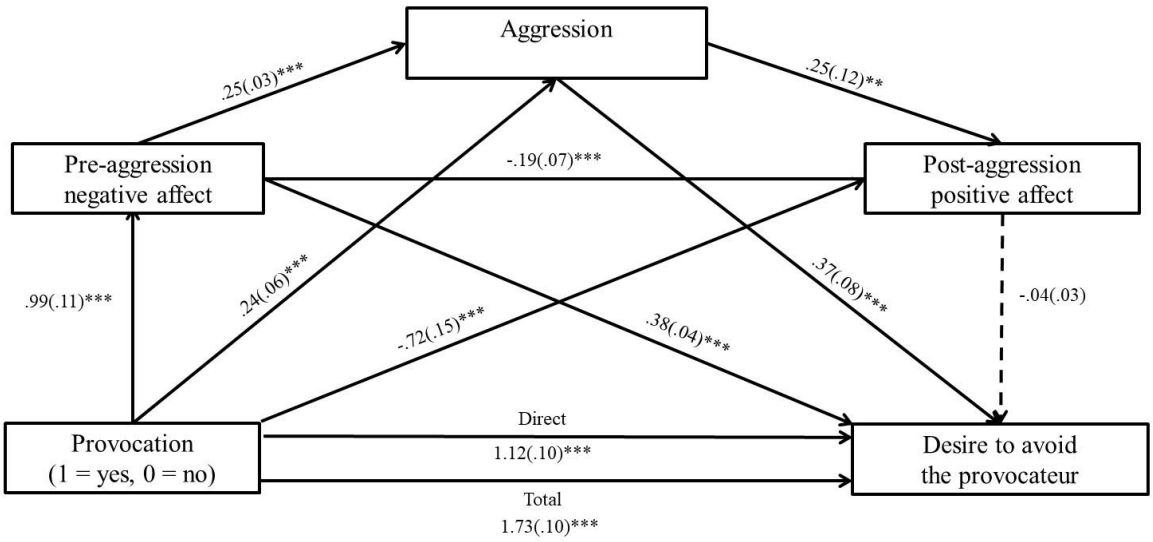
** $p < .01$, *** $p < .001$.

Third, I tested whether provocation elicited negative affect, which then predicted aggression, which then predicted positive affect, which then predicted the **desire to avoid** the provocateur. This model was significant and explained 65.7% of the variance in the criterion variable, $F(4, 288) = 137.99$, $p < .001$ (Figure 21). As in Study 3, the post-aggression positive affect was unrelated to the motivation to avoid the provocateur, $b = -.04$, $SE = .03$, $p = .26$, 95%CI [-.118; .032]. Total effect was significant, $b = 1.73$, $SE = .10$, $p < .001$, 95%CI [1.52; 1.93], so was the direct effect, $b = 1.12$, $SE = .10$, $p < .001$, 95%CI [.928; 1.33], and total

indirect effect of pre-aggression negative affect, aggression, and post-aggression positive affect, *b* = .60, *SE* = .08, 95%CI [.450; .769]. All indirect effects are summarized in Table 21.

**Figure 21**

*Serial Mediation Model From Study 4 Whereby the Direct Effect of Provocation on Desire to Avoid the Provocateur Was Serially Mediated by Pre-Aggression Negative Affect, Aggression and Post-Aggression Positive Affect (N = 293)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant.

** $p < .01$, *** $p < .001$.

**Table 21**

*Summary of Indirect Effects, Study 4 (N = 293)*

| **Desire to Harm the Provocateur (Model 1)** | | | |
|---|---|---|---|
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | .45 | .07 | [.316; .621] |
| X > M2 > Y | .16 | .05 | [.060; .285] |
| X > M3 > Y | -.12 | .03 | [-.214; -.062] |
| X > M1 > M2 > Y | .17 | .03 | [.107; .250] |
| X > M1 > M3 > Y | -.03 | .01 | [-.070; -.005] |
| X > M2 > M3 > Y | .01 | .007 | [.0001; .030] |
| X > M1 > M2 > M3 > Y | .01 | .006 | [.001; .030] |
| **Total indirect effect** | **.65** | **.09** | **[.467; .852]** |
| **Desire to Forgive the Provocateur (Model 2)** | | | |
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | .012 | .06 | [-.334; -.018] |
| X > M2 > Y | -.009 | .02 | [-.066; .037] |
| X > M3 > Y | -.145 | .04 | [-.251; -.061] |
| X > M1 > M2 > Y | -.009 | .02 | [-.065; .037] |

| | | | |
|---|---|---|---|
| X > M1 > M3 > Y | -.039 | .01 | [-.082; -.006] |
| X > M2 > M3 > Y | .012 | .008 | [.0002; .033] |
| X > M1 > M2 > M3 > Y | .012 | .007 | [.0003; .030] |
| **Total indirect effect** | **-.16** | **.08** | **[-.334; -.018]** |

**Desire to Avoid the Provocateur (Model 3)**

| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
|---|---|---|---|
| X > M1 > Y | .38 | .06 | [.260; .524] |
| X > M2 > Y | .09 | .03 | [.030; .170] |
| X > M3 > Y | .03 | .03 | [-.026; .098] |
| X > M1 > M2 > Y | .09 | .02 | [.044; .156] |
| X > M1 > M3 > Y | .008 | .009 | [-.007; .029] |
| X > M2 > M3 > Y | -.002 | .003 | [-.011; .002] |
| X > M1 > M2 > M3 > Y | -.002 | .003 | [-.011; .002] |
| **Total indirect effect** | **.60** | **.08** | **[.450; .769]** |

*Note.* X = provocation (1 = yes, 0 = no), M1 - pre-aggression negative affect, M2 = aggression, M3 = post-aggression positive affect, Y = intentions toward the provocateur. Analyses were conducted on both provoked and unprovoked participants.

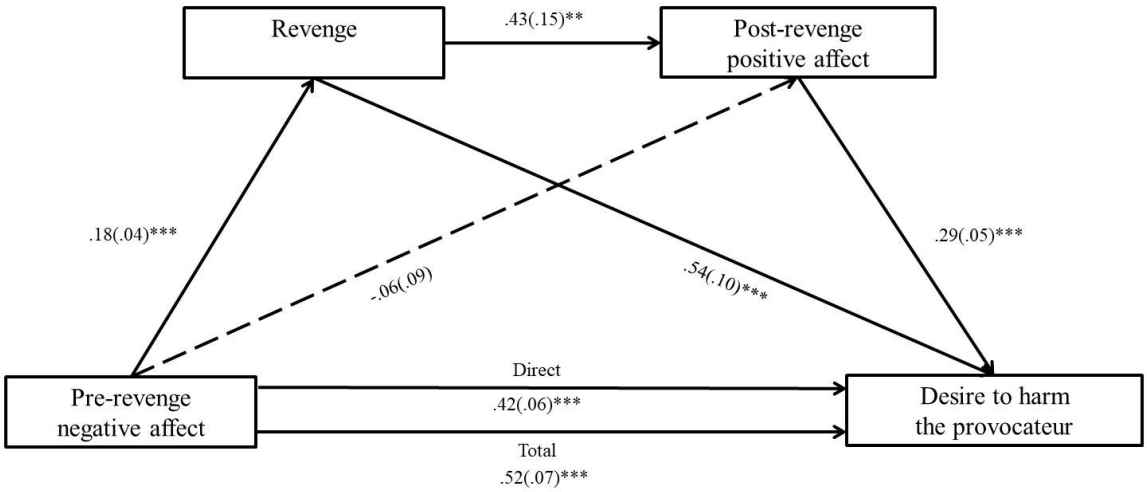
#### 5.4.2.5.2. Provoked participants

As in previous studies, I tested whether revenge-related positive affect predicted subsequent revengeful, forgiving, and avoiding intentions among provoked participants. I used PROCESS 3.5 macro for SPSS (Model 6; Hayes, 2017) with 10,000 bias-corrected and 95% bias-corrected bootstrap confidence intervals.

First, I examined whether pre-revenge negative affect predicted acts of revenge, which then predicted post-revenge positive affect, which then predicted the **desire to harm** the provocateur. This model explained 51.3% of the variance in the criterion variable, $F(3, 145) = 51.02$, $p < .001$ (Figure 22). Pre-revenge negative affect predicted an act of revenge, $b = .18$, $SE = .04$, $p < .001$, 95%CI [.090; .273] and act of revenge predicted positive affect, $b = .43$, $SE = .15$, $p < .01$, 95%CI [.135; .741]. The path from post-revenge positive affect to the desire to harm the provocateur was significant, $b = .29$, $SE = .05$, $p < .001$, 95%CI [.184; .404]. Total effect was significant, $b = .52$, $SE = .07$, $p < .001$, 95%CI [.386; .663], so was the direct effect, $b = .42$, $SE = .06$, $p < .001$, 95%CI [.301; .542]. Total indirect effect of pre-revenge negative affect, revenge, and post-revenge positive affect was significant, $b = .02$, $SE = .01$, 95%CI [.005; .051]. All indirect effects are presented in Table 22.

**Figure 22**

*Serial Mediation Model From Study 4 Whereby the Direct Effect of Pre-Revenge Negative Affect on Desire to Harm the Provocateur Was Serially Mediated by Revenge and Post-Revenge Positive Affect (N = 149)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant. Analysis was conducted only among provoked participants.

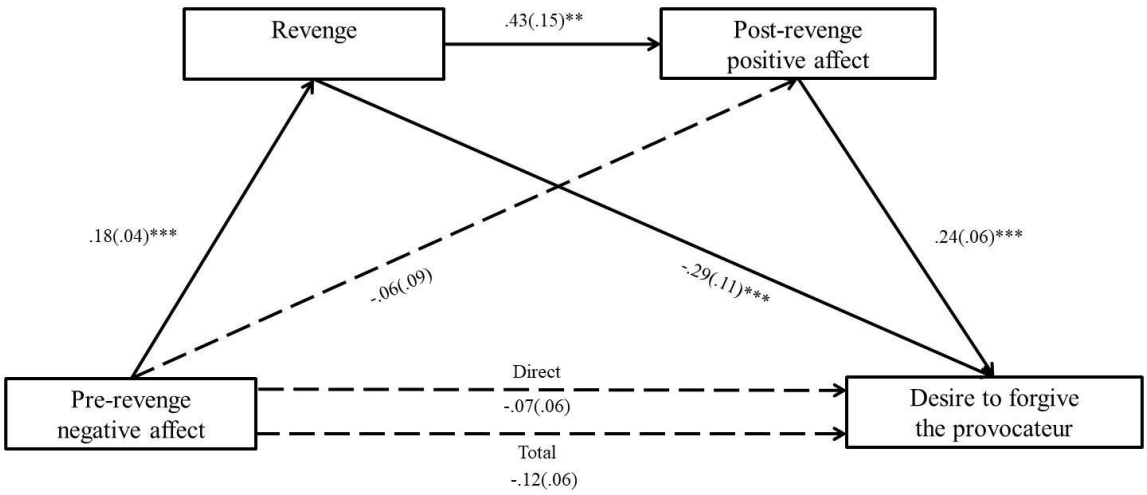
** $p < .01$; *** $p < .001$.

Second, I examined whether pre-revenge negative affect predicted acts of revenge, which then predicted post-revenge positive affect, which then predicted the **desire to forgive** the provocateur. This model explained 13.3% of the variance in the criterion variable, $F(3, 145) = 6.15$, $p < .001$ (Figure 23). Act of revenge was related to lesser forgiving intentions, $b = -.29$, $SE = .11$, $p < .01$, 95%CI [-.522; -.063], but post-revenge positive affect was related to greater forgiving intentions, $b = .24$, $SE = .06$, $p < .001$, 95%CI [.119; .361]. Total effect was insignificant, $b = -.12$, $SE = .06$, $p = .060$, 95%CI [-.259; .005], so was direct effect, $b = -.07$, $SE = .06$, $p = .253$, 95%CI [-.208; .055]. Total indirect effect of pre-revenge negative affect,

revenge, and post-revenge positive affect was significant, $b$ = .02, $SE$ = .01, 95%CI [.004; .043]. All indirect effects are summarized in Table 22.

**Figure 23**

*Serial Mediation Model From Study 4 Whereby the Direct Effect of Pre-Revenge Negative Affect on Desire to Forgive the Provocateur Was Serially Mediated by Revenge and Post-Revenge Positive Affect (N = 149)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant. Analysis was conducted only among provoked participants.

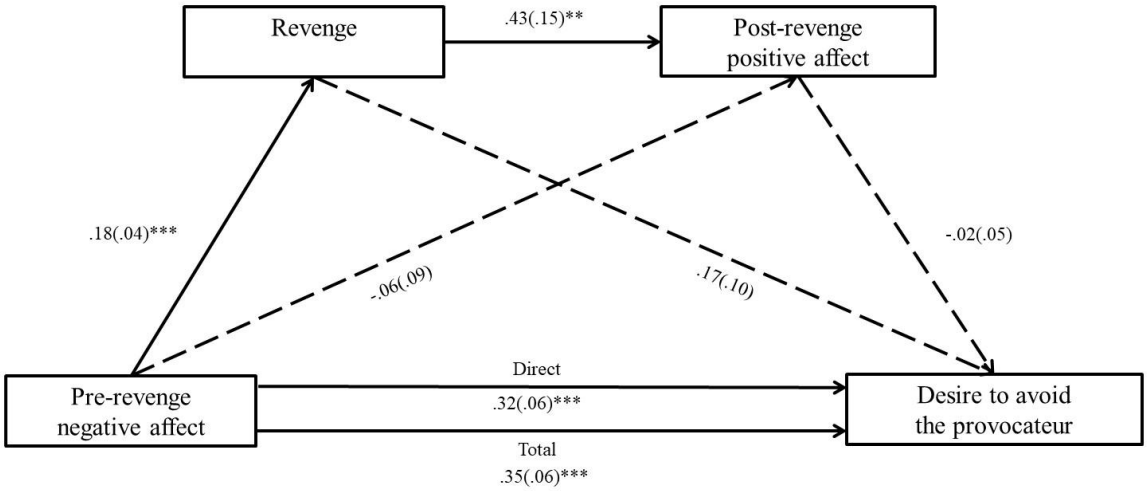
** $p$ < .01, *** $p$ < .001

Third, I examined whether pre-revenge negative affect predicted acts of revenge, which then predicted post-revenge positive affect, which then predicted the **desire to avoid** the provocateur. This model explained 20.8% of the variance in the criterion variable, $F$(3, 145) = 12.74, $p$ < .001 (Figure 24). Act of revenge was unrelated to avoiding intentions, $b$ = .17, $SE$ = .10, $p$ = .114, 95%CI [-.041; .384], so was the post-revenge positive affect, $b$ = -.02, $SE$ = .05, $p$ = .642, 95%CI [-.138; .085]. Total effect was significant, $b$ = .35, $SE$ = .06, $p$ < .001, 95%CI [.235; .468], so was direct effect, $b$ = .32, $SE$ = .06, $p$ < .001, 95%CI [.198;

.443]. Total indirect effect of pre-revenge negative affect, revenge, and post-revenge positive affect was insignificant, *b* = -.002, *SE* = .005, 95%CI [-.014; .008]. All indirect effects are presented in Table 22.

**Figure 24**

*Serial Mediation Model From Study 4 Whereby the Direct Effect of Pre-Revenge Negative Affect on Desire to Avoid the Provocateur Was Serially Mediated by Revenge and Post-Revenge Positive Affect (N = 149)*




*Note.* Values represent unstandardized regression coefficients and standard errors in parentheses. Dashed paths are nonsignificant. Analysis was conducted only among provoked participants.

** $p < .01$, *** $p < .001$

**Table 22**

*Summary of Indirect Effects, Study 4 (N = 149)*

| **Desire to Harm the Provocateur (Model 1)** | | | |
|---|---|---|---|
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | .10 | .02 | [.044; .160] |
| X > M2 > Y | -.02 | .03 | [-.081; .036] |
| X > M1 > M2 > Y | .02 | .01 | [.005; .051] |
| **Total indirect effect** | **.10** | **.04** | **[.023; .183]** |
| **Desire to Forgive the Provocateur (Model 2)** | | | |
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | -.05 | .02 | [-.116; -.009] |
| X > M2 > Y | -.05 | .02 | [-.065; .029] |
| X > M1 > M2 > Y | -.01 | .009 | [.004; .042] |
| **Total indirect effect** | **.01** | **.03** | **[-.123; .010]** |
| **Desire to Avoid the Provocateur (Model 3)** | | | |
| **Indirect effects** | ***b*** | ***SE*** | ***95% CI*** |
| X > M1 > Y | .03 | .02 | [-.009; .080] |
| X > M2 > Y | .001 | .007 | [-.011; .022] |

| | | | |
|---|---|---|---|
| X > M1 > M2 > Y | -.002 | .005 | [-.014; .008] |
| **Total indirect effect** | **.03** | **.02** | **[-.011; .082]** |

*Note.* X = pre-revenge negative affect, M1 = revenge, M2 = post-revenge positive affect, Y = desire to harm (Model 1), to forgive (Model 2), to avoid (Model 3) the provocateur. Analyses were conducted only among provoked participants.

### 5.4.3. Discussion

Study 4 replicated results of Study 3 in context of real life provocation, that is, rejection by another individual. Rejection by another individual increased negative affect, which then predicted greater aggression, which then predicted positive affect, which ultimately predicted the desire to both harm and to forgive the provocateur. These effects were unique to vengeful and benevolent intentions toward the provocateur, as I found no association between post-aggression positive affect and avoidant intentions. Thus, Hypotheses 1.1 and 1.2 were empirically supported. In addition, Study 4 provided additional evidence for the aggressive mood improvement, showing that aggression increased positive and decreased negative affect among rejected participants, thus replicating the results obtained by Chester and DeWall (2017).

Rejection predicted aggression through increased negative affect. These findings align with evidence for the well-established rejection-aggression link (e.g., Chester & DeWall, 2016, Twenge & Campbell, 2003; Twenge et al., 2007). Moreover, they correspond to previous works showing that negative affect in response to rejection motivates aggressive behavior (Chester & DeWall, 2017; Chow et al., 2008; Eisenberger et al., 2007), indicating that aggression can be a strategy of coping with distress (e.g., Berkowitz, 1989; Chester & DeWall, 2017). By retaliating participants restored their affective balance, and aggression-related positive affect subsequently predicted vengeful and forgiving motivations. Hence, Study 4 provided additional empirical evidence for the affective counterbalancing model

(Chester & Martelli, 2019), which proposes that positive affect associated with revenge counteracts negative affect associated with transgression. Moreover, Study 4 brought upon additional empirical evidence for the reinforcing model of aggression (Chester et al., 2018). Serial mediation analyses conducted only among rejected participants corroborated these results, showing that revenge was related to positive affect, which subsequently predicted vengeful and forgiving intentions, but was unrelated to avoiding intentions.

As in Study 3, the total effect of provocation on desire to avoid the provocateur was positive, which fits into previous works showing that social exclusion fosters solitude seeking (Wesselmann et al., 2014) as means of coping with social pain (Ren et al., 2016). Furthermore, the total effect of rejection on desire to forgive the provocateur was also positive, indicating that rejected individuals desired to reconcile with their transgressors. This finding is unexpected given that previous research linked rejection to antisocial rather than affiliative responses (e.g., Buckley et al., 2004; Chester & DeWall, 2017; Twenge & Campbell, 2003; Twenge et al., 2007). Social exclusion facilitates desire to build social bonds but mainly with new sources of potential attachment (e.g., making new friends) instead of sources of rejection (i.e., social reconnection hypothesis; Maner et al., 2007). It is possible that participants' desire to forgive their provocateurs increased over time as in McCullough and colleagues (2010). As such, an important limitation of Study 4 is the lack of assessment when the interpersonal rejection versus acceptance occurred.

### 5.5. Study 5: Extrinsic reward attenuates the effect of provocation on the desire for revenge

If revenge is driven out of desire to "reap hedonistic rewards" (Carlsmith et al., 2008, pp. 1316), then external gratification should diminish the urge to harm the provocateur. Thus, Study 5 tested Hypothesis 2, that is, the extrinsic reward attenuates the effect of provocation on desire to harm the provocateur. Participants were randomly assigned to receive either

insulting or praising feedback, were randomly assigned to learn that either their or their fictitious partners won an unexpected monetary reward, and then expressed how much they desired revenge upon their partners. Thus, Study 5 had 2 (insulting feedback vs. praising feedback) x 2 (reward for partner vs. reward for participant) between-subjects design.

Although the present work focuses on revenge related *affect* improvement, I decided not to put participants in a positive mood by evoking a positive affective state. First, positive affect is a much broader term than a particular positive emotion such as amusement or joy (e.g., Watson et al., 1999). Moreover, it is unclear which positive emotion I would need to evoke, given that positive emotions are generally experienced as pleasant (e.g., Fredrickson, 2001) and their appraisals tend to overlap (Tong & Jia, 2016). Instead, to evoke the state of gratification, I manipulated information on whether participant versus partner allegedly received an *unexpected* monetary reward.

Receiving unforeseen rewards often evoke a sudden rush of pleasure (e.g., Arias-Carrión et al., 2010) as dopaminergic neurons become activated then (Berridge & Kringelbach, 2008). Moreover, decreased dopaminergic activity has been linked to violence (Seo et al., 2008) and aggression is more prevalent among individuals with genotypes that code for reduced dopaminergic brain activity (Chester et al., 2016). Hence, contrary to previous works examining the role of hedonic reward in retribution seeking (e.g., Brüne et al., 2013; de Quervain et al., 2004; Strobel et al., 2011), this study did not use monetary incentive as indicative of punishment for unfair behavior in an economic game. Instead, participants were unexpectedly informed about the possibility of receiving two dollars and then learned that either themselves or their provocateurs received the monetary reward.

### 5.5.1. Method

#### 5.5.1.1. Participants

Sample size was computed using G*Power 3.1 (Faul et al., 2007) F test family for a two by two interaction effect in ANOVA. The required sample size to discover a between subject interaction effect of medium size (f = .25, corresponding to $\eta^2_p$ = .06) with .80 power was *N* = 125. Participants were 130 adults (56 female, 74 male; age: *M* = 38.21, *SD* = 11.44; range: 19-67) recruited from the Amazon Mechanical Turk. I required participants to have more than 100 HITs accepted and a 98% acceptance rate. Sixteen participants who did not follow the instructions in the writing task were excluded from the analysis. Analyses were therefore conducted on the sample of *N* = 114 (51 female, 63 male; age: *M* = 38.73, *SD* = 11.53; range: 19-67). The sample was 73.7% White American, 9.6% Asian American, 7% African American, 4.4% Latino, 3.5% Other, and 1.8% Native American. Participants were compensated with $2.

#### 5.5.1.2. Measures

**Provocation manipulation check** was performed by asking participants to what extent they felt: “angry”, “annoyed”, “grouchy”, “hostile”, “irritable”, “offended”, “scornful” and “upset” when received feedback on their essays (Denson et al., 2010). Participants gave their answers on a scale ranging from 1 (*not at all*) to 5 (*extremely*); $\alpha$ = .96, *M* = 2.28, *SD* = 1.27.

**Reward manipulation check** was performed by asking participants to what extent they felt “pleased”, “positive” and “satisfied” (positive affect; $\alpha$ = .96, *M* = 3.16, *SD* = 1.56), “irritable”, “negative”, “vengeful” (negative affect; $\alpha$ = .87, *M* = 2.22, *SD* = 1.34; Carlsmith et al., 2008) when learnt the outcome of the lottery. Participants responded using a scale ranging from 1 (*not at all*) to 5 (*very much*).

**Desire for revenge** was assessed with 5-item Revenge motivations subscale of TRIM-18 (McCullough et al., 2006). Participants gave their answers on a scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*); $\alpha$ = .92, *M* = 2.19, *SD* = 1.17.

#### 5.5.1.3. Procedure

Experiment was conducted using Qualtrics (https://www.qualtrics.com/). After providing their informed contest, participants gave their age and gender. Then, they were informed that they would get to interact with another Amazon Mechanical Turk worker in an interactive task. The aim of the task was to supposedly measure participants' skills in describing events they have to mentally visualize. To experimentally simulate an aversive social interaction, I used the exact same social feedback task I used in Studies 3 and 4 (Bushman & Baumeister, 1998). As such, participants wrote an essay (800 character minimum) about a time they were very angry, which they were informed would be exchanged over the Internet with another Amazon Mechanical Turk worker who was allegedly completing the same study. After submitting their written essay and passively viewing a 25-seconds loading screen, participants viewed a prewritten essay by their fictitious partner. Participants then evaluated this essay along five criteria and were also given an option to write comments on the essay. Exemplary opinions are: "*Conversational and to the point*" or "*I thought it was well written and I am sorry that this person had to go through something like that*". After passively viewing a 25-s loading screen, participants learnt their essay's score and were randomly assigned to receive either negative (10/35 points; *N* = 56) or positive (30/35 points; *N* = 58) feedback. After completing the essay task, participants reported their current angry affect (Denson et al., 2010).

Participants were then informed that because the essay task was engaging, the investigator will reward them with additional $2. Participants were told that the system will randomly determine whether they or their fictitious partner will receive the monetary reward.

After passively viewing 5-seconds loading screen, participants were informed that either they received the monetary reward ("You, not your partner, received the reward", reward for participant research condition; $N = 57$) or the worker who supposedly evaluated their essay ("Your partner, not you, received the reward", reward for partner research condition; $N = 57$). Participants were subsequently asked how the outcome of the monetary lottery has made them feel (Carlsmith et al., 2008) and then responded to the Revenge subscale of TRIM-18 (McCullough et al., 2006). Finally, they were probed (no one guessed the purpose of the experiment) and debriefed.

### 5.5.2. Results

#### 5.5.2.1. Manipulation checks

T-test showed that participants who received insulting feedback reported they felt more provoked, $M = 2.96$, $SD = 1.24$, than participants who received praising feedback, $M = 1.63$, $SD = .93$, $t(112) = 6.48$, $d = 1.21$, $p < .001$. A 2 (feedback: insult versus praise) x 2 (recipient of reward: participant versus partner) between subjects ANOVA revealed that the main effect of reward was significant, $F(2,109) = 42.12$, $p < .001$, $\eta^2_p = .44$. As predicted, participants in the reward for participant condition reported greater positive, $F(1,110) = 69.75$, $p < .001$, $\eta^2_p = .39$ and lower negative affect, $F(1,110) = 32.94$, $p < .001$, $\eta^2_p = .23$ than participants in the reward for partner condition. This effect was not qualified by an interaction effect with the feedback condition, $F(2, 109) = 1.92$, $p = .151$, $\eta^2_p = .03$. The main effect of the feedback condition did not affect the post-reward affect either, $F(2,109) = 2.82$, $p = .064$, $\eta^2_p = .05$.

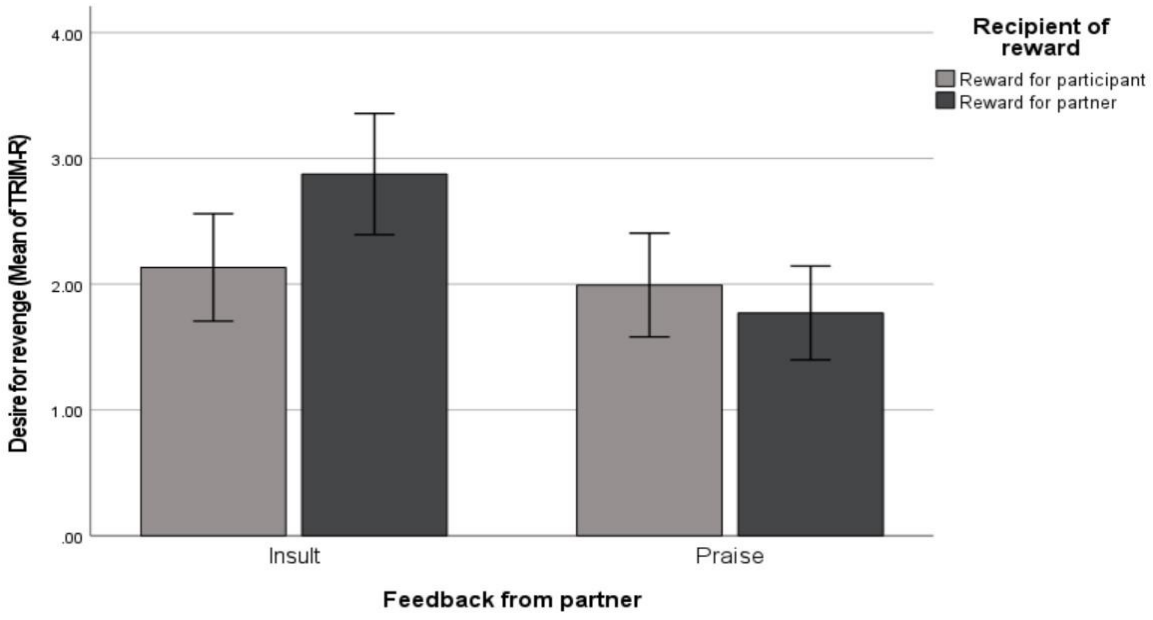
#### 5.5.2.2. Moderation analysis

A 2 (provocation: insulting feedback vs. praising feedback) x 2 (recipient of reward: participant vs. partner) between-subjects ANOVA revealed a significant main effect of provocation, $F(1,110) = 8.94$, $p = .003$, $\eta^2_p = .08$, demonstrating that insulted participants (*M*

= 2.51; *SD* = 1.23) desired revenge more than praised (*M* = 1.89; *SD* = 1.03) participants. This effect was qualified by a significant interaction of provocation and reward manipulation, $F(1, 110) = 5.37$, $p = .022$, $\eta^2_p = .05$. Insulted participants who won the reward desired revenge less (*M* = 2.13; *SD* = 1.08) than insulted participants who believed their partner (*M* = 2.88; *SD* = 1.27) won the reward, $F(1,110) = 6.26$, $p = .014$, $\eta^2_p = .05$. The simple effect of reward manipulation was insignificant for participants who received praising feedback, $F(1,110) = 0.58$, $p = .448$, $\eta^2_p = .01$. However, the simple effect of reward manipulation showed that among participants in the reward for partner condition, the desire for revenge was higher for insulted (*M* = 2.88; *SD* = 1.27) than for praised (*M* = 1.77; *SD* = 0.96) participants, $F(1,110) = 14.10$, $p < .001$, $\eta^2_p = .11$, whereas for participants in the reward for participants condition, the effect of provocation on desire for revenge was no longer significant, $F(1,110) = 0.23$, $p = .635$, $\eta^2_p = .002$ (Figure 25).

**Figure 25**

*Interactive Effect of Provocation and Reward Manipulation on Desire for Revenge, Whereby the Effect of Provocation on Desire for Revenge Was Attenuated Among Participants in the Reward for Participant Condition (N = 114)*



### 5.5.3. Discussion

As predicted, Study 5 found that participants who received insulting feedback from another individual and then were led to believe the individual who allegedly evaluated their essay got the reward, desired revenge more than participants who received insulting feedback from another individual, but were led to believe they got the reward. These findings confirm Hypothesis 2, that is, an extrinsic reward attenuates desire for revenge in response to provocation, thus suggesting that desire to feel gratified, rewarded, and satisfied may motivate revenge-seeking.

These findings overlap with previous works emphasizing the rewarding character of revenge as indicated by heightened activity in brain regions associated with reward processing (Brüne et al., 2013; Chester & DeWall, 2016; de Quervain et al., 2004). This evidence also suggests that getting even is satisfactory enough to reduce revenge seeking, thus highlighting the importance of justice in vengeance seeking (Gollwitzer, 2009). These results also align with the theorizing of Frijda (1994), who argued that revenge is satisfactory when the amount of pain between avenger and the transgressor is balanced.

Despite providing many novel insights, Study 5 was limited by a few issues. First, I did not assess the desire for forgiveness - only the desire for revenge. Therefore, it remains unclear whether an unanticipated extrinsic reward only decreases desire for revenge or, perhaps, it also increases desire for reconciliation. Moreover, after excluding data from participants who wrote nonsensical essays, the final sample size was smaller than estimated one. Further, the provocation manipulation check only included questions about the angry affect, thus indirectly communicating to participants what they should have been feeling.

The reward manipulation – though successfully evoked feelings of satisfaction and pleasure – was imperfect. More precisely, apart from evoking feelings of gratification, it could have also brought forth feelings of being compensated (vs. not compensated) for

experienced wrongdoing. In this vein, the reward manipulation could communicate to participants that justice was or was not restored. Prospective works would do well evoking the feelings of being rewarded in an alternative manner. For instance, participants could receive an unexpected monetary reward (vs. do not receive any reward).

Finally, Study 5 included only assessment of *motivation* to seek revenge instead of an *act* of revenge. It remains unknown whether unanticipated extrinsic reward would inhibit a factual act of revenge. Moreover, as in Studies 2-4 participants who received positive social feedback could not well refer to items assessing vengeful motivation. Consequently, an important limitation of Study 5 is lack of assessing benevolent intentions towards the essay evaluator.

## 6. General Discussion

Previous work (Chester & DeWall, 2017) demonstrated that revenge improves mood disrupted by aversive experience of provocation. However, it remains unclear what are the consequences of this mood improvement. Does the pleasure of revenge reinforces subsequent vengeance-seeking or, on the contrary, allows to rebuild the relationship with the transgressor? Following the predictions outlined in the affective counterbalancing model (Chester & Martelli, 2019) and reinforcing model of aggression (Chester et al., 2018; see also Golden et al., 2017), I examined whether revenge – aggression in response to perceived harm inflicted by another individual (Chester & Martelli, 2019; Stuckless & Goranson, 1992) – predicts positive affect, which further facilitates desire for revenge *and* for forgiveness. I conducted four studies, testing whether revenge related positive affect fosters retribution and reconciliation, and an additional fifth study examining whether extrinsic reward attenuates desire for revenge in response to provocation. This research replicated findings of Chester and DeWall (2017) on affect repair motives in revenge seeking and extended them further by demonstrating that restoring affective balance through retaliating promotes vengeance and

forgiveness (Studies 3 and 4). In addition, Study 5 tested whether extrinsic reward attenuated desire for revenge. Study 5 showed that extrinsic reward (a state characterized by feelings of pleasure), inhibits desire for revenge, therefore highlighting the motivation to feel good as fuel for revenge.

### 4.1. Provocation and aggressive behavior

This research showed that insulting feedback (Studies 2 and 3) and rejection by another individual (Study 4) are painful experiences (see Eisenberger & Lieberman, 2004). Insulted and rejected participants reported greater negative and lower positive affect than praised and accepted participants, and this increased negative affect motivated them to retaliate against their provocateurs. This evidence is consistent with a well-established rejection-aggression link (e.g., Chester & DeWall, 2016, 2017; Chester et al., 2018; DeWall et al., 2009; Eisenberger et al., 2007; Twenge et al., 2007). Moreover, these findings align with the General Aggression Model (Anderson & Bushman, 2002), which proposes that aggression is a product of personological and situational factors, as well as current internal states. They also correspond to Dollard's Frustration-Aggression hypothesis, which posits that aggression is a result of frustration (Dollard et al., 1939). Further, these findings align with classical theories on aggression, which propose that aggression arises from feelings of pain, irritation, and resentment (Berkowitz, 1989). However, they also coincide with novel approaches, which highlight the role of positive affect in aggression seeking (Chester, 2017).

### 4.2. Pleasure of revenge

Correlational evidence from Study 1 indicated that revenge is associated with feelings of pleasure and satisfaction. The more pins stuck in the person representing the transgressor, the higher positive affect participants reported afterwards. This finding overlaps with work of Chester and colleagues (2019) showing that individuals may experience feelings of delightfulness, gratification, and happiness when engaging in aggressive behavior (i.e.,

aggressive pleasure). Experimental Studies 2-4 showed that participants recovered from the aversive experience of provocation through retaliatory aggression (Chester & DeWall, 2017). More precisely, positive affect increased and negative affect decreased after aggression among provoked participants. Serial mediation analysis (Study 3 and Study 4) revealed that the worse participants felt after provocation, the more they were aggressive. The more they were aggressive, the better they felt, and the more they desire to *both* harm and to forgive their provocateur. As such, I replicated previous works on mood-improving qualities of retaliatory aggression (Chester & DeWall, 2017) and extended them further, by demonstrating that revenge not only helps victims restore their affective balance but that these improvements in affect shape further intentions toward the wrongdoer.

Although aggression was associated with feelings of happiness and pleasure (i.e, positive affect), it was also associated with feelings of anger and irritation (i.e., negative affect). Studies 3-4 showed that revenge made participants feel gratified (indicated by presence of positive affect), albeit participants remained irritated (indicated by presence of negative affect). This evidence corresponds to the bittersweet model of revenge (Eadeh et al., 2017), according to which revenge concurrently elicits positive affect above and beyond negative affect. Revenge brings gratification, which (to some extent) combats feelings of irritation, dejection, and rage. By retaliating, participants repaired their disrupted affect, which shows that revenge helps people mull over disappointments (Buss, 1961). Altogether this evidence indicates that revenge has a self-regulatory function: people retaliate to feel more pleasure and less pain (Tamir, 2016).

However, the pleasure of revenge could also result from honoring the principle of reciprocity, one of the elementary relational categories that underlies social interactions (Fiske, 1993). More directly, receiving negative feedback on the essay after evaluating the essay of another participant positively could lead to an “an eye for an eye, a tooth for a tooth”

attitude. Such behaviors are typical for Equality Matching as these relationships are characterized by reciprocity whereby people return what they received. In this vein, positive affect could occur from "repaying in kind". Behaviors that help to establish or maintain social dominance (such as revenge) are often rewarding (Seymour et al., 2007).

**4.3. Intentions toward the provocateur**

Studies 1-4 tested whether revenge-related positive affect fosters *both* the desire for revenge (Hypothesis 1.1) and for forgiveness (Hypothesis 1.2). Study 1 found that revenge-related positive affect was unrelated to desire to harm the provocateur, but was associated with desire to forgive them. Thus, Study 1 provided initial evidence for an affective counterbalancing model (Chester & Martelli, 2019), which proposes that revenge, by bringing momentary positive feelings, may ameliorate negative feelings associated with transgression and, consequently, help people forgive their transgressors. Unexpectedly, Study 2 did not find associations between revenge-related positive affect and either desire to harm or to forgive the provocateur. However, Studies 3 and 4 showed that revenge related positive affect fostered desire to harm and to forgive the provocateur, but not to avoid them, thus providing empirical support for Hypotheses 1.1 and 1.2. These findings demonstrate that revenge is both rewarding as it (brings pleasure) and reinforcing (this pleasure facilitates subsequent revenge seeking). Consequently, revenge (and aggression in general) has indeed the potential to be compulsive (see Golden et al., 2017). However, this evidence also indicates that pleasure of revenge may be impossible to satisfy, that is, even if people feel good from retaliating, they may still desire more revenge.

Further, Studies 3 and 4 provided the first empirical evidence for the affective counterbalancing model, which has not yet been experimentally tested (Chester & Martelli, 2019). Revenge-related positive affect, by combating provocation-related negative affect, allowed forgiveness to unfold. Additionally, post-revenge positive affect was unrelated to

motivation to avoid the provocateur, which aligns with works showing that positive affective states are related to approach motivation (e.g., Cacioppo et al., 1999; Lang, 1995). Altogether, this evidence shows that relationships between revenge-related positive affect and subsequent intentions toward the provocateur are specific to retribution and reconciliation.

The present findings also correspond to research emphasizing empowerment as motive for punishment (Strelan et al., 2020). In this vein, revenge helps to restore victims their sense of power, which they had lost due to transgression (Fischer et al., 2022). Revenge was shown to be empowering when transgressor's intent to harm was high, whereas forgiveness was found to be empowering regardless of intent (Strelan et al., 2020). Specifically, when victims believe the offender intended to harm them, taking revenge is more empowering than doing nothing. Thus, revenge-related empowerment can possibly explain why the pleasure of revenge predicted increases in both vengeful and benevolent intentions towards the transgressor. In fact, recent findings (Schumann & Walton, 2022) showed that both revenge and forgiveness are strategies of restoring a sense of humanness after transgression with forgiveness being more effective though.

Additionally, Study 5 showed that extrinsic reward attenuates the effect of provocation on desire for revenge. Insulted participants who were led to believe their wrongdoer got the reward, desired revenge more than insulted participants who were led to believe they, not their wrongdoer, got the reward. These results not only corroborates previous works on the rewarding nature of revenge (Chester & DeWall, 2016, 2017), but also stress the importance of just desert motives in revenge seeking (Carlsmith et al., 2002; Gollwitzer, 2009). Receiving a monetary reward was compensatory enough to diminish the desire for revenge, which suggests that seeing offenders "getting what they deserve" may be satisfactory (see Gollwitzer et al., 2011). As such, this evidence aligns with research on human inclination to perceive the world as fair (Lerner, 1980), which shows that belief in the

just-world is linked to the motivation to seek revenge (Kaiser et al., 2004) and to the past revengeful behaviors (Ferrari & Emmons, 1994). However, these findings also indicate that benefiting from the transgression (i.e., receiving the unexpected monetary reward) changed participants' perception of their partners, consequently making them less vengeful. More directly, participants could perceive their essay evaluators as less immoral which could have increased sympathy. Bocian and Wojciszke (2014) describe this phenomenon as a self-interest bias in the moral judgment of others' actions.

## 4.4. Importance

### 4.4.1. Replication

Studies 2-4 replicated findings of Chester and DeWall (2017, Study 5) on affect repair motives in revenge seeking. By retaliating, participants regained their affective balance disrupted by aversive social experiences. More directly, positive affect increased and negative affect decreased after revenge. Given the replication crisis in personality and social psychology (e.g., Lilienfeld, 2017; Maxwell et al., 2015; Shrout & Rodgers, 2018), this replication is of great importance. The present findings highlight the utility of using validated experimental manipulations (c.f., Chester & Lasko, 2021) and sharing research materials through open repositories.

### 4.4.2. Extension

This work not only replicated, but, importantly, extended the work of Chester and DeWall (2017) by showing that revenge related positive affect subsequently fosters both retribution and reconciliation. In this vein, consequences of reaping hedonistic rewards from revenge are both bitter (retribution) and sweet (reconciliation), which further expands the bittersweet model of revenge (Eadeh et al., 2017).

### 4.4.3. Integration

The present work binds together previous findings on the affective nature of revenge. Revenge is neither entirely "bitter" nor entirely "sweet" (Eadeh et al., 2017), as it elicits both positive and negative affect (Chester & DeWall, 2017). Revenge brings pleasure, which is laced with irritation (Carlsmith et al., 2008) and these feelings subsequently cause people to ponder about revenge taking (Carlsmith et al., 2008; Golden et al., 2017) and forgiving the transgressor (Chester & Martelli, 2019). This research project not only linked together previous findings, but also merged methodologies used in the previous works. Respectively, revenge was quantified using measures of aggression such as the Voodoo Doll Task (DeWall et al., 2013) and the Competitive Reaction Time Task (Chester & Lasko, 2018; Taylor, 1967). Measures of negative and positive affect were incorporated from the works showing that revenge is either bitter (Carlsmith et al., 2008) or bittersweet (Eadeh et al., 2017). Extrinsic reward was, in turn, induced by incorporating methodology of behavioral economics used in previous works examining neural correlates of punishment (Brüne et al., 2013; de Quervain et al., 2004).

## 4.5. Limitations

This research had plenty of limitations. First, all studies were conducted online and data for four out of five studies was collected using Amazon Mechanical Turk, a platform which has been subject to criticism due to arising concerns about the data quality (e.g., Chmielewski & Kucker, 2019). Asking participants to write essays on specific topics (Studies 3-5), helped detect nonsense responses likely produced by bots; software applications stimulating human activity in tasks over the Internet (Dreyfus, 2018, August 17). Prospective works should also include attention check questions to better control respondents' engagement (Shamon & Berning, 2020). Lack of attention check questions is, particularly, an important limitation of Study 1. More precisely, participants in Studies 2-5 wrote essays

which helped to detect careless participants. In Study 1, I did not ensure whether participants responded to questions carefully. Future research would do well testing the serial mediation model in a laboratory setting on a sample of adults. Such a laboratory setting would provide a much more controllable environment. Moreover, it would allow the use of different methods of quantifying aggression such as: Hot Sauce Allocation (Lieberman et al., 1999) or Point Subtraction Aggression Task (Golomb et al., 2007).

Furthermore, positive and negative affect were measured using only self-report measures. Research on affective forecasting (Wilson & Gilbert, 2003) shows that people tend to mispredict their future affective reactions (Carlsmith et al., 2008; Lambert et al., 2014; Wilson et al., 2000). They may also be motivated to under-report the pleasure of retaliating. Although, the present research showed that revenge is associated with feelings of pleasure and satisfaction in the context of situationally evoked wrong (Study 3), as well as real life transgressions (Studies 1 and 4), future research would still benefit from examining affective consequences of revenge using more objective measurement (Gardhouse & Anderson, 2013) such as, for example, heart rate variability (Kim et al., 2018). If retaliatory aggression is indeed reinforcing, then individuals should exhibit increased heart rate after a provocation (indicative of stress) and then reduced heart rate after revenge (indicative of relief). Another objective way of measuring affect could be done through electrodermal activity, which assesses changes in skin surface conductance on account of sweat secretion (Critchley & Nagai, 2013). Again, if retaliatory aggression brings relief, then frequency-domain indices of galvanic skin response should increase after provocation, and then should decrease after aggression, thus indicating reduced sympathetic activity.

The way intentions toward the provocateur were measured is another limitation of this research. First, they were assessed analogically as positive and negative affects were, that is, using the self-report measures. Intentions are not always the best indicator of behavior (Webb

& Sheeran, 2006) as people tend to act differently than they would assume (e.g., Milgram, 1963). Future works could outflow this limitation by assessing intentions toward the provocateur behaviorally. The Tangram Help/Hurt Task (Saleem et al., 2015) could be especially applicable as it assesses both antisocial and prosocial behaviors. In this task, participants are led to believe they interact with another individual in a puzzle task and are asked to assign puzzles for their partner to complete. The more difficult puzzles to assign to the partner, the higher harmful intentions (the easier puzzles, the higher prosocial intentions, respectively).

Another limitation that needs to be pointed out are the instruments for assessing intentions toward the provocateur: the Decisional Forgiveness Scale (Worthington et al., 2008) and the Transgression-Related Interpersonal Motivations Inventory (McCullough et al., 2006). I used these measures as they are reliable and valid measures of intentions toward transgressors that are commonly used in the research on revenge and forgiveness (e.g., Gámiz et al., 2021; Harper et al., 2014; Lin et al., 2014; McCullough et al., 2010). However, they did not perfectly fit the procedure. This is because participants in the control conditions could not well refer to few items including: "*I want us to bury the hatchet and move forward with our relationship*", "*Despite what he/she did, I want us to have a positive relationship again*", or "*I have given up my hurt and resentment*". This is important limitation of this research, which could be overcome by measuring intentions toward the provocateur using a novel yet previously validated measure (e.g., Cronbach & Meehl, 1955; Flake et al., 2017; Haynes et al., 1995) better tailored to the procedure. Post-aggression intentions toward the provocateur could also be assessed using a behavioral measure such as Tangram Hurt/Help Task (Saleem et al., 2015).

Furthermore, in Study 4 I did not control for the quality of the relationship with the transgressor (Burnette et al., 2012). Following the valuable relationship hypothesis

(McCullough et al., 2010), victims who perceive the transgressor as a source of threat may be more likely to avoid them (out of fear of being harmed again), whereas those who see the transgressor as valuable partner may be less inclined to retaliate and more prone to forgive (out of feelings for transgressor). As such, future works could examine the serial mediation model accounting for the relationship specificity. Another interesting direction could be to examine this model among romantic couples to see if (and to what extent) romantic partners retaliate against each other and reap hedonistic reward from doing it.

Another potential issue is the selection of the control condition in Study 4 (i.e., previous experience of being accepted by another individual). I asked participants to write about the previous experience of acceptance following the established procedure of evoking feelings of interpersonal rejection (Gardner et al., 2000; Maner et al., 2007) to overcome the issue of employing unvalidated experimental manipulation (Chester & Lasko, 2020; Smith, 2005) and to replicate and extend findings of Chester and DeWall (2017) who followed this very procedure. Social acceptance is also considered the default interpersonal state (Coan & Sbarra, 2015) – people tend to expect to be accepted by others (e.g. Gollwitzer et al., 2018). Nevertheless, this limitation could be addressed by employing another revenge-seeking manipulation such as punishment with extremely high noise blasts (compared to extremely low noise blasts (e.g., Ferguson & Rueda, 2009).

Final limitation of this research is the way of estimating sample size for studies testing the serial mediation model(s). Given the lack of consensus on how to run a priori sample size estimations for complex mediational models, I approximated the sample size for Studies 2-4 using two different sample size estimating methods: recommendations of Franz and McKinnon (2007) and G*Power (Faul et al., 2007; linear multiple regression models). This estimation yielded the sample size of approximately 300 participants. Such a sample size is twice larger as the sample used by Chester and DeWall (2017) in the study this research

sought to extend. Replicating (and further extending) their findings gives me confidence that the sample size was sufficient. However, it must be stressed that none of the sample size estimating methods I used directly applies to the serial mediation model(s) tested in these studies, which leaves the margin of error for underestimation.

### 4.6. Future Directions

Individual dispositions are likely to moderate the relationship between revenge and/or post-revenge positive affect and subsequent intentions toward the provocateur. For instance, there are reasons to expect that people high on trait forgivingness (Berry et al., 2005) or religiosity (e.g., Huber & Huber, 2012) will be less inclined to retaliate and, even if, more likely to hold benevolent intentions toward the provocateur. Opposite can be expected for people high on trait vengefulness (Stuckless & Goranson, 1992) or sadism (Buckels et al., 2013). Sadists hurt others for the sake of enjoyment (O'Meara et al., 2011) and derive pleasure from pain inflicted upon another individual, which, however, does not last long (Chester et al., 2019). For these reasons, sadists may be especially inclined to compulsively seek revenge.

This research did not take into consideration attitudes people might have towards revenge, particularly regarding the morality of revenge. Revenge could be associated with a positive affect more strongly among people who find revenge moral. This is because such individuals believe they justifiably restore social justice when enacting punishment (e.g., Stuckless & Goranson, 1992). Future works could examine how attitudes towards revenge influence affective consequences of vengeance. Though it was shown that people intuitively approve revenge taken by victims (Gollwitzer et al., 2016), prospective works could examine how moral judgment of revenge changes depending on how enacting revenge makes someone feel. More specifically, participants should judge harshly a person who feels good (vs. bad) from having taken revenge.

Future research could also examine how affective consequences of retaliating shape subsequent intentions toward wrongdoers using functional magnetic resonance imaging (de Quervain et al., 2004; Singer et al., 2006). Procedures for evoking revenge seeking such as Cyberball (Williams & Jarvis, 2006) and assessing aggression such as Competitive Reaction Time Task were adjusted for fMRI in order to examine the neural mechanisms of retaliatory aggression (Chester & DeWall, 2016). Prospective works could then examine how activity in the brain reward circuitry changes from the moment of provocation, through aggression, to subsequent behaviors toward the wrongdoer. If revenge (and aggression in general) is truly addictive-like (Golden et al., 2017), then activity in the brain reward circuitry should increase not only after revenge, but also after having an opportunity to harm the provocateur again after.

Prospective works should also examine more deeply the relationships between various motivations towards the transgressor following revenge-taking. In this investigation, I treated vengeful and benevolent motivations as distinct, running separate mediational models for each. However, it is likely that victims may want, at the same time, to *both* retaliate against and reconcile with their transgressors analogically as they feel good and bad about having taken revenge (Carlsmith et al., 2008; Eadeh et al., 2017). Respectively, future works could examine associations between post-revenge affect and subsequent intentions toward provocateur using a more temporal framework (e.g., West et al., 2021). Indeed, forgiveness is a complex *process* which entails one's change of attitudes toward the wrongdoer and vengeful intentions are usually the first reaction to transgression (Förster et al., 2019).

Study 5 demonstrated that insulted participants who supposedly received reward were less motivated to seek revenge than insulted participants who were led to believe their fictitious partner got the reward. Information about winning the reward made participants feel positive, pleasant, and satisfied. This state, however, was elicited through incentive, instead

of inducement of particular positive emotion such as amusement, compassion, or joy. Still, though, this finding suggests that positive emotions are likely to make people less vengeful and more benevolent. For instance, state humility was shown to be associated with less aggressive motivation (Summerell et al., 2020). As such, future research would benefit from investigating how and under which conditions positive emotions may attenuate provocation-aggression link and foster forgiveness.

This research demonstrated that extrinsic reward attenuates vengeful motivation following provocation. However, this evidence is still kind of preliminary as I neither replicated this effect, nor tested whether extrinsic rewards inhibit factual aggression. Prospective works would do well not only replicating and extending this research, but also investigating whether victims would punish their offenders if given a choice to repair their mood in an alternative manner through, for example, watching entertaining videos. Such videos tend to be engaging and usually elicit positive emotions of high arousal such as amusement or joy (e.g., Siedlecka & Denson, 2018). If retaliatory aggression is indeed driven by desire to feel rewarded, then provoked participants should fulfill their need for reward through an easier (and more moral) option than harming another individual.

Finally, I examined revenge in a dyadic context, which does not allow me to extrapolate these findings to a relevant area of intergroup conflict. Future research would benefit from extending these findings into an intergroup domain to examine how the pleasure of revenge shapes intergroup relations. This could be particularly insightful in the context of intractable intergroup conflicts, which include repeated patterns of violence (e.g., Bar-Tal, 2013). Negative emotions play an important role in such conflicts (Gross et al., 2013) as they fuel intergroup aggression (Porat et al., 2020), which then provides temporary relief from persistent tension. This intensive, albeit short-lasting pleasure elicited by aggression, may explain the perseverance of intergroup conflicts. Emotion regulation strategies can be

effective in reducing conflict-related negative emotions (e.g., Halperin et al., 2013) and group members can be motivated to regulate their group-based emotions to pursue ingroup goals (Goldenberg et al., 2016).

**7. Summary**

The present research replicated and *extended* work of Chester and DeWall (2017) on revenge related affect improvement. Provoked participants recovered from the pain of aversive social experience through revenge. Revenge related positive affect further fostered desire to both harm and forgive transgressors, yet not avoid them, thus providing the first empirical evidence for the affective counterbalancing model (Chester & Martelli, 2019), which states the pleasure of revenge can counteract pain of wrongdoing. In addition, these findings offered initial evidence that revenge (and, overall, aggression) can be compulsive due to short-lasting feelings of pleasure which reinforce subsequent acts of aggression. Finally, this work demonstrated that inducement of reward reduces desire for revenge in response to provocation. Altogether, this evidence suggests that revenge is driven by the desire to feel gratified and consequences of revenge related gratification are both “bitter” (vengeance) and “sweet” (forgiveness).

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