Me as good *and* me as bad:

Priming the self triggers positive *and* negative implicit evaluations

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Abstract

Although theories of personality and human behavior have long assumed that the self is affectively complex, widely used indirect measures of implicit self-evaluations have largely focused on the robustness and cultural universality of the self's positivity. Such indirect measures assess evaluations on a single continuum, ranging from positive to negative. Thus, they focus on the self's *relative* positivity and are inherently incapable of assessing whether the self is associated with good *and* bad. Using the well-established evaluative priming task, the present work tested the hypothesis that positive implicit self-evaluations coexist with an inkling of negative implicit self-evaluations. Studies 1 and 2 empirically demonstrated that priming the self facilitated the classification of both positive *and* negative targets (bivalent-priming). In contrast, replicating classic findings, priming a personally significant, liked object facilitated the classification of positive targets and inhibited the classification of negative targets (univalent-priming). Study 3 showed that the bivalent-priming triggered by self-primers cannot be explained by alternative accounts (e.g., arousal, vigilance). Meta-analyses of all studies attests to the robustness and reproducibility of self-primers triggering both positive *and* negative implicit evaluations. Moreover, tests estimating heterogeneity in the strength of implicit self-evaluations indicated that individual differences in nonclinical, healthy individuals may be limited, possibly reflecting measurement limitations, the nature of implicit self-evaluations, or both. Overall, the present work shines a spotlight on a previously undocumented effect: Despite the self's robust net positivity, the self reliably triggers negative implicit self-evaluations. Implications for the conceptualization, assessment, and consequences of implicit self-evaluations are discussed.

Key words: Implicit social cognition, implicit attitude, self-esteem, ambivalence, indirect measures

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Philosophers, theologians, sociologists, poets, novelists, anthropologists, and psychologists have long been fascinated by “the self” (James, 1890). Naturally, psychologists across diverse perspectives have focused on understanding the structure, function, origins, consequences, and measurement of self-representations. Personality theorists, in particular, have long focused on the self as an organizing construct in the personality system (Bowlby, 1969; Sullivan, 1953). Much of this theorizing, as well as intuition, has long assumed that the basic structure of the self is inherently affectively complex (Andersen et al., 1996; Andersen & Chen, 2002; Freud, 1911; Higgins, 1987; M. Klein et al., 1955; Kohut, 1966; Linehan, 1993), arising from and reflecting the complexities of interpersonal relationships, especially early relational and attachment experiences (Fonagy et al., 2007; Rudman, 2004; Shore, 1994, 2000; Sullivan, 1953).

In contrast to this theoretical backdrop, extant research has largely focused on the self’s *relative* implicit positivity. This literature provides strong evidence that people possess highly favorable implicit self-evaluations—i.e., evaluations that arise spontaneously when thinking of the self (Gawronski & Bodenhausen, 2014; Greenwald & Banaji, 1995; Koole et al., 2001; see also Ferguson & Zayas, 2009; Ross & Nisbett, 1991). Although research has shown that positive implicit self-evaluations are robust and appear to be a universal characteristic of the human mind, commonly used indirect measures assess only *relative* implicit self-evaluations. Specifically, standard indirect measures assess implicit evaluations on a single continuum, ranging from good on one end to bad on the other. Such measures are not able to examine the self’s affective complexity.

Consequently, an empirical question remains: What is the basic structure of self-representations at an implicit level? Drawing on diverse theoretical perspectives that underscore

the highly dynamic (Feldman Barrett, 2017) and social nature of the mind (Lieberman, 2016; Meyer, 2019), we examine the proposition that the basic structure of the self includes positive *and* negative implicit evaluations. That is, implicit self-positivity naturally coexists with an inkling of implicit self-negativity. Critically, the present work explores the coexistence of positive and negative implicit self-evaluations as a normative (typical, common) feature of the self, which differs from past theorizing on subjectively experienced self-ambivalence. Specifically, traditionally, past work on ambivalence has largely assumed that holding positive and negative self-evaluations is a problematic state (Guidano & Liotti, 1983) experienced by only subsets of individuals—for example, those with an anxious attachment (Ainsworth et al., 1978; Pietromonaco & Barrett, 1997), borderline personality disorder (Linehan, 1993), low self-esteem (Graham & Clark, 2006; Riketta & Ziegler, 2006), or a history of physical and emotional abuse (Berenson & Andersen, 2006). Whereas traditional views assume that possessing positive and negative self-evaluations is an atypical and aberrant state with deleterious downstream consequences, the present work assumes that complexity in implicit self-evaluations is a key feature of self-representations with adaptive significance. Accordingly, the present work empirically tests the hypothesis that the normative structure of implicit self-evaluations is inherently bivalent, comprising both positive *and* negative evaluations.

Social Cognitive Conceptualizations of the Personality System

Although the study of the self-representation spans diverse subfields in psychology, historically, it has been a focal point of personality theories. Classic as well as contemporary work has aimed to elucidate the normative structure and development of the self, shedding light on people's shared personality as human beings as well as the basic intra- and interpersonal processes by which biology and experience shape the self (Ainsworth et al., 1978; Bowlby, 1969, 1973;

Freud, 1962; Higgins, 1987; Maslow, 1954; Rogers, 1961).

Most relevant, the present work is informed by the Cognitive-Affective Processing System (CAPS) theory (Mischel & Shoda, 1995; Shoda & Mischel, 1998). The CAPS theory was developed to address a longstanding challenge in the study of human behavior. Human behavior is highly dynamic and sensitive to context; any given individual shows wide variation in thoughts, feelings, and behaviors over time and across situations. Thus, how do we conceptualize a coherent and stable personality system that can account for such variability in a person's thoughts, feelings, and behavior (Shoda et al., 2002)? From a CAPS approach, the answer was to draw from social cognitive principles to conceptualize a personality system as a network of cognitions and affects (referred to as a CAPS network), wherein activation of particular cognitions and affects occurs in response to various features of situations, enabling highly dynamic responding to ever-changing contextual influences (both external and internal). In this fashion, each person's stable CAPS network mediates the effect of situations on behavior, accounting for the wide-ranging diversity that characterizes human behavior. Thus, behavior reflects interactions between the *person* and *situation* (for further information see Cervone & Shoda, 1999; Mischel et al., 2000; Zayas et al., 2002). Some aspects of a person's network are expected to be common or normative among members of a culture, reflecting shared evolutionary and cultural influences (Mendoza-Denton et al., 1999; Mendoza-Denton & Mischel, 2007). Other aspects of the network may be unique for an individual, reflecting differences in biology and experiences (e.g., Rosenberg & Jones, 1972).

Critically, evaluative aspects of the self-representation serve a central role in the CAPS network, as well as other social cognitive conceptualizations of the personality system (Bandura, 1982; Fleeson & Jayawickreme, 2016, 2021). Indeed, from this perspective, self-evaluations are assumed to be affect-laden and “hot,” triggered automatically in response to psychologically

important features of situations (such as one's own name), and outside of one's awareness (Mischel & Shoda, 1995). Given that information associated with or about the self has important consequences, which can be either harmful or beneficial to the individual (Smith & Lazarus, 1990), self-evaluations are likely to be relevant in most (or all) situations. Nonetheless, the consequences of implicit self-evaluations for feeling, thought, and behavior are likely to depend on the organization of other cognitions and affects that comprise a person's CAPS network. Thus, implicit self-evaluations are not static, isolated processes. Instead, they are dynamic and interdependent, with continuous interactive and reciprocal influences with one's goals, expectancies, and regulatory strategies. As an example, a person may perceive disinterest from an interaction partner, heightening the accessibility of negative aspects of the self. But whether this social threat leads to approach, such as attempting to engage with the partner, or avoidance, such as averting eye gaze, depends on expectancies and beliefs about one's own actions and partner's intentions (Ayduk et al., 2000; Murray et al., 2011; Murray, Holmes, et al., 2006b).

The Self-Representations' Affective Complexity

CAPS is a metatheory about the structure and function of the personality system and highlights the prominent role of self-evaluations as a mediating psychological process. Yet, it is relatively silent on the structure of the self-representation. Crucially, various theoretical accounts of the self suggest that the most characteristic feature of the self-representation is its affective complexity (Andersen & Chen, 2002; Baumgardner, 1990; Bowlby, 1969; Higgins, 1987; M. Klein et al., 1955; Kohut, 1966; Riketta & Ziegler, 2006; Sullivan, 1953; Zeigler-Hill, 2006). This affective complexity reflects that the self-representation is constructed, developed, and maintained within dyadic relationships (Aron et al., 1991; Baldwin, 1992; Cooley, 1902; Coopersmith, 1967; Mead, 1934; Sullivan, 1953). From a developmental lens, repeated interactions with caregivers

serve as the basis for an infants' self-worth, shaping nonconscious aspects of the self-representation (Baldwin, 1994; Baldwin et al., 1990; Bowlby, 1969; Pietromonaco & Barrett, 2000). Attentive and responsive caregiving promotes the development of positive self-worth, whereas inattentiveness and unresponsiveness are risk factors for the development of negative self-worth (Ainsworth et al., 1978; Mikulincer & Shaver, 2004; Zayas, Mischel, et al., 2011).

Notwithstanding the almost singular focus on individual differences, there is an appreciation that all relationships are inherently affectively complex (Murray, Holmes, et al., 2006a; Murray & Holmes, 2009). That is, although high-quality relationships are generally characterized by positive interactions, even the most responsive and secure relationships are rife with opportunities for aversive and unrewarding experiences. Relationship partners may be generally supportive but can, at times, be unavailable and inattentive or even outright rejecting. Indeed, neo-Freudians have long discussed that the inherent affective complexities of relationships present individuals with conflicts and challenges that must be resolved at various points throughout personality development, with implications for the self (Adler, 1927, 1964; Bowlby, 1969, 1973; Erikson, 1950; Freud, 1962; Horney, 1950; M. Klein et al., 1955). According to Sullivan's self theory (Sullivan, 1953), instances of the caregiver's social approval and disapproval within the first year of life are the basis by which the self system develops the idea of the "good me" and "bad me."

Beyond developmental perspectives, various social psychological theories also underscore the idea that the self-representation is affectively complex. Work on the fundamental need to belong has routinely shown that self-evaluations are profoundly modulated by encountering social threats (Baldwin, 1994; Baldwin et al., 1990; Murray, Griffin, et al., 2006). Social threats, whether actual or imagined, signal a personal flaw or failure and make salient that one is dispensable and

not wholly beloved (Chernyak & Zayas, 2010; Leary, 2005; Leary & Baumeister, 2000; Pickett & Gardner, 2005; Williams, 2009; Zayas et al., 2009). Likewise, theories of self-deception and distortions also underscore the idea that people must manage the reality of encountering negative self-relevant events, for the sake of maintaining a positive views of themselves in their own eyes and in the eyes of others. From this perspective, social threats (MacDonald & Leary, 2005), failure (Sedikides & Strube, 1997), and concerns about mortality (Pyszczynski et al., 2004) readily highlight the self's deficiencies (Alicke & Sedikides, 2009; Greenwald, 1980). Indeed, a large literature shows people's aptitude for consciously or even nonconsciously engaging in self-protection strategies to minimize the impact of one's negative and undesirable aspects, such as self-handicapping (Berglas, 1978), defensive pessimism (Norem & Cantor, 1986), and repression (Baumeister & Cairns, 1992). Thus, this body of work also suggests that affective complexity may characterize people's implicit self-evaluations.

Importantly, social cognitive work on implicit evaluations provide a framework for understanding the processes by which the implicit self-representation may acquire a bivalent structure. The classic view is that implicit evaluations develop slowly, with repeated experiences encountered over time (Wilson et al., 2000). When one repeatedly interacts with a stimulus in the environment, the corresponding spontaneously triggered evaluations begin to be stored in memory. Over time, the statistical regularities between the stimulus and the evaluation are encoded into associative structures (Conrey & Smith, 2007; Fazio, 2001). If the stimulus is repeatedly associated with rewarding experiences, then the mental representation of the stimulus will acquire an association with a positive evaluation. Likewise, if the stimulus is repeatedly associated with aversive experiences, the mental representation of the stimulus will acquire an association with a negative evaluation. Importantly, stimuli frequently associated with positive *and* negative over

time and space may come to acquire both positive and negative evaluations in memory (Kaplan, 1972; Newby-Clark et al., 2002; Priester & Petty, 1996; Thompson et al., 1995). Moreover, implicit evaluations may also arise from propositional beliefs and can be acquired through inferential reasoning wherein people consider how and why events may be related (Gawronski et al., 2017; Kurdi & Dunham, 2020). Thus, given that people routinely encounter positive and negative information with varying degrees of consequences for the self, and that any given social interaction involves a continuously changing constellation of social rewards and threats, the self-construct is likely to possess a bivalent structure.

Documenting the Self's Relative Implicit Positivity

Over the last three decades, research and theory in social cognition has advanced the conceptualization and measurement of implicit self-evaluations. This work has largely focused on the ubiquity and robustness of the self's relative implicit positivity or positive *implicit self-esteem* (Greenwald & Banaji, 1995). Such evaluations of the self, ranging from positive to negative, occur automatically and uncontrollably in response to self-relevant stimuli (Bosson et al., 2000; Gebauer et al., 2008). In contrast to explicit self-evaluations, which are assessed through direct methods wherein participants report on their self-evaluations, implicit self-evaluations are assessed via indirect methods. Such methods *infer* self-evaluations—for example, from how quickly and accurately participants perform on classification tasks that tap into how concepts are associated with one another (see Fazio & Olson, 2003 for a review).

The self's relative implicit positivity is perhaps most easily illustrated by the classic name-letter effect (NLE; Nuttin, 1985, 1987): individuals strongly prefer their own initials and other letters in their own names, more than other people like these same letters (Nuttin, 1985; see Jones et al., 2002; Kitayama & Karasawa, 1997; Koole et al., 2001; Koole & Pelham, 2003; see also

Gebauer et al., 2008 for the name-liking effect). Critically, people are never directly asked to evaluate the self; rather, evaluations of self-relevant stimuli are assumed to reflect self-evaluations. Additionally, a variety of computer-based classification techniques have also documented the robustness of implicit self-positivity, including the Implicit Association Test (IAT; Greenwald & Farnham, 2000), Go/No-Go Task (GNAT; Gregg & Sedikides, 2010), and the evaluative priming task (EPT; Back et al., 2009; Spalding & Hardin, 1999). In a large-scale study ($N = 23,413$), Bar-Anan and Nosek (2014) showed that, across seven indirect measures of self-esteem, people preferred the self over others, even familiar others; effect sizes across the various measures were moderate-to-large (average Cohen's $d = .64$). Recent work has provided evidence that implicit self-esteem assessed by the IAT reflects activation of neural regions involved in reward processing when viewing self-relevant images (Izuma et al., 2018). Moreover, the robustness of positive implicit self-esteem may be a universal human characteristic. In a cross-cultural study by Yamaguchi and colleagues (2007), participants ($N = 505$) from China, Japan, and the United States showed evidence of positive implicit self-esteem as assessed by the self-esteem IAT.

Implicit Self as Good *and* as Bad: Does the Self Trigger Positive *and* Negative Implicit Evaluations?

Despite the rich literature on implicit self-evaluations, the possibility that the self may spontaneously activate positive *and* negative evaluations has not been directly examined. The lack of attention to this question does not reflect a lack of awareness of the self's affective complexity. Instead, we speculate that it may, in part, stem from the fact that commonly used indirect measures assess *relative* evaluations. That is, they operationalize implicit evaluations on a single evaluative dimension, ranging from positive on one end to negative on the other end (Banse, 1999; Bosson et al., 2000; DeHart & Pelham, 2007; Dewitte et al., 2008; Greenwald & Farnham, 2000; McNulty

et al., 2014; Spalding & Hardin, 1999; Zayas & Shoda, 2005), rather than exploring each evaluative dimension independently (Cacioppo & Berntson, 1994; Cacioppo, Berntson, Norris, & Gollan, 2012). For example, the self-esteem IAT (Greenwald & Farnham, 2000) assesses the extent to which the self (versus others) is associated with positive (versus negative). Similarly, the name-letter effect (Nuttin, 1985) requires that individuals judge preferences to letters on a Likert scale ranging from unpleasant to pleasant. Although the EPT can assess positive and negative separately, and was originally implemented in this fashion (Fazio et al., 1986a), researchers commonly reduce response times to a single index that reflects positive vs. negative self-evaluations (Hetts et al., 1999; Spalding & Hardin, 1999; Wentura & Degner, 2010).

To be sure, indirect measures that assess relative (good vs. bad) evaluations have several advantages—for example, increased reliability (see Bar-Anan & Nosek, 2014; also see Olson et al., 2007). Moreover, relative measures are often the most appropriate tool for addressing many research questions, given the importance of relative (vs. absolute) evaluations in judgment and behavior (Goffin & Olson, 2011; Olson et al., 2007). Nonetheless, because relative measures are not able to assess the coactivation of separate evaluations (O’Shea & Wiers, 2020), they are not the appropriate tool for assessing whether mental representations of the self automatically trigger both positive *and* negative evaluations (Kaplan, 1972; see Riketta & Ziegler, 2006 for a similar argument focused on relative measures of explicit self-esteem).

Empirically testing the focal hypothesis requires an indirect measure that assesses implicit self-evaluations on two separate dimensions: one assessing the extent to which the self activates positive evaluations, and a second assessing the extent to which the self activates negative evaluations. Fortunately, the original implementation of the EPT (Fazio et al., 1986a) allows for the assessment of positive and negative evaluations on two separate dimensions (see also de Liver

et al., 2007; Petty et al., 2006). In the EPT, participants are primed with the name of an attitude object, or an affectively neutral stimulus (e.g., “*BBB*”), and asked to classify subsequently presented positive and negative target words as *good* or *bad* by pressing one of two response keys as quickly and accurately as possible. When the valence of the prime and target word is *congruent* (i.e., both are positive, or both are negative), performance on the target classification task is facilitated. In contrast, when the valence of the prime and target word is *incongruent* (i.e., the prime is positive and the target is negative, or vice versa), performance on the target classification task is impaired. To illustrate, coffee is a positive attitude object for many people. Thus, if primed with the word *COFFEE*, people should be faster at classifying positive target words, such as *sunshine*. But, after being primed with *COFFEE*, people should be slower at classifying negative target words, such as *garbage*. This pattern is taken as evidence that the attitude object, in this case coffee, spontaneously elicits a positive evaluation (see Figure 1, panel A). If instead the prime is the name of a disliked attitude object, such as *POISON*, the opposite occurs: people are now faster at classifying negative target words (e.g., *garbage*) and slower at classifying positive target words (e.g., *sunshine*). Likewise, this pattern is taken as evidence that the attitude object, poison, spontaneously elicits a negative evaluation (see Figure 1, panel B).

But what happens if the prime refers to one’s self? If the self is similar to a typical liked attitude object, one might expect that priming the self would facilitate the classification of positive targets and inhibit the classification of negative targets. Indeed, if the self is more positive than a liked attitude object, we might expect this pattern to be even more pronounced (Fazio et al., 1986, 2001). On the other hand, if the self is an attitude object that is more affectively complex, comprising positive *and* negative evaluations, priming the self might facilitate the classification of positive *and* negative target words (see Figure 1, panel C).

Figure 1. Structural representation of implicit evaluations in memory: positive (panel A), negative (panel B), and bivalent evaluations (panel C). In each panel, the large circle represents a person's mind, and the smaller circles within each person's mind represent the thoughts and affects that are accessible. The lines among the concepts indicate which concepts are connected with one another and the strength of association. Solid lines connecting concepts indicate an excitatory association (i.e., activation of one concept results in the activation of the associated concept). Dashed lines connecting concepts indicate an inhibitory association (i.e., activation of one concept inhibits activation of the associated concept).

The validity of the present hypothesis depends on extant theoretical frameworks that assume, explicitly or implicitly, the separability of positive and negative evaluations (Cacioppo & Berntson, 1994; Cacioppo et al., 1997, 1999; Carver & White, 1994; Gray, 1987; Larsen & McGraw, 2011; Metcalfe & Mischel, 1999; Petty et al., 2006). According to these theories, the human mind continuously and effortlessly makes two independent evaluations: assessments of possible rewards and assessments of possible harms. Thus, positive and negative evaluations operate in parallel and independently (vs. as opposite endpoints of a continuum), allowing them to become coactivated in a nonreciprocal manner (Grabenhorst et al., 2007). Theoretical frameworks that conceptualize positive and negative evaluations as separate and independently-operating systems afford the possibility that a single stimulus—whether a person, place, or thing—might activate positive *and* negative evaluations simultaneously.

Although existing research has yet to empirically document that the self triggers positive and negative implicit evaluations, there has been interest in such affectively mixed implicit responses elicited by other classes of evaluative stimuli (de Liver et al., 2007). For example, work by Petty and colleagues (2006; Study 1) has examined how encountering conflicting information may result in affectively complex implicit evaluations, as assessed with the EPT. Most relevant, work by Zayas & Shoda (2015) used the EPT to assess the evaluations triggered by priming the mental representation of a significant other (e.g., one's romantic partner). Priming participants with the name of a liked significant other facilitated the classification of positive targets, reflecting that significant others trigger positive evaluations. However, priming with the name of that same liked significant other also facilitated the classification of negative targets. This pattern of *bivalent-priming* (i.e., facilitating the classification of positive *and* negative targets) drastically differed from the classic pattern of *univalent-priming* elicited by objects. That is, replicating past findings

(Fazio et al., 1986a), priming with the name of a liked object facilitated classification of positive targets and inhibited classification of negative targets. Given that representations of the self are highly interconnected with representations of others (Andersen & Chen, 2002; A. Aron et al., 1992; Arthur Aron et al., 1991; Arthur Aron & Fraley, 1999; Baldwin, 1992; McNulty et al., 2014; Zayas et al., 2002), the finding that significant others trigger bivalence-priming offers some empirical evidence that implicit bivalence may also characterize the self.

Overview of Present Work

Despite widespread interest in implicit self-evaluations (Falk & Heine, 2015), to our knowledge, the hypothesis that the self automatically activates both positive and negative evaluations remains unexamined. Granted, research has discussed the cognitive and affective complexity of explicit judgments about the self-concept (Campbell et al., 1996; Greenwald & Banaji, 1989; Higgins, 1987; Klein & Loftus, 1988; Markus & Nurius, 1986; McConnell, 2011; Roberts & Donahue, 1994; Sui & Humphreys, 2015; Swann & Schroeder, 1995; Symons & Johnson, 1997). But the self-concept is different from self-evaluations (Baumeister, 1993; Brown, 2007; Campbell, 1990); for example, a person who thinks they are bad at math can still feel positively towards the self, and conversely, a person who thinks they are good at math can feel negatively towards the self. Additionally, research using self-report measures has assessed individual differences in the affective complexity of explicit self-evaluations (DeMarree et al., 2011; Riketta & Ziegler, 2006; Spencer-Rodgers et al., 2004; Zeigler-Hill, 2006). However, explicit self-evaluations, which reflect people's consciously held and stated feelings, differ from implicit evaluations, which reflect more spontaneous evaluations that may or may not be consciously accessible. In fact, the indirect and direct measures of self-evaluations often do not converge (Bosson et al., 2000; Rudolph et al., 2008; Zayas & Shoda, 2005), consistent with the

idea that they may reflect different aspects of self-evaluations.

Thus, the primary aim of the present work was to demonstrate that, for most people, the basic structure of implicit self-evaluations is bivalent: The self triggers positivity but, also triggers some negativity. Across all studies, we used the classic and well-established EPT (Fazio et al., 1986a; see Fazio & Olson, 2003 for a review) to assess the extent to which the self automatically elicits both positive *and* negative evaluations in memory. Specifically, Studies 1 and 2, with the latter preregistered, aimed to provide an empirical demonstration that the self triggers bivalent-priming, reflecting the activation of positive *and* negative implicit evaluations. As a comparison, these studies also aimed to provide a conceptual replication of past work (Fazio et al., 1986b; Zayas & Shoda, 2015) showing that a personally significant, liked attitude object triggers univalent-priming, reflecting the activation of positive but inhibition of negative evaluations. Study 3 aimed to rule out alternative explanations and provide evidence that the bivalent-priming effect is not simply the consequence of self primes triggering arousal or alertness.

Study 4 summarizes the results of meta-analyses of all the available data estimating the strength and robustness of positive and negative implicit self-evaluations. Moreover, following calls to assess the extent to which psychological processes show heterogeneity, our meta-analyses also estimated the heterogeneity in the strength of positive and negative implicit self-evaluations (Bolger et al., 2019; Whitsett & Shoda, 2014; Zayas et al., in press). Naturally, these analyses speak to the presence of *individual differences*. Even if the self triggers positive and negative implicit self-evaluations for most people, do some individuals possess stronger (or weaker) evaluations? And do individual differences in implicit self-evaluations relate to other individual difference measures? Across studies, we collected measures of explicit self-evaluations (Studies 1-3), as well as personality traits relevant to the self-construct, such as narcissism, consciously

experienced self-ambivalence, and explicit self-esteem (Study 2). We, therefore, capitalized on all the available data to provide a high-powered assessment of the extent to which individual differences in implicit evaluations, as assessed with the EPT, correlate with explicit self-evaluations as well as personality measures. We also examined the reliability of the EPT. In the General Discussion, we discuss the implications of the findings for understanding both shared and unique aspects of the personality system, as well as implications for the conceptualization and measurement of implicit self-evaluations.

For all studies, we obtained approval from the Institutional Review Board for human participants (protocol no. 09-07-558) and written informed consent from all participants. We report all studies that have been conducted to test the hypothesis that priming the self activates positive *and* negative implicit evaluations.¹ Additionally, all measures and manipulations are reported in the manuscript and will be available at OSF upon publication [URL to be included upon publication]. No data were excluded, unless otherwise specified.

Study 1

The main goal of Study 1 was to provide an initial test of the hypothesis that the mental representation of the self automatically activates both positive *and* negative evaluations. The evaluative priming task (EPT; Fazio et al., 1986a) was used to assess the extent to which priming participants with their own names subsequently facilitated or inhibited the classification of positively and negatively valenced target words. To establish a standard with which to compare self-evaluations, the EPT was also used to assess the evaluations elicited by priming participants with the name of a self-nominated, personally significant, liked attitude object. Maintaining

¹ Ongoing work is examining the coexistence of positive and negative implicit self-evaluations across cultures, how experimentally manipulating situational contexts affects implicit self-evaluations, as well as neural correlates of implicit self-evaluations. This work is in progress and focuses on questions outlined in the future directions.

consistency across the two prime conditions in the process of generating the prime word was an important feature of the experimental design, given that the act of generating a prime word may increase the value of the attitude object, the fluency of the prime word, and affect other psychological processes that could potentially lead to differential performance on the EPT (Cohen et al., 2017). Additionally, by asking participants to generate a personally significant, liked attitude object, we kept the personal significance similar across the two prime conditions. Thus, because both the self and object primes were self-generated and personally significant, differences in the evaluations elicited by them, as measured by the EPT, are unlikely to arise from differences in how the primes were generated.

Study 1 was expected to provide a replication of past work (Fazio et al., 1986; masked for review) wherein liked attitude objects trigger univalent-priming; i.e., facilitate the classification of positive target words but inhibit the classification of negative target words. The focal hypothesis, however, centered around the pattern of results for self-primes. If the evaluations triggered by the self are similar to those of liked attitude objects, then self-primes should facilitate the classification of positive target words but inhibit the classification of negative target words. Indeed, if the self is imbued with more positivity than a liked object, then the pattern of univalent-priming could be even more pronounced, resulting in greater facilitation of positive targets and greater inhibition of negative targets. But, if the self is more affectively complex, then self-primes should trigger bivalent-priming. Specifically, we hypothesized that priming the self would facilitate the classification of both positive *and* negative targets.

Method

Participants

Forty-two participants from a large northeastern university in the United States completed

the study in exchange for course credit. One individual was excluded for not following instructions (i.e., in the object condition, the participant named a person (“mom”) instead of an object). Thus, the final sample consisted of 41 individuals (33 female; $M_{\text{age}} = 19.85$ years, $SD_{\text{age}} = 1.17$ years). Participants self-reported their ethnic and racial identities as follows: 76% White, 22% Asian or Asian American, 2% Black or African American, 2% Hispanic/Latino, and 2% other ethnicities. The experimental design was a 2 (prime type: self vs. object) $\times$ 2 (target valence: positive vs. negative) within-subjects ANOVA. Two main statistical tests were used to provide evidence of the primary hypothesis. First, a one-sample *t*-test was used to examine the extent to which the self facilitated classification of negative targets. Additionally, a *paired t*-test was used to examine the extent to which the self facilitated classification of negative targets more than the liked-object prime, which was expected to clearly elicit positive evaluations. Given that Study 1 was the first attempt to examine the extent to which the self facilitated the classification of negative targets, there was no data available about the size of the effect. Still, previous work (masked for review) examining the extent to which significant other primes facilitate the classification of negative targets has found that, across two studies, the effect size was medium (Cohen’s $d = .5$). Using this information, a study with a sample size of 41 affords .88 statistical power to detect a comparable effect size ($d = .5$) using a two-tailed *paired t*-test and alpha of .05. A sensitivity analysis showed that with these same parameters the present study could detect an effect size as small as $d = .41$ with .80 statistical power.

Measures and Procedure

Overview of Procedures. Upon arrival at the lab, participants were greeted by a research assistant and seated at a computer. All measures were administered on a Windows computer running Inquisit psychological software (build 3.0.3.2). Following procedures used by (masked

for review), participants first answered questions to generate stimuli later used as primes in the two evaluative priming tasks. Participants then completed two evaluative priming tasks (one for the self and one for the liked object), followed by demographic questions (i.e., age, sex, gender, year in school, ethnicity, race, whether English was the native language, and major) and self-report measures of explicit evaluations towards the self and the liked object (described in the Method section of Study 4). At the end of the session, participants were debriefed.

Generating Prime Stimuli for Evaluative Priming Tasks (EPT). To generate self-primes, participants were prompted to type in their first name. Names have been used successfully in previous work to prime the self (Turk et al., 2008) and in various implicit measures of self-evaluation (Greenwald & Farnham, 2000; Zayas & Shoda, 2005). To generate liked, personally significant object primes, participants were instructed to type a word that refers to a liked object, which was defined as “*any THING in your life that you feel strongly about (e.g., a puppy). ‘Object’ could also refer to an activity that you feel both strongly and positively about, a strong food preference (e.g., you may really enjoy chocolate), or a significant place (e.g., your hometown), but this should not include a person.*”

Assessing Implicit Self and Object Evaluations: EPTs. Participants then completed two EPTs in succession: the *self-EPT* and the *object-EPT*, with the order of completion counterbalanced across participants.² Prior to the first EPT, participants completed a 16-trial practice block in which the prime was either a neutral word (“*GLOVE*”) or nonword letter string (“*NNN*”). Participants were instructed to respond quickly (i.e., keeping response times under 1000 ms) and accurately (i.e., keeping average accuracy rate above 80%). Following Fazio et al.’s

² There was a statistically significant unpredicted prime type by order of completion interaction, $F(1, 39) = 5.22$, $p = .028$, $\eta_p^2 = .12$. We therefore performed all analyses on each order separately. Critically, irrespective of the order in which the tasks were completed, self-primes facilitated the classification of negative targets more than object primes, $ps < .003$.

(1986a) original procedures (see also Bar-Anan & Nosek, 2014), participants were also instructed to hold the first word (prime) in memory and to recite it aloud after categorizing the target. They were told that their audible responses would be monitored for accuracy. Participants repeated the practice block until they met the stated performance standard.

In the self-EPT, a single trial consisted of the following: (a) a prime (in uppercase letters), which was either the participant's own name or a letter string ("GGG" or "RRR") for 200 ms; (b) a blank screen for 100 ms; and (c) a target word (in lowercase letters), which was either positive (i.e., *honor, lucky, diamond, loyal, freedom, rainbow, love, honest, peace, heaven*) or negative (i.e., *evil, cancer, sickness, disaster, poverty, vomit, bomb, rotten, abuse, murder*). The target remained on the screen until participants categorized it as pleasant or unpleasant. The self-EPT consisted of two data-collection blocks with 40 such trials; all combinations of prime and target were presented an equal number of times.

The object-EPT was identical to the self-EPT, except that the name of the liked object (instead of the self) served as the prime stimulus. We counterbalanced the letter string used in the self- and object-EPTs. For half of the participants, the self-EPT contained the letter string *GGG*, and the object-EPT contained *RRR*; for the other half of the sample, the letter string assignments were reversed. Likewise, we counterbalanced the response key assignment, such that half of the participants performed the EPT with pleasant assigned to the left response key and unpleasant to the right, and the remaining half of the sample performed the EPT with the opposite response key assignments.

Data Reduction and Analyses

Data Reduction. Following standard procedures for reaction time (RT) (Greenwald et al., 1998) and procedures used in previous work using the EPT (masked for review), we excluded the

first two trials within each block, trials that were incorrectly categorized, and trials with RTs outside the normal range of time needed to categorize a single trial (<150 ms or $> 4,999$ ms). Of the remaining trials, those with RTs below 300 ms and above 3,000 ms were recoded to 300 ms and 3,000 ms, respectively. RTs were transformed into log units, and all analyses were performed on log-transformed RTs (RTs transformed back to milliseconds from log-transformed units are reported for illustrative purposes). On average, across the two EPTs, participants had average RTs of 689 ms (range 475 ms to 1026 ms), while maintaining high levels of accuracy (average accuracy rate of 96% (range 84 to 99%)).

Finally, following prior work using the EPT (Fazio et al., 1986a), we derived measures of the extent to which each concept of interest (object and self) facilitated (vs. inhibited) the classification of subsequently presented targets. To quantify facilitation-inhibition scores of positive targets, we subtracted the average RT for the *valenced prime (self or object) $\rightarrow$ positive target* trials from the average RT for the *letter string $\rightarrow$ positive target* trials. Similarly, to quantify facilitation-inhibition scores of negative targets, we subtracted the average RT for the *valenced prime (self or object) $\rightarrow$ negative target* trials from the average RT for the *letter string $\rightarrow$ negative target* trials. Thus, each participant was characterized by four facilitation-scores, one for each prime by target valence combination (e.g., self $\rightarrow$ negative facilitation-inhibition score).

Data Analytic Strategy. The facilitation-inhibition scores were the dependent variable in all analyses. Our focal test was a *paired t*-test examining differences between self- and liked-object primes on facilitation-inhibition scores of negative targets. For completeness, we also report the analogous *paired t*-test on facilitation-inhibition scores of positive targets, and the results of a repeated-measures ANOVA with prime type (self vs. object) and target valence (positive vs. negative) as the within-person factors.

Results

Implicit Self- and Object-Evaluations

The results replicated past work (Fazio et al., 1986a). As shown in Figure 2 (panel A), liked-object primes facilitated the classification of positive targets, $t(40) = 4.30, p < .001, M = 77$ ms, $SD = 122$ ms, 95% CI [38 ms 116 ms], $d = .67$, and inhibited the classification of negative targets, $t(40) = -2.30, p = .03, M = -22$ ms, $SD = 82$ ms, 95% CI [-48 ms 4 ms], $d = .36$.³ Importantly, the results drastically differed for self-primes. Priming participants with their own names facilitated the classification of positive targets, $t(40) = 9.17, p < .001, M = 93$ ms, $SD = 73$ ms, 95% CI [70 ms 116 ms], $d = 1.43$, but, critically, self-primes also facilitated the classification of negative targets, $t(40) = 3.15, p = .003, M = 28$ ms, $SD = 61$ ms, 95% CI [9 ms 48 ms], $d = .49$.

Directly comparing the evaluations elicited by the self to those elicited by a self-nominated, liked object revealed that self-primes facilitated the processing of negative targets to a greater extent than did liked-object primes, *paired* $t(40) = 4.39, p < .001, M_{diff} = 50$ ms, $SD_{diff} = 86$ ms, 95% CI [23 ms 77 ms], $d = .69$. The two types of primes facilitated the classification of positive targets to similar extents, *paired* $t(40) = 1.13, p = .264, M_{diff} = 16$ ms, $SD_{diff} = 123$ ms, 95% CI [-23 ms 55 ms], $d = .18$. There was also a statistically significant main effect of prime type, $F(1, 40) = 14.82, p < .001, \eta^2 = .27$, and target valence, $F(1, 40) = 31.95, p < .001, \eta^2 = .44$, with the latter reflecting that participants were faster to categorize positive (vs. negative) target words. There was no statistically significant prime-by-target interaction, $F(1, 40) = 2.72, p = .107, \eta^2 = .06$.

³ RTs and associated confidence intervals are displayed in milliseconds for illustrative purposes. However, all analyses were performed on log-transformed RTs following standard procedures (Bar-Anan & Nosek, 2014, p.; Greenwald et al., 1998; Zayas & Shoda, 2015).

Figure 2. Bars represent facilitation-inhibition scores (milliseconds) for liked-object primes and self-primes as a function of target valence (positive vs. negative) for Study 1 (left panel) and Study 2 (right panel). Error bars represent 95% CI. Positive numbers indicate that primes facilitated classification of target words, whereas negative numbers indicate that primes inhibited classification of target words. Means and SEs used to derive the 95% CIs were computed using log-transformed RTs and transformed back to milliseconds for illustration.

Next, for descriptive purposes (Tukey, 1977), we examined the prevalence of possessing negative implicit self-evaluations within our participant sample. Specifically, we classified each person as possessing (or not) negative self-evaluations according to whether their facilitation-inhibition scores for negative targets was greater than zero (coded as 1, reflecting evidence of negative self-evaluations) or was equal to or less than zero (coded as 0, reflecting absence of negative self-evaluations). As a comparison, using an analogous approach, we classified each person as possessing (or not) negative evaluations for the self-nominated liked object. Self-primes facilitated the classification of negative targets for the majority (63.4%), which was statistically

different from the distribution for liked-object primes, which facilitated the classification of negative targets for 34.1% of the sample (McNemar's nonparametric test, $p = .008$). Neither distribution differed from a 50/50 distribution (for self-primes: $p = .118$; for liked-object primes: $p = .061$).

Discussion

Study 1 provides initial empirical support for the hypothesis that the self spontaneously activates both positive *and* negative evaluations. As found in previous work (Fazio et al., 1986a), when priming participants with a personally significant, liked object, Study 1 replicated the typical pattern of univalent-priming: Participants were faster at classifying subsequently presented positive targets and slower at classifying subsequently presented negative targets. In contrast, when primed with the self, participants demonstrated bivalent-priming: they were faster at classifying positive targets and also faster at classifying negative targets. Importantly, because both prime words were personally significant and self-generated, differences in the effects of self (vs. liked object) primes cannot be attributed to differences in how the prime words were generated.

Collectively, the present findings provide support for implicit self-bivalence. However, one might ask whether the letter-string primes used as a baseline to compute the facilitation-inhibition scores were truly affectively neutral. Letter strings have been used effectively as a comparison condition in past research (de Liver et al., 2007; Fazio et al., 1986a; Zayas & Shoda, 2015). Still, a reasonable concern is that the observed differences in self and object implicit evaluations, as reflected by the facilitation-inhibition scores, reflect differences in participants' evaluations of the letter-string primes used as the comparison, rather than the self- vs. object-primes.⁴ Study 2 directly

⁴ This possibility is unlikely for two reasons. The specific letter-string primes used as comparisons were equated by counterbalancing the stimuli across the self- and object-EPTs. Moreover, RTs for trials with letter-string primes did not differ significantly as a function of whether they were presented in the self- or the object-EPT ($ps > .224$).

addressed this concern by assessing evaluations elicited by the self and liked object compared to the same letter-string primes.

Study 2

We conducted a preregistered study (https://osf.io/pmex8/?view_only=86c1cb3e988a47ddbff9bcde2d4aa196) to more stringently test the hypothesis that the self activates positive *and* negative implicit evaluations.⁵ Similar to Study 1, the EPT was used to assess evaluations of the self as positive and negative, and the self-nominated liked object again served as a comparison. However, whereas in Study 1, the self- and liked-object primes were assessed in different EPTs, in Study 2, evaluations of the self and liked object were assessed in the same EPT. This change offered a direct comparison of evaluations triggered by the self and objects. Study 2 aimed to replicate the pattern of results found in Study 1. More specifically, self-primes were expected to facilitate the classification of positive *and* negative targets, whereas liked-object primes were expected to only facilitate the classification of positive targets and inhibit the classification of negative targets.

Method

Participants

Two hundred and twenty-six participants were recruited at a large northeastern university in the United States in exchange for course credit. Following procedures for exclusions described the preregistration, we excluded two participants who performed at least 3 SDs either below the

⁵ Prior to Study 2, a similar study (preregistered; URL for review purposes: https://osf.io/6wpa8/?view_only=348c9c1e8efb4491873b2083a1934476) was conducted. Although the aim was to run 60 participants, because of a coding error, data for only 53 participants were obtained. The results were highly similar to those reported here; priming the self led to facilitation of negative target words, whereas priming with a liked object led to inhibition. However, the one-sample *t*-tests for both self- and liked-object primes failed to reach statistical significance (see SOM for a full report of the results). Therefore, the study design was rerun, but estimating a smaller effect size and thus recruiting a larger sample of participants.

mean on accuracy or above the mean on reaction times. This left a sample of 224 individuals (169 female; $M_{\text{age}} = 19.49$ years, $SD_{\text{age}} = 1.30$ years) who self-reported their ethnic and racial identities as follows: 51% White, 37% Asian or Asian American, 15% Black or African American, 17% Hispanic/Latino, and 7% other races/ethnicities. The experimental design was a 2 (prime type: self vs. object) $\times$ 2 (target valence: positive vs. negative) within-subjects ANOVA. As in Study 1, we first examined the extent to which the self facilitated classification of negative targets, which was assessed using a one-sample *t*-test. We also examined the extent to which the self facilitated classification of negative targets more than the liked-object prime using a repeated-measures *t*-test. Study 1 showed a medium effect size (Cohen's $d = .49$) for self-primes facilitating the classification of negative targets. With a sample size of 224, we had .99 statistical power to detect a medium effect size (Cohen's $d = .5$) using a two-tailed *paired t*-test and α of .05. A sensitivity analysis showed that with these same parameters, our study could detect an effect size as small as $d = .19$ with .80 statistical power.

Measures and Procedure

All procedures and measures were identical to those of Study 1, except in two ways. First, participants completed one EPT that included both self- and liked-object primes, administered on a Windows computer running Inquisit psychological software (build 5.0.14.0). After a 16-trial practice block (see Methods of Study 1), participants completed three 48-trial data collection blocks during which each prime (self, liked object, and two letter-string primes) was presented with positive and negative targets an equal number of times. To ensure that the results were not dependent on the specific letter string, two sets of letter strings were used (*RRR* and *GGG*, and *MMM* and *BBB*) and counterbalanced across participants. The response key assignment was also counterbalanced across participants. Second, participants completed individual differences

measures to assess experienced self-ambivalence, explicit self-esteem, and narcissism (see Study 4 Method section for details). Half of the participants completed these individual differences measures prior to the EPT, and the remaining half of the sample after the EPT.

Data Reduction and Analyses

All procedures for handling RT data, computing facilitation-inhibition scores, and analyzing the data were identical to procedures used in Study 1. Participants had average RTs of 738 ms (range 423 to 1389 ms), while maintaining high levels of accuracy (average accuracy rate of 96% (range 80 to 100%)).

Results

Implicit Self-Evaluations

The overall pattern of results for liked-object primes and self-primes were highly similar to the pattern observed in Study 1. As shown in Figure 2 (panel B), liked-object primes facilitated the classification of positive targets, $t(223) = 7.40, p < .001, M = 42 \text{ ms}, SD = 94 \text{ ms}, 95\% \text{ CI } [30 \text{ ms } 55 \text{ ms}], d = .49$, and inhibited the classification of negative targets, $t(223) = -4.12, p < .001, M = -22 \text{ ms}, SD = 85 \text{ ms}, 95\% \text{ CI } [-33 \text{ ms } -11 \text{ ms}], d = .28$. Importantly, the results were drastically different for self-primes. Priming participants with their own names facilitated the classification of positive targets, $t(223) = 16.52, p < .001, M = 95 \text{ ms}, SD = 96 \text{ ms}, 95\% \text{ CI } [83 \text{ ms } 108 \text{ ms}], d = 1.10$. Critically, self-primes also facilitated the classification of negative targets, $t(223) = 2.96, p = .003, M = 17 \text{ ms}, SD = 85 \text{ ms}, 95\% \text{ CI } [6 \text{ ms } 28 \text{ ms}], d = .20$.

Directly comparing the evaluations triggered by the self to those triggered by a self-nominated, liked object revealed that self-primes facilitated the processing of negative targets to a greater extent than did liked-object primes, *paired* $t(223) = 7.036, p < .001, M_{diff} = 39 \text{ ms}, SD_{diff} = 88 \text{ ms}, 95\% \text{ CI } [27 \text{ ms } 51 \text{ ms}], d = .47$. Self-primes also facilitated the classification of positive

targets to a greater extent than did liked-object primes, *paired t*(223) = 10.85, $p < .001$, $M_{diff} = 53$ ms, $SD_{diff} = 78$ ms, 95% CI [43 ms 63 ms], $d = .73$. There were also statistically significant main effects of prime type, $F(1, 223) = 135.59$, $p < .001$, $\eta^2 = .38$, and target valence, $F(1, 223) = 131.92$, $p < .001$, $\eta^2 = .37$, with the latter reflecting that participants were faster to categorize positive (vs. negative) target words. Finally, the prime by target interaction was statistically significant, $F(1, 223) = 5.71$, $p = .018$, $\eta^2 = .025$, reflecting that the difference in positive vs. negative implicit evaluations was greater for self-primes than liked-object primes.

As in Study 1, for descriptive purposes, we examined the percentage of the sample that showed any evidence of possessing implicit self-negativity. Again, we classified participants as possessing (or not) negative self-evaluations according to whether their facilitation-inhibition scores were greater than zero or equal to/less than zero. Self-primes facilitated the classification of negative targets for the majority of participants (60.7%), which was significantly different from a 50/50 distribution (McNemar's nonparametric test, $p < .001$). It also significantly differed from the distribution observed for liked-object primes, which facilitated the classification of negative targets for a minority (36.6%; McNemar's nonparametric test, $p < .001$).

Discussion

Study 2 provides stronger empirical support for the hypothesis that the self spontaneously activates both positive *and* negative evaluations. More specifically, whereas implicit self-evaluations are traditionally assumed to be wholly positive, a preregistered study replicated the key finding: priming the self not only facilitated the classification of positive target words, reflecting implicit self-positivity, but also facilitated the classification of negative target words, reflecting implicit self-negativity. Moreover, whereas self-primes elicited bivalent (positive and negative) implicit evaluations, liked-object primes elicited univalent (only positive) implicit

evaluations. Importantly, because facilitation-inhibition scores of self- and liked-object primes were computed using the *same* letter-string primes, the findings of Study 2 provide strong evidence that differences between the self and a liked object are not due to peculiarities of the letter strings used as comparison primes. Overall, the findings support the hypothesis that the self triggers both positive *and* negative evaluations, and not wholly positive evaluations such as the univalent positive evaluations elicited by personally significant, liked objects.

The results of Study 2 provide empirical support for the hypothesis that the self triggers at least some negativity. Nonetheless, the possibility remains that the bivalent-priming effect triggered by self-primes reflects processes other than the activation of positive and negative evaluations. Theoretical models of emotion postulate that arousal is a key component of emotion (Lang et al., 1997), and possibly even more potent in affective processing than valence (Hinojosa et al., 2009). Thus, if self-primes are more arousing, this heightened arousal may facilitate performance on any task, including the EPT. Research on the factors that affect performance on priming tasks, however, have found that the arousal level of primes does not affect priming effects (Hinojosa et al., 2009). Still, priming the self may automatically capture attention, akin to the classic “cocktail” effect (Cherry, 1953; Wood & Cowan, 1995), which may in turn facilitate performance (Bargh, 1982; Gray et al., 2004; Moray, 1959; Shapiro et al., 1997). In Study 3, we examined the empirical viability of these alternative hypotheses.

Study 3

Studies 1 and 2 provide empirical evidence supporting the hypothesis that priming the self activates positive and negative evaluations simultaneously. But might these findings simply reflect that priming the self triggers heightened arousal or alertness? According to these alternative accounts, the self spontaneously activates positivity but not negativity, similar to the evaluations

elicited by a liked object. Thus, in the EPT, positive targets are conceptualized as *congruent* with respect to the valence of the self-primers, whereas negative targets are conceptualized as *incongruent*. From such a perspective, the reason that self-primers facilitate the classification of negative (incongruent) targets is simply because self-primers trigger arousal or alertness, which enhances performance on this simple classification task. If such characterizations are valid, then we would expect self-primers to facilitate the classification of other incongruent target words, not just negatively valenced words. That is, if priming the self facilitates classifications of target words in general, then priming the self should also facilitate the classification of target words that are incongruent with the self representation on a different dimension.

To investigate the plausibility of these alternative explanations, Study 3 examined whether self-primers facilitate performance on a non-valence classification task. Participants completed two priming tasks (PT): an *EPT* (similar to Study 1) that assessed the extent to which the self facilitated (vs. inhibited) classification of positive and negative targets and a *gender priming task (GPT)* that assessed the extent to which the self facilitated (vs. inhibited) classification of gender-congruent and -incongruent targets. The key test of our hypothesis in Study 3 is whether self-primers facilitate classification of negatively valenced stimuli to a greater extent than gender-incongruent stimuli. If the bivalent-priming triggered by the self reflects that heightened arousal and alertness, then the pattern of results in the GPT should mirror the pattern observed in the EPT. In other words, self-primers should facilitate classification of words that are congruent with one's gender identity *and* facilitate classification of words that are incongruent with one's gender identity. However, if the bivalent-priming effect reflects the affective complexity of the self, as we propose, then the pattern of results in the GPT should differ from the pattern observed in the EPT. That is, self-primers should facilitate the classification of positive *and* negative target words on the EPT, but self-primers should

only facilitate the classification of gender-congruent target words and inhibit the classification of gender-incongruent target words on the GPT.

Method

Participants

One hundred and seventy-seven participants (121 female) received course credit for their participation. Because all participants met the performance requirement for inclusion, no participants were excluded. Participants self-reported their ethnic and racial identities as follows: 60% White, 38% Asian or Asian American, 7% Black or African American, 9% Hispanic/Latino, and 3% other ethnicities. The experimental design was a 2×2 repeated measures with target (congruent vs. incongruent with respect to the prime) and task (valence vs. gender-EPT) as within-person factors. As in Studies 1 and 2, we first used a one-sample *t*-test to examine the extent to which the self facilitated classification of negative targets, and a *paired t*-test to examine the extent to which the self facilitated classification of negative targets more than gender-incongruent targets. We predicted that self-primes would facilitate classification of negative targets and do so to a greater extent than gender-incongruent targets. With a sample size of 177, we had .99 statistical power to detect a medium effect size (Cohen's $d = .5$) using a two-tailed *paired t*-test and alpha of .05. In addition, for analyses involving correlations among implicit and explicit measures, we had 99% statistical power to detect a medium correlation ($r = .30$) using a two-tailed test and alpha of .05. A sensitivity analysis showed that with these same parameters, our study could detect an effect size as small as $r = .21$ with .80 statistical power.

Measures and Procedures

Overview. All measures were administered on a Windows computer running Inquisit psychological software (build 4.0.8.0). Procedures were highly similar to those used in Study 1.

Participants first typed their first names, which were then used as self-prime stimuli in the two priming tasks that followed. They then completed the EPT, which assessed self-evaluations (as in the EPT in Study 1), and the gender priming task (GPT), which assessed self-gender associations. Finally, participants completed self-report measures to assess demographic information and explicit evaluations towards the self (as in Study 1). Participants also completed self-report measures to assess their gender identity (“*female*,” “*male*,” “*other*”), as well as biological sex, and to assess their explicit gender-associations (described in the Method section of Study 4).

Assessing Implicit Self-Evaluations and Self-Gender Associations. The procedures for the EPT and GPT were identical to those used in Study 1 except for the following: To keep the number of target words equal in both priming tasks, we used 8 positive (all positive target words from Study 1 except for *diamond* and *heaven*) and 8 negative target words (all negative words from Study 1 except for *cancer* and *abuse*). The GPT has been used in previous work (Fiedler et al., 2011; Zayas, Greenwald, et al., 2011; Zayas & Shoda, 2015), and was identical to the EPT except that the target words were unambiguously female (i.e., *woman*, *girl*, *daughter*, *Ms.*, *Miss*, *female*, *gal*, *lady*) or male (i.e., *man*, *boy*, *son*, *Mr.*, *Mister*, *male*, *guy*, *sir*) in meaning. As in Study 1, we counterbalanced the order of response key assignments, and the letter strings used (*RRR*, *GGG*). Additionally, we counterbalanced the order of the two priming tasks (EPT and GPT).⁶ Because each priming task involved classifying target words on different dimensions (valence vs. gender), participants performed a 16-trial practice block before each task. Following the practice block (using *GLOVE* or *NNN*, as primes), they completed two 32-trial blocks for data collection.

Data Reduction and Analyses

For both priming tasks, we followed the same procedures for handling RT data. Across the

⁶ There was no main effect or interactions with the order that the two EPTs were performed ($ps > .21$).

two tasks, participants had average RTs of 698 ms (range = 435-1210 ms; $SD = 149$ ms) and maintained high levels of accuracy (average accuracy rate of 97% (range = 83-100%; $SD = 2.7\%$)). For the EPT, we computed facilitation-inhibition scores of positive and negative targets following the same procedures used in Study 1. For the GPT, we first coded whether the target was congruent or incongruent with respect to the participant's gender.⁷ For example, for female participants, we treated *self* → *female* trials as congruent and *self* → *male* trials as incongruent, and vice versa for male participants. Then, we quantified facilitation-inhibition scores of gender-congruent targets by subtracting the average RT for the *self-prime* → *gender-congruent target* trials from the average RT for the *letter string* → *gender-congruent target* trials. Similarly, we quantified facilitation-inhibition scores of gender incongruent targets by subtracting the average RT for the *self-prime* → *gender-incongruent target* trials from the average RT for the *letter string* → *gender-incongruent target* trials.

Results

Implicit Self-Evaluations and Gender-Associations

As shown in Figure 3, results of the EPT replicated those of Study 1. Priming the self facilitated the classification of positive targets, $t(176) = 12.52$, $p < .001$, $M = 77$ ms, $SD = 92$ ms, 95% CI [63 ms 90 ms], $d = .94$. Priming the self also facilitated the classification of negative targets, $t(176) = 4.36$, $p < .001$, $M = 26$ ms, $SD = 87$ ms, 95% CI [13 ms 39 ms], $d = .33$.

However, the aim of Study 3 was to examine whether the pattern of results in the GPT differs from the pattern observed in the EPT. As expected, self-primes facilitated classification of gender-congruent targets, $t(176) = 11.58$, $p < .001$, $M = 75$ ms, $SD = 111$ ms, 96% CI [61 ms 89 ms], $d = .87$. But, critically, self-primes did *not* significantly facilitate classification of gender-

⁷ We also asked participants to report on their gender. The two responses showed 100% agreement.

incongruent targets; in fact, the pattern of results, although not statistically significant, indicated inhibition, $t(176) = -.16$, ns , $M = -2$ ms, $SD = 85$ ms, 95% CI [-14 ms 11 ms], $d = -.01$.

Figure 3. Bars represent the facilitation-inhibition scores (milliseconds) for self-primers in the evaluative priming task (EPT; left) and self-primers in the gender priming task (GPT; right) as a function of target congruency (congruent vs. incongruent). Error bars represent 95% Confidence Intervals (CI). Positive numbers indicate that primes facilitated target classification. Negative numbers indicate that primes inhibited target classification. Means and SEs used to derive the 95% CI were computed using log-transformed RTs and were transformed back to milliseconds for illustration.

To directly compare performance across the EPTs and GPTs, we coded trial type as congruent vs. incongruent. Specifically, for the EPT, given the prevalent assumption that the self is positive, we treated *self* → *positive* trials as congruent and *self* → *negative* trials as incongruent. For the GPT, we coded congruency (vs. incongruency) based on each participant's self-reported sex, as previously mentioned (see Data Reduction in Method section).

A paired t -test revealed that on incongruent trials (i.e., trials in which the self was followed

by negative targets on the valence-EPT and the self was followed by gender-incongruent targets on the gender-EPT), self-priming facilitated classification of negative targets to a greater extent than for gender-incongruent targets, $t(176) = 3.57, p < .001, M_{diff} = 28 \text{ ms}, SD_{diff} = 111 \text{ ms}, 95\% \text{ CI} [11 \text{ ms } 44 \text{ ms}], d = .27$. On congruent trials (i.e., trials in which the self was followed by positive targets on the EPT and the self was followed by gender-congruent targets on the GPT), facilitation-inhibition scores between the two tasks did not significantly differ, $t(176) = .06, ns, M_{diff} = 2 \text{ ms}, SD_{diff} = 109 \text{ ms}, 95\% \text{ CI} [-15 \text{ ms } 18 \text{ ms}], d = .01$. A repeated measures ANOVA with task (valence vs. gender) and trial type (congruent vs. incongruent) as the within-subject factors revealed a task $\times$ trial-type interaction, $F(1,176) = 6.41, p = .012, \eta^2 = .04, d = .38$;⁸ a main effect of task, $F(1,176) = 6.44, p = .012, \eta^2 = .04, d = .38$ (reflecting that self-priming facilitated performance more so on the EPT compared to GPT); and a main effect of target, $F(1,176) = 106.84, p < .001, \eta^2 = .38, d = 1.56$ (reflecting greater facilitation of congruent than incongruent targets).

Lastly, similar to Studies 1-2, for descriptive purposes, we examined the extent to which participants within our sample demonstrated implicit self-negativity. Following the same approach as in Studies 1 and 2, participants were classified as possessing (or not) negative self-evaluations. As a comparison, each participant was also classified as possessing (or not) gender-incongruent self-evaluations. Similar to the pattern of results observed in Studies 1 and 2, self-priming facilitated the classification of negative targets for 65% of participants, which was significantly different from a 50:50 distribution. This percentage was also significantly greater than the 50.3% of the sample for whom the self-priming facilitated the classification of gender-incongruent targets (McNemar's

⁸ To examine if the results varied as a function of participants' sex, we repeated the analyses with participant sex as a between-subjects factor. There was no statistically significant three-way interaction between task, trial type, and sex, $F(1,175) = .47, ns$. Moreover, one-sample t -tests confirmed that self-priming facilitated the classification of negative targets, compared to the constant of zero, for females, $t(120) = 2.11, p = .037$, and males, $t(55) = 5.52, p < .001$. Additionally, we confirmed that self-priming facilitated the classification of negative targets more so than gender incongruent targets for both females, $t(120) = -2.597, p = .011$, and males, $t(55) = -2.58, p = .013$.

Test, $p = .004$).

Discussion

Study 3 provides a conceptual replication of the bivalent structure of implicit self-evaluations: Primes referring to the self facilitated classification of both positive *and* negative targets, in line with the hypothesis that the self activates positive and negative evaluations. In contrast, in a gender priming task (GPT), self-primes only facilitated the classification of target words that were congruent with one's gender identity but did not facilitate the classification of target words that were incongruent with one's gender identity. Indeed, a direct test showed that self-primes facilitated the classification of negative targets to a greater extent than incongruent gender targets.

The present findings provide important evidence against alternative accounts. Specifically, both the EPT and GPT used *identical* self-primes; the only difference between the tasks was the nature of the target classification. In the EPT, participants classified unambiguously valenced targets as positive versus negative, and in the GPT, participants classified targets that had clear gender connotations as male versus female. Thus, if the bivalent-priming effect resulted from self-primes eliciting general facilitation (e.g., triggered by arousal or alertness), self-primes should have also facilitated performance on the GPT regardless of prime-target congruency. This was not the case. Self-primes did not produce overall facilitation of the target classification in the gender-EPT. Similarly, if the bivalent-priming effect reflected the fact that representations of self are central in a person's network and activate other concepts, the self should have primed the processing of a variety of attributes, including gender. But, again, this pattern was not observed. Finally, the results did not support a response-facilitation account, in which arousal enhances a dominant response (Allen, Kenrick, Linder, & McCall, 1989). If the dominant automatic

evaluation associated with the self was wholly positive, then facilitation of this response would have led to greater inhibition of negative target words. Instead, priming the self facilitated the classification of negative targets. In sum, the findings of Study 3 further support the hypothesis that the self is associated with some negativity, and that the observed bivalent-priming effect triggered by priming the self is not simply due to an alerting or arousal response.

Study 4

In Study 4, we conducted meta-analyses of all the available data with several goals in mind. First, we examined the robustness of our main finding—that the self triggers bivalent-priming. Specifically, we aimed to more precisely estimate the extent to which self-priming triggers both positive and negative evaluations by capitalizing on the large number of participants ($N = 495$) across all studies. These analyses also evaluated the heterogeneity of implicit self-evaluations (Bolger et al., 2019; Whitsett & Shoda, 2014; Zayas et al., in press). That is, to what extent do individuals differ from one another in the strength of their positive and negative implicit self-evaluations? Along these lines, we also examined the extent to which *individual differences* in implicit self-evaluations relate to theoretically relevant explicit measures. In all studies, participants completed measures to assess their explicit self-evaluations. Additionally, in Study 2, participants also completed measures of personality assumed to be relevant to self-evaluations: specifically, explicit self-esteem (Rosenberg, 1965), narcissistic personality (Raskin & Terry, 1988), and experienced self-ambivalence (i.e., the extent to which a person reports feeling mixed or conflicted feelings about the self), which is associated with lower explicit self-esteem (Baumgardner, 1990; Riketta & Ziegler, 2006; Zeigler-Hill, 2006). Thus, we capitalized on all the available data to examine, with high statistical power, the relationship between implicit and explicit evaluations, as well as the relationship between implicit self-evaluations and self-reported

measures of personality. As a comparison, we examined the relationship between implicit and explicit object-evaluations, and implicit and explicit self-gender associations.

Finally, Study 4 examined the reliability of the self-EPT. Broadly defined, reliability refers to the extent to which a measure produces consistent results under comparable testing conditions. These analyses were motivated by discussions focused on the reliability of the EPT, especially the self-EPT (Bosson et al., 2000; Falk et al., 2015; Falk & Heine, 2015; Gawronski et al., 2020; Gregg & Sedikides, 2010). Thus, we used all the available data to obtain estimates of the self-EPT's reliability. For these reliability analyses, we divided the EPT data into two halves (i.e., based on whether the trial was odd- or even-numbered). Specifically, we examined two aspects of reliability of interest to psychologists (Cronbach, 1957; Watson & Petrie, 2010). First, we examined the extent to which two halves of the same EPT lead to the same conclusion in terms of group-level effects (e.g., do both halves of the self-EPT show that performance on self → negative trials is facilitated?). Second, we examined the extent to which two halves of the same EPT lead to the same conclusion in terms of individual differences (e.g., to what extent does a participant who shows strong facilitation on self-negative trials for one half of the self-EPT also show strong facilitation on self-negative trials for the other half of the same self-EPT?).

Method

Measures and Procedure

After completing the EPTs, participants completed self-report measures, described below. Specifically, participants completed measures to assess explicit evaluations of self (Studies 1-3, $N = 495$), explicit evaluations of objects (Studies 1-2a, $N = 318$), subjective ambivalence (Studies 2

and 2a, $N = 277$), narcissism and self-esteem (Study 2, $N = 224$), and explicit associations of gender (Study 3, $N = 177$).

Explicit Evaluations towards Self and Liked Object. To assess explicit feelings toward the self and the liked object, participants completed two questions assessing explicit positive and negative evaluations: “*How strong are your POSITIVE feelings about yourself [this object]?*” and “*How strong are your NEGATIVE feelings about yourself [this object]?*” on a scale from 1 (*not at all*) to 9 (*extremely*).

Structural Ambivalence. Structural ambivalence refers to the extent to which the same object, person, or place is evaluated positively *and* negatively. We assessed structural ambivalence for each attitude object (self and liked object) by following the Thompson, Zanna, and Griffin, 1995 formula: $(P+N)/2 - |P - N|$, where P represents positive evaluations and N represents negative evaluations. For implicit structural ambivalence, we used self→positive and self→negative facilitation-inhibition scores to represent P and N, respectively. That is, we derived the average of the self→negative and self→positive inhibition-facilitation scores and then subtracted the absolute difference between the two components. For explicit structural ambivalence, we used explicit positive evaluations and explicit negative evaluations and applied the same formula.

Explicit Self-Gender Associations. Participants completed two items to assess explicit gender identity (“*How strongly do you identify as MASCULINE?*,” “*How strongly do you identify as FEMININE?*”), using a scale from 1 (*not at all*) to 9 (*extremely*) with 5 (*somewhat*) as the midpoint.

Experienced Self-Ambivalence. Following previous work (Baumgardner, 1990; Riketta & Ziegler, 2006; Zeigler-Hill, 2006), participants were asked to indicate the extent to which their beliefs and feelings about the self were: (1) *mixed*, (2) *contradictory*, (3) *consistent*, and (4)

unambiguous, using a 9-point Likert scale (1 = *not at all*, 9 = *extremely*). The latter two items were reverse-scored, such that higher scores uniformly reflected greater experienced ambivalence. Correlations among the first three items were high ($r_s > .551$), but correlations with ratings of “unambiguous” were weak ($r_s < .178$). Thus, only the first three items were averaged together to create a composite reflecting experienced self-ambivalence (Cronbach’s $\alpha > .82$).

Narcissistic Personality Inventory. The Narcissistic Personality Inventory (NPI; Raskin & Terry, 1988) that consists of forty paired items (e.g., “*I have a natural talent for influencing people. / I am not good at influencing people*”). Each narcissism-indicative response that participants endorsed received one point, for a maximum possibility of forty points (α s ranged from .78 to .92).⁹

Rosenberg Self-Esteem. Participants completed the Rosenberg (1965) self-esteem scale, in which participants indicated their agreement with 10 statements (e.g., “*I feel that I have a number of good qualities*”) on a scale from 1 (strongly disagree) to 7 (strongly agree; $\alpha = .89$).

Data Analytic Strategy

Meta-Analysis. Estimating Implicit Self-Bivalence. We first combined the data from all available studies (including data from Study 2a reported in the SOM to obtain an unbiased and conservative estimate of effect sizes; Rosenthal, 1979). We used multilevel modeling (MLM) to estimate the weighted mean of each of the facilitation-inhibition scores, while accounting for the hierarchical structure of participants nested within different studies. In all models, we treated study as a random effect (Rosenthal & DiMatteo, 2001), allowing the intercept to vary randomly at the

⁹ Because of a coding error, participants answered 32 of the 40 possible items from the NPI. Despite answering fewer items, Cronbach’s alpha remained high, and well above acceptable levels, providing evidence of its reliability. Additionally, NPI correlated in expected ways with other personality traits (see Tables S2 in SOM), providing evidence of construct validity. Such findings are consistent with past work showing that much shorter versions of the NPI, for example a 16-item version (Ames et al., 2006), and even a single item version of the NPI (Konrath et al., 2014; van der Linden & Rosenthal, 2016), demonstrate good validity.

level of the study. Treating study as a random effect also allowed us to estimate and empirically test the presence of statistically significant heterogeneity across studies (Riley et al., 2011; Simons et al., 2017). *Estimating the Heterogeneity in Strength of Implicit Self-Evaluations.* We were interested in examining the extent to which participants in our samples showed heterogeneity in the strength of their positive and negative implicit self-evaluations. To do so, we performed meta-analyses using MLM. But this time, instead of using the facilitation-inhibition scores as the dependent variable, we used reaction times (in log transformed units) on *individual trials*.¹⁰ The main predictor variable was prime type. Mirroring our approach in examining responses to positive and negative targets separately, we examined the effect of prime type for each target valence separately. Thus, the MLM analyses estimate, for each participant, the effect of prime type on response times in the target classification task. This analysis allowed us to estimate the fixed effect of prime type, which is the weighted average for all participants across all studies. Importantly, MLM allowed us to specify the effect of prime type as a random effect, allowing the effect of prime type to be estimated for each participant. Specifically, because each participant completed multiple trials for each prime type, it was possible to estimate, for each participant, the effect of the prime type from random noise. When analyses compare group-level averages, e.g., where each participant is characterized by only two observations, disentangling the effect of prime type from random noise is not possible. Consequently, because these MLM analyses allow each participant to be characterized by their own prime type effect, it is possible to empirically examine the extent

¹⁰ Before conducting MLMs to examine heterogeneity, we followed the same data reduction procedures as in Studies 1-3. Specifically, we excluded the first two trials within each block, trials that were incorrectly categorized, and trials with RTs outside the normal range of time needed to categorize a single trial (<150 ms or > 4,999 ms). Of the remaining trials, those with RTs below 300 ms and above 3,000 ms were recoded to 300 ms and 3,000 ms, respectively. RTs were transformed into log units, and all MLM analyses were performed on log-transformed RTs. RTs transformed back to milliseconds from log-transformed units are reported for illustrative purposes.

to which the priming effects observed in Studies 1-3 are heterogeneous (i.e., individuals differ significantly from one another in the magnitude of the effect).¹¹

Correlations between Implicit Evaluations and Explicit Measures. With respect to the second exploratory aim of examining individual differences, we conducted sensitivity analyses to identify the smallest effect size that could have been detected with .80 statistical power (two-tailed, $\alpha = .05$), given our sample sizes. For correlations between implicit and explicit self-evaluations, with an $N = 495$ ($df = 483$), we could detect an r of .125. For correlations between implicit self-evaluations and narcissism and self-esteem, with an $N = 224$ ($df = 222$), we could detect an effect of .185. For subjectively experienced ambivalence, with an $N = 277$ ($df = 271$), we could detect an effect size of .168. For correlations between implicit and explicit object-evaluations, with an $N = 318$ ($df = 309$), we could detect an r of .157. Finally, for correlations between implicit and explicit self-gender associations ($N = 177$, $df = 175$), we could detect an effect size as small as .207.

Reliability Analyses. To examine the extent to which the EPT yielded consistent results, for each study, we divided the EPT data into two halves based on the order in which the trial was completed (i.e., whether the trial was odd- or even-numbered). Given that trial type was randomly presented for each participant, the odd and even halves of the same EPT should provide equivalent assessments of the same underlying association (Hambleton et al., 1991; Novick, 1966). We computed the facilitation-inhibition scores for the two halves of the EPT following procedures

¹¹ We examined variability in positive and negative implicit self-evaluations separately, as well as variability in the relative proportion of positive to negative implicit self-evaluations (i.e., a single structural ambivalence score constructed from the two independent evaluations, following the Thompson formula (Thompson et al., 1995). It was not possible to examine the extent of heterogeneity in structural implicit self ambivalence, because the test of heterogeneity focuses on responses to single (i.e., unaggregated) trials and structural ambivalence involves aggregating across trials to derive a single index.

described in Study 1. We then examined the extent to which both halves of the task produced consistent results in terms of group-level effects and individual differences.

Reliability of Group-Level Effects. To what extent do both halves of the self-EPT lead to the same conclusion with regards to the group-level effects? To assess the reliability of group-level effects, we examined the statistical equivalence of the facilitation-inhibition scores for each prime-target combination across the two halves. To do so, we again performed MLM analyses on all available data. The MLM model was similar to the model in the main meta-analyses but included version (odd vs. even trials) as a fixed level-1 factor, and participant (along with study) as a random factor. To verify that the two halves of the EPT are equivalent, we performed equivalence testing (Lakens, 2017; Lakens et al., 2018). Equivalence testing allows us to conclude that any observed difference is smaller than the smallest effect of interest (or some specified value) and thus provides evidence of no difference. Specifically, we performed equivalence testing using the two one-sided tests (TOST) procedure (Lakens, 2017). In the TOST procedure, upper (Δ_U) and lower (Δ_L) equivalence bounds are specified based on the smallest effect (Δ) size of interest (e.g., a positive or negative raw score difference, or standardized difference, such as Cohen's d). Two composite null hypotheses are tested: $H_{01}: \Delta \leq \Delta_L$ and $H_{02}: \Delta \geq \Delta_U$. When both one-sided tests can be statistically rejected, one can conclude that the observed effect falls within the equivalence bounds ($\Delta_L < \Delta < \Delta_U$) and is close enough to zero to be practically nonexistent (Lakens et al., 2018; Seaman & Serlin, 1998). We used the estimated marginal means and standard deviations from the multilevel model to assess means of the facilitation-inhibition scores for the two halves. Upper and lower equivalence bounds were specified as small, with a Cohen's d of .2 (equivalent to an $r = .10$): $\Delta_L = -.2$ and $\Delta_U = .2$. The statistical power of the TOST procedure for all tests was .80 or greater.

Reliability of Individual Differences. To what extent are rankings of individuals consistent across the two halves of the EPT? To assess the reliability of individual differences, for each study, we first computed the split-half correlations among the facilitation-inhibition scores for the two halves of the EPT. We then normalized the distribution by converting r s to Z using the Fisher's r -to- z transformation, weighted the transformed effect sizes as a function of their accuracy (based on the sample size; $N - 3$), and finally, transformed the weighted Z coefficients back to r for ease of interpretation (Rosenthal & DiMatteo, 2001).

Results

Meta-Analysis

Estimating Implicit Self- and Object-Evaluations. Figure 4 shows the facilitation-inhibition scores for each study individually as a function of prime type and target type (top panel), as well as the average (weighted) facilitation-inhibition scores for all studies (bottom panel). As shown in the meta-analytically combined aggregate measures, liked-object primes facilitated the classification of positive targets ($M = 51$ ms), although this effect approached statistical significance ($F(1, 26.911) = 291.25, p = .061, 95\% \text{ CI } [-30 \text{ ms}, 132 \text{ ms}]$).¹² The liked-object primes inhibited the classification of negative targets ($M = -22$ ms, $F(1, 317) = 23.41, p = .001, 95\% \text{ CI } [-31 \text{ ms}, -11 \text{ ms}]$). In contrast, priming the self reliably facilitated the classification of positive targets ($M = 90$ ms, $F(1, 2.74) = 291.25, p = .001, 95\% \text{ CI } [70 \text{ ms}, 110 \text{ ms}]$). But also, critically, priming the self reliably facilitated the classification of negative targets ($M = 20$ ms, $F(1, 2.188) = 23.28, p = .03, 95\% \text{ CI } [13 \text{ ms}, 28 \text{ ms}]$). Directly comparing self-primes with liked-object primes revealed that self-primes facilitated the processing of

¹² In all MLMs, 'study' was treated as a random factor, which is a more conservative test. When 'study' is treated as a fixed factor, the self-generated liked-object prime significantly facilitated the classification of positive targets, $F(1, 315) = 69.775, p = .001$.

negative targets to a greater extent than the liked-object primes ($F(1, 811)=54.51, p < .001$). Self-primes also facilitated the processing of positive targets to a greater extent than the liked-object primes, ($F(1, 333.25)=46.30, p < .001$).

Estimating the Heterogeneity of the Implicit Self-Evaluations. Even if the “true” effect of self-primes were the same for all individuals, we would still expect some variability due to random noise. Thus, our next analysis focused on the question: to what extent do participants in our samples vary in the magnitude of positive and negative implicit self-evaluations, more so than would be expected by chance? Table 1 shows the results of the MLM analyses assessing the effect of prime type (self vs. baseline) on reaction times to classifying positive and negative targets. As shown, the fixed effects of prime type were statistically significant. On average, self-primes facilitated the classification of positive targets and facilitated the classification of negative targets. Importantly, the random effect, $\tau_{11 \text{ subID.prime type}}$, estimates the variability of the effect of prime type across participants. The effect of self-primes on the classification of targets varied significantly more than expected by chance for both positive and negative targets ($ps < .001$).¹³ Nonetheless, allowing the effect of prime type to vary across participants (vs. estimating prime type as fixed) only accounted for 1% of the variance for positive targets and less than 1% for negative targets.¹⁴ These results signal that individual differences in self-evaluations may exist, but variability may be limited in healthy, nonclinical populations. Given the statistically significant heterogeneity, in the next section, we examined whether individual differences in implicit self-evaluations correspond to explicit measures.

¹³ Statistical significance test of the random effect was assessed using the likelihood ratio test (Hayes, 2006), which involves comparing the deviance of the model with prime type as a fixed effect with the deviance of the model with prime type as a random effect, and then assessing the probability of the difference using a chi-square test with 1 *df*.

¹⁴ Variance accounted for was computed by taking the residual of the MLM with prime type as a random effect and dividing it by the residual of the MLM with prime type as fixed effect and subtracting this ratio by 1. Thus, it is conceptually similar to a squared partial correlation in ordinary least squares (Hayes, 2006).

Figure 4. Mean facilitation-inhibition scores (milliseconds) as a function of prime type (squares = self-primes; circles = liked-object primes) and target type (black lines = positive/congruent targets; grey lines = negative/incongruent targets) for Studies 1-3 (top panel), and the summary measure representing the average (weighted) facilitation-inhibition scores across studies (bottom panel). Error bars represent 95% CI. Means and SEs used to derive the 95% CIs were computed using log-transformed RTs and transformed back to milliseconds for illustration.

Table 1. *Estimates of Fixed Effects and Random Effects from Multilevel Models (MLM) Conducted on All Available Data*

Positive Targets				Negative Targets			
Fixed Effects				Fixed Effects			
Predictors	Estimates	95% CI	p	Predictors	Estimates	95% CI	p
(Intercept)	705	684 – 727	<0.001	(Intercept)	671	651 – 691	<0.001
Prime Type	-86	-90 – -82	<0.001	Prime Type	-20	-26 – -14	<0.001
Random Effects				Random Effects			
σ^2	.095	.093 – .097	<0.001	σ^2	.088	.086 – .090	<0.001
$\tau_{00 \text{ study}}$	.000	.000 – .026	0.65	$\tau_{00 \text{ study}}$	.001	.000 – .010	0.506
$\tau_{00 \text{ subID}}$	.048	.042 – .055	<0.001	$\tau_{00 \text{ subID}}$	.039	.034 – .044	<0.001
$\tau_{11 \text{ subID,prime type}}$	.004	.003 – .006	<0.001	$\tau_{11 \text{ subID,prime type}}$	.003	.002 – .005	<0.001
$\rho_{01 \text{ subID}}$	-0.5			$\rho_{01 \text{ subID}}$	-0.39		
ICC	0.31			ICC	0.29		
N_{study}	4			N_{study}	4		
N_{subID}	495			N_{subID}	495		
Marginal R^2 /				Marginal R^2 /			
Conditional R^2	0.028 / 0.333			Conditional R^2	0.001 / 0.294		

Note. Most relevant to testing heterogeneity effects of self-primes is the random effect, $\tau_{11 \text{ subID,prime type}}$, which represents variance across participants in the effect of prime type. σ^2 represents residual variance. $\tau_{00 \text{ study}}$ represents variance due to study. $\tau_{00 \text{ subID}}$ represents variance across participants. For all MLM analyses, reaction time (in log transformed units) on individual trials was the dependent variable. For illustration, estimates of fixed effects and 95% CIs were transformed back to milliseconds.

Examining Correlations Between Implicit Self-Evaluations and Explicit Measures

Implicit and explicit measures of self-evaluation were weakly correlated (for positive evaluations, $r = .015$, *ns*; for negative evaluations, $r = .102$, $p = .024$; see Table 2; correlations for individual studies are reported in Tables S1-S4 in SOM). Furthermore, none of the self-report personality measures correlated with implicit self-evaluations (r s ranged $-.034$ to $.058$; see Table S2 in SOM), even though self-report personality measures correlated with each other in theoretically expected ways (e.g., explicit self-esteem was positively associated with narcissism).

As a comparison, we examined explicit and implicit evaluations of personally significant, liked objects. Interestingly, implicit and explicit evaluations of liked objects were also relatively uncorrelated (for positive evaluations, $r = .061$, $p = .284$; for negative evaluations, $r = .038$, *ns*).

As another comparison, we examined the relationship between implicit and explicit measures of gender associations. Implicit and explicit measures of self-gender associations were moderately correlated. For example, individual differences in explicit femininity predicted stronger self→female associations ($r = .264$, $p < .001$) and weaker self→male associations ($r = -.394$, $p < .001$). Likewise, individual differences in explicit masculinity predicted stronger self→male associations ($r = .375$, $p < .001$) and weaker self→female associations ($r = -.264$, $p < .001$; see SOM). Furthermore, self-reported gender identity (as male or female) meaningfully predicted implicit self-gender associations. Participants who identified as female (vs. male) showed stronger self-female ($t(175) = 4.52$, $p < .001$; $d = .77$) and weaker self-male associations ($t(175) = -6.317$, $p < .001$; $d = 1.03$). Importantly, however, when we examined the correlations between implicit and explicit measures *within* each gender (i.e., *among* males and *among* females), the correlations were no longer statistically significant (for females: r s ranged from $-.018$ to $.022$, p s $> .808$; for males: r s ranged from $-.175$ to $.065$, p s $> .197$).

Table 2. *Meta-analytically weighted zero-order correlations between implicit and explicit positive and negative evaluations for the self and liked object*

	Self						Liked object					
	Explicit			Implicit			Explicit			Implicit		
	Pos	Neg	SAmb	Pos	Neg	SAmb	Pos	Neg	SAmb	Pos	Neg	SAmb
Self												
<i>Explicit</i>												
Pos	--											
Neg	-.284***	--										
SAmb	-.214***	.909***	--									
<i>Implicit</i>												
Pos	.015	-.07	-.048	--								
Neg	-.031	.102*	.022	.167*	--							
SAmb	-.017	.071	.022	.052	.815***	--						
Liked Object												
<i>Explicit</i>												
Pos	.193***	-.047	-.011	.029	.045	.072	--					
Neg	-.083	.240***	.033	-.003	-.008	.021	-.399***	--				
SAmb	-.122*	.224***	.032	.001	-.018	.001	-.584***	.978***	--			
<i>Implicit</i>												
Pos	.015	.019	.006	.633***	.135*	.007	.061	-.011	-.004	--		
Neg	.036	-.006	.021	.069	.503***	.326***	.042	-.038	.038	.120*	--	
SAmb	.076	-.022	.014	-.021	.382***	.334***	<.001	-.026	.033	.065	.812***	--

Note. Correlations involving the self ($N = 495$), and correlations involving the like object ($N = 442$). Pos = positive evaluation. Neg = negative evaluation. SAmb = structural ambivalence, derived using the formula (Thompson et al., 1995): $(\text{Pos} + \text{Neg})/2 - |\text{Pos} - \text{Neg}|$.

*** $p \leq .001$. ** $p \leq .01$. * $p \leq .05$.

Examining the Reliability of the EPT

Reliability of Group-Level Effects. In terms of the self's evaluative structure, to what extent do two halves of the self-EPT produce equivalent results at the group-level? Results of the meta-analytically combined data indicated that differences between two halves of the same EPT were small, and thus the halves were not statistically different. Specifically, as shown in Figure 5, the difference between the two halves of the self-EPT assessing the self → positive facilitation-inhibition scores was 3 ms (95% CI [-13 ms, 18 ms]; $F(1, 985.94) = .409, p = .523$). The TOST equivalence test procedure indicated that the observed difference between the two halves of 3 ms, equivalent to a $d = .02$, was significantly within the equivalence bounds of $d = -.2$ ($t(494) = 4.823, p < .001$) and $d = .2$ ($t(494) = -4.076, p < .001$). Importantly, the difference between the two halves of the self-EPT assessing the self → negative facilitation-inhibition scores was -8 ms (95% CI [-21 ms, 5 ms]; $F(1, 494) = .687, p = .408$). Crucially, the TOST equivalence test procedure indicated that the observed difference between the two halves of 8 ms, equivalent to a $d = .06$, was significantly within the equivalence bounds of $d = -.2$ ($t(494) = 3.232, p < .001$) and $d = .2$ ($t(494) = -5.668, p < .001$). We performed a similar reproducibility analysis with the data for the object-EPT. As shown in Figure 5, liked-object primes also elicited priming effects that were highly consistent across the two halves of the EPT (see SOM for results for the object-EPT).

Figure 5. Average (weighted) facilitation-inhibition scores (milliseconds) across studies for two halves of the self-EPT (Evaluative Priming Task; top panel) and object-EPT (bottom panel). Facilitation-inhibition scores are shown as a function of half (odd vs. even trials), prime type (squares = self-primes; circles = liked-object primes), and target type (black lines = positive/congruent targets; grey lines = negative/incongruent targets). Error bars represent 1 SE. Means and SEs were computed using log-transformed RTs and transformed back to milliseconds for illustration.

Reliability of Individual Differences. In terms of individual differences, to what extent do two halves of the EPT lead to the same rank ordering of individuals? To examine this issue, we computed split-half correlations of performance on the two halves of the self-EPT. As shown in Table 3, the split-half correlations for the convergent validities (e.g., self→positive_half1 predicting self→positive_half2) were small to moderate. For the self→positive facilitation-inhibition score, the correlation between the two halves was .199

($p < .001$), and for the self→negative facilitation-inhibition score, the correlation between the two halves was .128 ($p = .005$). Additionally, the convergent validities were not statistically significantly greater than the discriminant validities (e.g., self→positive_half1 predicting self→negative_half2; $ps > .06$).

Discussion

The meta-analyses show that priming the self not only facilitates the processing of positive targets, as expected, but also facilitates the processing of negative targets. Such a phenomenon was demonstrated with two different comparison conditions: affectively neutral letter strings and a personally significant, liked attitude object. Additionally, the results showed that, although there were statistically significant levels of heterogeneity in the strength of positive and negative implicit self-evaluations (i.e., some individuals showed stronger implicit evaluations than others), these effect sizes were small. Accordingly, individual differences in implicit self-evaluations showed weak or no appreciable correlations with explicit self-evaluations or with personality measures of narcissism, experienced self-ambivalence, or self-esteem. In this regard, the present findings are consistent with some research also failing to find meaningful associations between implicit self-esteem and explicit self-evaluations and personality measures (Bosson et al., 2000, 2008; Rudolph et al., 2008; Zayas & Shoda, 2005).

Finally, the results of the reliability analyses clearly demonstrate that the self-EPT shows strong reliability in assessing group-level effects: two halves of the same self-EPT produced equivalent results, leading to the same conclusions. At the same time, the reliability analyses demonstrated that the self-EPT is characterized by low reliability with

Table 3. *Split-half correlations between two halves (odd or even trials) of the same EPT.*

		Self				Liked object			
		Pos ₁	Neg ₁	Pos ₂	Neg ₂	Pos ₁	Neg ₁	Pos ₂	Neg ₂
Self	Pos ₁	--							
	Neg ₁	.087 [†]	--						
	Pos ₂	.199 ^{***}	.094 [*]	--					
	Neg ₂	.104 [*]	.128 ^{**}		--				
Liked object	Pos ₁	.618 ^{***}	.041	.194 ^{**}	.080	--			
	Neg ₁	.064	.449 ^{***}	.015	.035	.074	--		
	Pos ₂	.204 ^{**}	.069	.576 ^{***}	.154 ^{**}	.266 ^{***}	.078	--	
	Neg ₂	.041	.103 [†]	.008	.570 ^{***}	.055	.085	.060	--

Note. EPT = Evaluative Priming Task. Correlations involving the self-EPT ($N = 495$), and correlations involving the object-EPT ($N = 442$). Pos = positive evaluation. Neg = negative evaluation. Numerical subscripts denote odd (“1”) and even (“2”) trials. ^{***} $p \leq .001$. ^{**} $p \leq .01$. ^{*} $p \leq .05$. [†] $p \leq .10$.

respect to individual differences: stability of individual differences across two halves of the same self-EPT, as reflected by split-half correlations, were statistically significant but small. Indeed, according to Classical Test Theory (CTT: Lord & Novick, 1968; Novick, 1966), one would expect a much higher correlation between the two halves. In the ideal case where measurement error is zero, CTT would assume that the observed score would only reflect the “true” value of the underlying construct, and the two halves of the test would correlate perfectly. Of course, this view assumes that the underlying construct being measured is stable at the time of assessment and that individual differences exist and are robust. Yet, a growing view is that implicit evaluations are inherently unstable and context sensitive, thus, undermining the assumptions of CTT. Moreover, if the underlying range of true scores is relatively narrow (e.g., capturing an effect that is homogenous across the sample), then the assessment of individual differences is further complicated (De Schryver et al., 2015; Nicewander & Price, 1978; Overall & Woodward, 1975; R. H. Williams et al., 1995). This raises questions about the nature of positive and negative implicit self-evaluations: Is the low level of heterogeneity reflecting limitations of the self-EPT as a measure or does it reflect meaningful information about the nature of implicit self-evaluations in healthy, non-clinical populations? Regardless, the results of Study 4 increase our confidence that the self-EPT is a robust and reliable method for detecting the presence of self→positive and self→negative links, but that the EPT does not seem suitable as a measure of individual differences in the strength of implicit self-evaluations. We discuss the implications of these findings for the conceptualization and measurement of implicit self-evaluations in the General Discussion.

General Discussion

Various theories of personality and human behavior underscore the idea that self-

representations are affectively complex. Despite the prevalence of this belief, and extensive research on the self, there has been no direct empirical work examining whether the self triggers both positive and negative implicit evaluations. Across three studies, we used the well-established evaluative priming task (EPT; Fazio et al., 1986a) to examine whether the self spontaneously activates positive *and* negative evaluations. Studies 1-2 provide empirical evidence that implicit self-positivity is not the entire picture: at an implicit level, the self spontaneously triggers positive *and* negative evaluations (bivalent-priming). In contrast, a personally significant, highly liked object triggers only positive evaluations and inhibits negative evaluations (univalent-priming), replicating past work (Fazio et al., 1986a; Zayas & Shoda, 2015). Critically, Study 3 showed that the results do not simply reflect heightened arousal or alertness that may be triggered by priming the self: in a gender classification task, self-primers did not facilitate classification of gender incongruent targets but did facilitate classification of negative targets. Finally, meta-analyses of all studies further attest to the robustness of the finding that the self triggers bivalent-priming at the group-level. There was strong empirical evidence that, in general, people possess positive *and* negative implicit self-evaluations. Indeed, although there was statistically significant heterogeneity in the strength of positive as well as negative implicit self-evaluations, the extent of individual differences was small by conventional standards. Not surprisingly then, and consistent with past work, *individual differences* in implicit self-evaluations showed little to no convergence with explicit measures.

Implications of Implicit Self-Bivalence for Social Cognitive Conceptualizations of the Personality System

The present work is grounded in social cognitive conceptualizations of the personality system. In particular, the Cognitive-Affective Processing System (CAPS) theory (Mischel &

Shoda, 1995; Shoda & Mischel, 1998) conceptualizes a person's "mind" as a network of cognitions and affects that mediates the effect of a situation on behavior. A centerpiece of the CAPS network are cognitions and affects about the self, especially self-evaluations that are triggered automatically and effortlessly. Importantly, the CAPS theory provides a unifying framework for understanding the psychological bases for normative intraindividual or *within*-person dynamics, as well as interindividual or *between*-person differences. In this manner, it is possible to explore a variety of questions about the normative structure of the personality system: which aspects of the network are universal—for example, reflecting shared evolutionary and cultural pressures? At the same time, this framework allows for the examination of individual differences in the personality system: in what ways are aspects of the network variable from person to person—for example, reflecting each person's distinctive constellation of biological and learned experiences? Answers to questions about normative functioning and individual differences provide a more complete picture of human personality and its variability. Thus, in the sections that follow, we consider the implications of the coexistence of positive *and* negative implicit self-evaluations for the personality system in terms of its normative structure as well as individual differences. In doing so, we also identify areas for future work.

Implications for Understanding Normative Intraindividual Processes

The present work identifies the presence of a general phenomenon, elucidating a relatively universal aspect of the self-representation, and shedding light on the cognitive architecture of human beings' shared personality. In so doing, it highlights a distinctive feature of the CAPS network. Revisiting Figure 1, activating the self-representation primes positive *and* negative (bivalent-priming: panel c), and not simply positive (univalent-priming: panel a), which is the case for representations of personally significant, liked objects. To be sure,

the present findings provide a conceptual replication of past work, documenting the robustness of relative implicit self-positivity (Greenwald & Farnham, 2000; Kitayama & Karasawa, 1997; Yamaguchi et al., 2007). Across all studies, the strength of positive implicit self-evaluations exceeded the strength of negative implicit self-evaluations by orders of magnitude. Critically, however, implicit self-positivity does not convey the entire picture. Despite the robustness of the self's net positivity, the present work demonstrates that people also reliably possess negative implicit self-evaluations.

From a methodological perspective, the fact that the self spontaneously triggers some implicit negativity would have gone unnoticed using common indirect measures of self-esteem that tap into relative (positive vs. negative) self-evaluations. For example, using the EPT, researchers typically derive a single index reflecting the extent to which the self facilitates the classification of positive targets *relative* to negative targets (Hetts et al., 1999; Spalding & Hardin, 1999; Wentura & Degner, 2010). As illustrated with the results from Study 2, doing so would have clearly shown that the self is more positive than negative ($M\ diff = 78\ ms$). Yet, this approach would have overlooked the fact that the self still triggers appreciable negativity ($M = 17\ ms$). By separately assessing positive and negative implicit self-evaluations, the present work provides evidence of the affective complexity of implicit self-evaluations. Indeed, a focus on relative implicit evaluations would lead one to conclude that the self triggered greater positivity than a liked object. Although such a conclusion is true, a singular focus on relative positivity fails to appreciate that the self also triggered greater negativity than a liked object.

Importantly, from a theoretical perspective, the coexistence of positive and negative implicit self-evaluations appears to be a normative, common aspect of the personality system, characterizing most people. Such conclusions are based on the meta-analyses reported in Study 4

that empirically assessed the heterogeneity of the self-priming effects. Although tests of heterogeneity in the strength of positive and negative were statistically significant, the effect sizes estimating heterogeneity were, by conventional levels, small. Stated differently, participants were highly similar to one another in the strength of their positive and negative implicit self-evaluations, with only small differences between individuals.

Thus, the coexistence of positive *and* negative implicit self-evaluations, as assessed in the present work, may reflect a basic feature of the personality system. In this way, the present theorizing on the inherent complexity of self-evaluations diverges from more common conceptualizations of subjective ambivalence that have focused on individual differences. Specifically, traditional views of ambivalence have assumed that subjectively experiencing positive and negative feelings about the self is a rare and problematic state (Guidano & Liotti, 1983) that characterizes only a subset of individuals, such as those who are insecurely attached or possess low self-esteem (Graham & Clark, 2006; Pietromonaco & Barrett, 1997; Riketta & Ziegler, 2006). Why has past work found ambivalence to be rare and problematic, whereas the present work has found the coexistence of positive and negative implicit self-evaluations to be common? One explanation lies in the distinction between structural ambivalence (or “bivalence”), as observed in the present work, and subjective ambivalence, as typically measured in past work (Riketta & Ziegler, 2006). Structural ambivalence refers to a single object eliciting positive and negative evaluations simultaneously, whereas subjective ambivalence refers to the consciously felt experience of conflict or contradictory feelings about a given object. Although structural ambivalence may give rise to subjective ambivalence, this isn’t always the case. Work on attitude change has shown that structural ambivalence may exist even when individuals do not subjectively experience conflict (Petty et al., 2006). The present findings suggest that the bivalent-priming

triggered by the self reflects structural ambivalence and may not necessarily lead to subjective ambivalence. Moreover, whereas subjective ambivalence may be associated with negative psychological and health outcomes (Ainsworth et al., 1978; Berenson & Andersen, 2006; Graham & Clark, 2006; Linehan, 1993; Pietromonaco & Barrett, 1997; Riketta & Ziegler, 2006), implicit self-bivalence may not.

Indeed, diverse theoretical perspectives assume that self-representations emerge from and reflect affective and dynamic social interactions; self-representations, like other memory structures, serve to facilitate future action in rich social environments. Building on these ideas, complexity at an implicit level may serve adaptive functions as a normative feature of the personality system. To the extent that implicit evaluations are assumed to color perceptions and guide behavior, possessing positive *and* negative implicit self-evaluations might enable the monitoring and responding to complex, affectively-rich, and ever-changing social interactions (Murray & Holmes, 2009; Pickett & Gardner, 2005; Zayas et al., 2002). This cognitive architecture might enable individuals to easily detect and process positive and negative information, perhaps increasing one's cognitive tolerance for encountering affectively complex self-relevant information, and one's ability to quickly make sense of and utilize such information (Riketta & Ziegler, 2007; DeMarre et al., 2011). Moreover, the presence of positive *and* negative implicit evaluations might make one attuned to social rewards *and* social threats. The presence of some negative implicit self-evaluations may be part of the cognitive-affective architecture characterizing people's hypervigilance to any signs of disapproval or rejection from others. Attunement to such social threats, although aversive, may facilitate quickly responding to remedy the source of the threat, thereby strengthening the threatened relationship. Such attunement may be a prerequisite for the mutual interdependence that characterizes social interactions (Schwenke et al., 2020). For

a person to be responsive to their social environment, they must be continuously attuned for cues that reveal the consequences of their actions in the eyes of others, evaluate self-relevant cues quickly, and modify their behaviors for social coordination.

This account of the functional significance of possessing positive *and* negative implicit self-evaluations assumes that implicit self-evaluations may be, by design, highly context sensitive. Such a proposition is informed by current theories of implicit evaluations more broadly (Payne, Vuletich, & Lundberg, 2017; Dalege & van der Maas, 2020). There is an increasing appreciation that the temporal instability of implicit evaluations, although traditionally viewed as reflecting limitations of the measurement instruments (see Connor & Evers, 2020), could reflect characteristics of the measured construct. Most relevant, some have suggested that measures of implicit evaluations reflect transient states (Dentale et al., 2020; Schmukle & Egloff, 2005), and overlooked contextual influences (Gawronski & Bodenhausen, 2017, 2011; Gschwendner et al., 2008; Zayas, Greenwald, et al., 2011). Informed by these perspectives highlighting that implicit evaluations reflect accessibility of associations (Gawronski & Payne, 2010; Payne et al., 2017), positive and negative implicit self-evaluations are conceptualized as memory structures in the minds of individuals. In the language of concept activation (Higgins & King, 1981), the self concept is associated with positive and negative (as a point of comparison, personally significant liked object are associated with positive and *not* negative). Thus, self→positive and self→negative are *available links* in a person's mind. But the likelihood that the evaluation is retrieved upon activation of the self also reflects *link accessibility*—*i.e.*, the ease with which a concept, like the self, activates an associated concept, like positive or negative evaluations (Payne et al., 2017). Link accessibility can vary chronically, via the accumulation of experiences over time, but far from

being static, decontextualized entities, link accessibility can fluctuate temporarily from situation to situation.

Importantly, this functional account is also highly consistent with the CAPS framework, which highlights that behavior varies over time and across situations as a function of the pattern of activation among available and accessible cognitions and affects within a person's CAP network. Given that social interactions are highly dynamic, and that self-evaluations are sensitive to how one sees themselves in the eyes of others, implicit self-evaluations may be highly sensitive to the contextual processes that underlie social cognition. Indeed, the mind continuously evaluates the world in terms of goodness and badness, with the self serving as a reference point from which these evaluations are made (Happé et al., 2017). Given that a defining feature of the mind is its adaptability (Gilbert & Burgess, 2008), with particular importance for social interactions (Schwenke et al., 2020), implicit self-evaluations may be quite dynamic, shifting continuously in response to ever-changing contexts. These contexts may be external, such as an ever-changing stream of inputs provided by dyadic partners or group members. But contexts are also shaped by internal processes (e.g., affect, attentional focus, expectations), and much of this inner dialogue is likely to be social (Moser et al., 2017). Neuroscience research on the default mode network (DMN) shows that the brain's resting state is social (Buckner et al., 2008; Lieberman, 2016; Sormaz et al., 2018). In a variety of different settings, individuals think about themselves and others, recall recent interactions, envision upcoming ones, and remember multitudes of other memories. Thus, even though in our studies, participants were not given explicit instructions to think about social contexts, responses on the self-EPT may have nonetheless reflected the socially embedded nature of the mind.

Implications for Understanding and Measuring Individual Differences

Since the social cognitive movement, researchers have been interested in individual differences in implicit self-evaluations. Recent frameworks conceptualize between-person differences as *individual differences in chronic link accessibility*—the ease with which the evaluation is retrieved upon activating the self construct.

Despite the widespread interest, work focused on individual differences in implicit evaluations is not without controversy (Gawronski & Payne, 2010; Payne et al., 2017). Work assessing individual differences in relative implicit self-positivity has found inconsistent results. Whereas some studies have found that individual differences predict related outcomes (Asendorpf et al., 2002; Cai et al., 2014; Conner & Barrett, 2005; Greenwald & Farnham, 2000; Jordan et al., 2003; Spalding & Hardin, 1999; Wang et al., 2017; Zeigler-Hill, 2006), other studies have failed to find clear and consistent evidence with regard to individual differences in implicit self-evaluations (Bosson et al., 2000; Rudolph et al., 2008; Zayas & Shoda, 2005). Such mixed findings have sparked discussions about the conceptualization and measurement of implicit aspects of the self-representation (Bosson et al., 2000; Falk et al., 2015; Falk & Heine, 2015; Gawronski et al., 2020; Gregg & Sedikides, 2010).

In the present work, we observed statistically significant heterogeneity in the strength of positive and negative implicit evaluations, but the extent of variability was small, accounting for about 1% of the residual variance. Moreover, we found weak evidence of reliable associations between implicit self-evaluations and explicit self-evaluations, and with personality measures of narcissism, self-esteem, and experienced self-ambivalence. Lastly, the reliability analyses indicated that, although the EPT showed strong reliability for assessing group-level effects, the EPT was characterized by poor reliability with respect to assessing stable

individual differences.

These results raise the question: Why are *individual differences* in positive and negative implicit self-evaluations relatively weak? A reasonable explanation is that the EPT, although well suited for assessing group-level effects, is “noisy,” reflecting the methodological limitations of indirect methods of implicit evaluations specifically (Draheim et al., 2019; Miller & Ulrich, 2013; Stolz et al., 2005), and cognitive-behavioral tasks, such as the Stroop, more broadly (Borsboom et al., 2009; De Schryver et al., 2015; Hedge et al., 2018). Another, not mutually exclusive, possibility is that the low reliability with the assessment of individual differences reflects variability in the measured construct itself. Contemporary work posits that a certain degree of instability reflects the contextualized nature of implicit evaluations (Dentale et al., 2020; Gawronski & Bodenhausen, 2017; Payne et al., 2017; Schmukle & Egloff, 2005); within-person variability that is not-yet-explained is viewed as “noise” or “error” and obscures the assessment of between-person differences.

These two possibilities attempt to explain the weak reliability of indirect measures of implicit evaluations generally. But, here, we raise a third, not mutually exclusive, possibility that is more specific to conceptualizing and measuring individual differences in implicit self-evaluations: Perhaps, in healthy, non-clinical populations, the “true” distribution of implicit self-evaluations assessed at “baseline” or “rest” may show little heterogeneity. If the “true” variability in the population is small, this too would contribute to lower reliabilities. In this respect, it is worth noting that reliabilities of implicit self-evaluations tend to be lower than those of other constructs; for example, it is strongest for political attitudes, lower for implicit bias, and weakest for implicit self-evaluations (Bar-Anan & Nosek, 2014). We believe that the possibility that the true distribution is characterized by low heterogeneity (as compared to other constructs) is theoretically

and practically important and warrants consideration. The data involving the object-EPT and self-GPT, which serve as comparisons, provide insight into this account.

As already discussed, there is a large literature attesting to the overwhelming positivity of the self-construct, both at the implicit and explicit levels (Tesser, 1999, 2000). Indeed, even individuals classified as having “low” explicit self-esteem actually report moderate levels of positivity, scoring near or above the midpoint of the scale (Riketta & Ziegler, 2007). This literature raises the possibility that the true distribution of self-evaluations in a population may be naturally restricted (as compared to other constructs whose evaluations may span a fuller evaluative space). The results involving our comparison conditions (object-EPT and self-GPT) provide some empirical support that the naturally restricted evaluative space of the self may play some role in the self-EPT’s lower reliability. First, given that the object-EPT also showed low reliability of individual differences and no convergence with explicit evaluations, one might question the ability of the object-EPT to discriminate among attitude objects. However, when past studies have assessed evaluations of objects whose evaluations spanned a broader evaluative space (e.g., liked objects as well as disliked objects), implicit and explicit measures have converged (Fazio et al., 1986b; Zayas & Shoda, 2015). Second, the data from the self-GPT provides an informative comparison. Because our sample included male- and female-identified participants, we could assess self-gender associations across the full dimension of gender. Thus, it is informative that *within* each gender (an analysis that constrains the full theoretical range), implicit and explicit self-gender associations only weakly converged, but *across* genders (an analysis encompassing a wider theoretical range), implicit and explicit self-gender associations showed moderate convergence. Indeed, the self-GPT successfully distinguished *between* male- and female-identified participants, even though it was not able to distinguish *among* males or *among* females.

The possibility that the true distribution of implicit self-evaluations in healthy, non-clinical populations is characterized by weak heterogeneity has theoretical importance for personality psychologists and raises new and exciting directions for future research (Bolger et al., 2019). Empirical examination of the extent of meaningful individual differences in implicit self-evaluations sheds insight into the self-construct itself. Indeed, a complete understanding of the personality system requires identifying core cognitions and affects in the personality system that are shared by many individuals in group, as well as identifying ways in which these cognitions and affects, and interconnections among them, differ across individuals. For example, processes shaped by strong evolutionary pressures, many of which are social in nature (Geary, 2005), are expected to show little variability across individuals (Ekkekakis et al., 2005). Consistent with this view, in personality neuroscience (Canli et al., 2002), passively viewing photographs of fearful faces triggered heightened activation of the amygdala for the sample as a whole, but the magnitude of amygdala activation was not significantly correlated with individual differences. In contrast, passively viewing photographs of smiling faces failed to show heightened activation of the amygdala in the sample as whole, but the magnitude of the activation positively correlated with the trait of extraversion. If the complexity of implicit self-evaluations has adaptive functions for social interaction, it too may show little evidence of individual differences.

Importantly, even if people are more or less similar to one another in their “resting” or “baseline” levels of self-positivity and -negativity, individual differences may arise in the downstream consequences of such evaluations, or in response to different situations. For example, for one individual, activation of the self→negative link may activate other negative self-relevant thoughts and memories, whereas for another individual, activation of the self→ negative link may trigger compensatory processes, such as activating highly positive self-relevant thoughts and

memories. How and when implicit evaluations affect behavior is likely to be affected by many intervening psychological processes (Fiedler et al., 2011; Gollwitzer, 1999). Indeed, a hallmark of the CAPS perspective is that any given cognition or affect is embedded within a larger network and thus works in conjunction with other aspects of the network to respond to situations. The idea that the manifestation of any one aspect of the system depends on the network in which it is embedded is also echoed in trait theories emphasizing the study of the whole person (Allport's (1927). Naturally, this means that effects of positive and negative implicit self-evaluations on behavior or observable outcomes is mostly likely not a 1 to 1 correspondence. Instead, the effects of implicit self-evaluations are likely to depend on other regulatory strategies that are also accessible at a given time within the person's network. For example, work by Ayduk and colleagues (Ayduk et al., 1999, 2000, 2006, 2008) finds that even though individuals who are high in trait rejection sensitivity are highly attuned to signs of rejection, whether or not they respond to the rejection in a defensive manner depends on their regulatory abilities. Consideration of complex person-by-situation interactions may be essential to understanding how implicit evaluations give rise to behavior (Fleeson & Jayawickreme, 2016, 2021; Gawronski et al., 2020).

Given these considerations, we propose ideas for how to explore individual differences and consequences of implicit self-evaluations in the next section.

Unanswered Questions and Future Directions

The present work provides the empirical evidence that the self triggers positive *and* negative implicit evaluations. Still, this is just the first step in understanding this newly documented phenomenon. Just as hundreds of studies have examined the robustness, and neural, developmental, and behavioral correlates of implicit self-esteem (as assessed with relative measures), more work is needed to fully understand the generality, antecedents, and consequences

of implicit self-bivalence. Below, we discuss the generality of the findings (Simons et al., 2017) and identify a few areas of inquiry for future research.

First, our conclusions of the bivalent structure of the self are based on healthy individuals (total $N = 495$) recruited from a northeastern university in the United States. Despite the large sample size, future work needs to assess the extent to which implicit self-bivalence characterizes individuals who are generally older, less educated, and from other cultures and geographic regions (Hetts et al., 1999). Given cross-cultural work showing implicit positivity across cultures (Yamaguchi et al., 2007), a natural question is: to what extent does implicit self-bivalence characterize the self across cultures? Additionally, although our studies document that people exhibit implicit self-evaluations that are overwhelmingly more positive than negative, our data do not speak to whether the same holds true for individuals with certain psychopathology and mental health conditions, such as clinically depressed individuals or those with suicidal ideation (Creemers et al., 2012).

Importantly, the coexistence of the self's positivity and negativity was demonstrated using the EPT. Although the EPT is a well-established measure and well-positioned to assess positive and negative implicit self-evaluations, future work might use or develop other indirect measures. Importantly, it would be informative to obtain evidence of the coactivation of positive and negative with neural measures. Work by Izuma and colleagues (2018) has found that performance on the self-esteem IAT corresponds to greater activation of neural areas involved in reward processing when individuals view self-relevant imagery. Future work could examine whether viewing self-relevant imagery (e.g., self-portraits) versus affectively neutral or mundane imagery or personally relevant, positive imagery that is not directly related to the self (e.g., picture of one's home) activates neural areas involved in the processing of aversive stimuli.

Future work might explore the functions of implicit self-bivalence from a normative perspective. That is, what are the downstream consequences of a cognitive-affective architecture in which the self spontaneously activates positive and negative implicit evaluations? To the extent that implicit evaluations color perceptions, activating the self-representation might facilitate the encoding and storage of self-relevant negative information (Bargh & Thein, 1985), as compared to activating the representation of a liked object. Moreover, given contemporary views that implicit evaluations are highly context-dependent, and affected by internal states and motivations, such as one's goals (Ferguson, 2008), implicit self-evaluations are likely to be open to situational influences. Past experimental work has shown that exposure to mild social threats enhances relative implicit positivity (Jones et al., 2002; Pelham et al., 2005; Rudman & Fairchild, 2004). A promising direction for future work is to examine how such mild threats affect positive and negative implicit self-evaluations, providing greater clarity about whether such threats primarily affect positive implicit self-evaluations, negative self-evaluations, or both equally.

Finally, although the overarching question of the present work focused on the normative structure of the personality system, the findings have several implications for work focusing on individual differences. Researchers interested in exploring questions regarding individual differences in positive and negative implicit self-evaluations in healthy, non-clinical populations may benefit from modifying existing approaches or developing new measures for the primary purpose of assessing individual differences. For example, measures that do not rely primarily on difference scores, or accuracy-based or integrative measures which combine speed and accuracy into a composite score, may be appropriate (Draheim et al., 2019; Hedge et al., 2018; Miller & Ulrich, 2013; O'Shea & Wiers, 2020). Additionally, increasing the number of trials that each participant completes may increase the sensitivity of the

EPT to assess implicit self-evaluations. Finally, further examination of heterogeneity in implicit self-evaluations using indirect measures that are better suited for assessing individual differences would advance our understanding of the personality system—both shared and unique aspects (Zayas et al., in press).

Concluding Remarks

Mental representations of the self are the building blocks of personality and human behavior, and scholars from diverse disciplines in psychology and related fields have pondered the basic structure and function of self-representations. The present work speaks to the perennial question facing psychologists across diverse subdisciplines: What is the nature of our shared human personality? By assessing self-priming effects using a more absolute measure of evaluations (self as good *and* self as bad) versus a more conventional relative measure (self as good versus self as bad), the present work sheds light on the cognitive architecture of the self-representation, illuminating key ways in which the self-representation differs from representations of other aspects of the environment that are also meaningful and positive (Greenwald, 1980). Although the self-representation is highly positive, as previously documented, the present work shows that that implicit self-positivity coexists with implicit self-negativity.

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