

Individual Differences in Activation of the Parental Care Motivational System: Assessment, Prediction, and Implications

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We report on the development, validation, and utility of a measure assessing individual differences in activation of the parental care motivational system: The Parental Care and Tenderness (PCAT) questionnaire. Results from 1,608 adults (including parents and nonparents) show that the 25-item PCAT measure has high internal consistency, high test–retest reliability, high construct validity, and unique predictive utility. Among parents, it predicted self–child identity overlap and caring child-rearing attitudes; among nonparents, it predicted desire to have children. PCAT scores predicted the intensity of tender emotions aroused by infants, and also predicted the amount of time individuals chose look at infant (but not adult) faces. PCAT scores uniquely predicted additional outcomes in the realm of social perception, including mate preferences, moral judgments, and trait inferences about baby-faced adults. Practical and conceptual implications are discussed.

Keywords: parental care, tenderness, motivation, individual differences, scale validation

In his pioneering textbook, *An Introduction to Social Psychology*, William McDougall (1908) devoted dozens of pages to “the parental instinct” and its motivational implications. McDougall characterized the parental instinct as “the most powerful of instincts” (p. 68) and speculated that it “is the source, not only of parental tenderness, but of all tender emotions and truly benevolent impulses, is the great spring of moral indignation, and enters in some degree into every sentiment that can properly be called love” (p. 275).

Recent research reveals renewed appreciation for McDougall’s (1908) perspective on the motivational psychology of parental care. It has been speculated that the evolutionarily ancient physiology underlying parental caregiving behavior serves as a biological foundation for empathy, compassion, and altruistic behavior (Batson, 2006; Goetz, Keltner, & Simon-Thomas, 2010; Preston, 2013), and has been linked to the psychology of romantic attachment (Bell, 2001). The affective signature of parental care—the emotion that McDougall (1908) called “tenderness”—appears to be psychologically distinct from other superficially similar affective states (such as empathy, sympathy, and love; Kalawski, 2010;

Lishner, Batson, & Huss, 2011). Several recent theoretical overviews identify parental care as a biologically fundamental and psychologically unique motivational system (Aunger & Curtis, 2013; Kenrick, Griskevicius, Neuberg, & Schaller, 2010).

If indeed there is a unique motivational system associated with parental care, it will be valuable to assess individual differences in its activation; these individual differences may be uniquely useful in predicting a variety of affective, cognitive, and behavioral outcomes. In this article, we describe the development and validation of a self-report questionnaire designed to assess individual differences in activation of the parental care motivational system. We also report additional evidence attesting to its predictive and explanatory utility.

The Parental Care Motivational System

Within the psychological literature on human motivation, there is an important distinction between process and content (Carver & Scheier, 2012; Deci & Ryan, 2000). Many models of motivation focus primarily on *process*, and articulate general-purpose mechanisms governing the manner in which goal-directed behavior of any kind unfolds over time (e.g., Carver & Scheier, 1981; Reeve & Lee, 2012). Models focused instead on *content* employ principled means of induction or deduction to identify specific needs, and the motivational systems associated with those needs, that can be considered fundamental in some meaningful way (e.g., Baumeister & Leary, 1995; Deci & Ryan, 2000; Maslow, 1943). It is within this latter context that the case has been made that there is a psychologically unique motivational system that evolved for parental care of offspring.

From a biological perspective, motivational systems serve the function of facilitating reproductive fitness (Aunger & Curtis, 2013; Bernard, Mills, Swenson, & Walsh, 2005; Kenrick et al., 2010; Schaller, Neuberg, Griskevicius, & Kenrick, 2010). Reproductive fitness is served not merely by an organism’s own survival

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and production of offspring but also by the survival of those offspring until they reach reproductive age themselves. Compared with most animals, human offspring are slow to mature. They are relatively helpless during infancy, and remain vulnerable to injury and illness for additional years before maturing to reproductive age. Parental care of offspring—most obviously from mothers, but also from fathers—contributes substantially to human reproductive fitness (Geary, 2000; Taylor et al., 2000). It is for this reason that there likely evolved a motivational system—a coordinated set of affective and cognitive mechanisms with functional implications for behavior—that facilitates the protection and nurturance of children (Aunger & Curtis, 2013; Kenrick et al., 2010; McDougall, 1908).

Motivational systems are responsive to functionally relevant stimuli. The parental care system appears to be activated by perceptual cues and inferential events connoting the immediate need to provide care for offspring. This is evident in research documenting the consequences of becoming a parent: Many physiological (e.g., hormonal) changes accompany parenthood, and these changes are linked to social-bonding and/or protective responses that serve the objective of parental care (e.g., Atzil, Hendler, & Feldman, 2011; Edelstein, Stanton, Henderson, & Sanders, 2010; Gordon, Zagoory-Sharon, Leckman, & Feldman, 2010; Hahn-Holbrook, Holbrook, & Haselton, 2011; Hume & Wynne-Edwards, 2005; Leuner, Gaspard, & Gould, 2010). In women, some of these physiological changes may be directly tied to pregnancy, childbirth, and lactation. But fatherhood produces neurochemical changes as well (e.g., decreases in testosterone and prolactin; Gray, Yang, & Pope, 2006; Wynne-Edwards & Reburn, 2000), indicating the important role of mere perceptual and/or inferential cues in accounting for some of the physiological consequences of parenthood. Behavioral changes serving offspring protection are also implicated: In both women and men, parenthood is associated with behavioral risk-aversion, caution, and carefulness (Cameron, Deshazo, & Johnson, 2010; Chaulk, Johnson, & Bulcroft, 2003; Fessler, Holbrook, Pollack, & Hahn-Holbrook, 2014), especially under circumstances that make one's parental role psychologically salient (Eibach & Mock, 2011).

Although the parental care motivational system may be activated at a relatively high level among actual parents, its physiological foundations are necessarily innate and its basic psychological architecture is likely to characterize all normally developing humans. Therefore, parental care motives may be temporarily activated even among nonparents, in response to perceptual cues and events that simulate the presence of offspring. Both parents and nonparents automatically orient toward and attend to infant faces (Brosch, Sander, & Scherer, 2007; Cárdenas, Harris, & Becker, 2013), and even nonparents find children rewarding (Parsons, Young, Kumari, Stein, & Kringelbach, 2011) and become more wary of strangers when a child is nearby (Fessler et al., 2014).

McDougall (1908, p. 63) suggested that the “parental instinct” (and the accompanying emotional experience of tenderness) is responsive not just to children but also to “any other helpless and delicate thing.” Recent research (conducted with primarily nonparent samples) supports this speculation: Following the visual perception of baby animals (with facial features mirroring those of human infants), even nonparents show an increased tendency toward behavioral caution and carefulness (Sherman, Haidt, &

Coan, 2009). People also report a stronger caretaking inclination toward children who have more prototypically infantile facial features (Glocker et al., 2009). The emotion of tenderness is also aroused more strongly in response to adults with infantile features or who otherwise appear more vulnerable (Lishner et al., 2011; Lishner, Oceja, Stocks, & Zaspel, 2008).

In sum, the parental care motivational system is activated, with predictable consequences, by the perception of functionally relevant stimuli (e.g., infants), and this motivational system may be activated not only among parents but also among nonparents.

Individual Differences

Motivational systems are not activated with identical frequency and magnitude in all persons. For this reason, the study of human personality is informed by research on individual differences in the activation strength of various needs and the motives that serve those needs (e.g., Carver & White, 1994; McClelland, 1985; Murray, 1938)—an approach that is conceptually distinct from, and empirically complementary to, the tradition of describing personality in terms of behavioral traits (Winter, John, Stewart, Klohnen, & Duncan, 1998). Measurable individual differences exist in epistemic needs (e.g., needs for cognition and closure; Cacioppo & Petty, 1982; Webster & Kruglanski, 1994), aspirational motives (e.g., motives for achievement and power; McClelland, Atkinson, Clark, & Lowell, 1976; Winter, 1973), and the needs and motives that govern interpersonal affiliations of various kinds (Hill, 1987; Leary, Kelly, Cottrell, & Schreindorfer, 2013; Penke & Asendorpf, 2008). The supporting literatures confirm that assessing individual differences in motive strength is useful not only for the description of personality but also for the prediction of a wide range of affective, cognitive, and behavioral responses.

The same principles apply to the parental care motivational system. There are likely to be substantial individual differences in the frequency and extent to which the parental care system is activated, and the measurement of these differences is likely to be useful in predicting other psychological phenomena.

These individual differences may partially overlap with obvious demographic distinctions. As discussed previously, the parental care system appears to be more chronically activated among actual parents than among nonparents. In addition, compared with men, women are anatomically obliged to devote more effort and energy to the care of offspring (and are subject to cultural norms that have historically obliged women to occupy the role of parental caregiver), so the parental care system may be activated more strongly in women than in men (Taylor et al., 2000). Yet even within these categories, there are likely to be considerable individual differences. Indeed, parental status and sex account for only a small part of the between-person variation in the tendency to respond more positively to images of infants than adults (Lehmann, Huis in't Veld, & Vingerhoets, 2013)—a measure that may be interpreted as one indirect indicator of parental care motive activation.

Lehmann et al. (2013) also found that especially positive responses to human infants were correlated with individual differences in empathy, feelings of closeness to others, and the need to belong, but the magnitudes of these relationships were weak (β s ranged between .12 and .24 when controlling for age, sex, and parental status; sample n s were 506 and 516). These results suggest that other individual difference constructs may be related to, but

not isomorphic with, individual differences in the activation of the parental care motivational system. Individual differences in interpersonal warmth and empathic concern are among the most likely candidates for some conceptual overlap, as are those involving identification with a stereotypically feminine (i.e., nurturant) social role, and attitudes regarding parenting styles. But none of these constructs tap directly into the parental care motivational system. For instance, measures of empathic concern (e.g., Davis, 1983) capture a general tendency to feel compassion toward people (typically adults) in immediate distress, but are not ideal for assessing responses toward specific categories of people (e.g., babies) who may not be in immediate distress, but are simply vulnerable and in need of protection. And although measures of feminine self-concept (e.g., Bem, 1981) may assess individual differences in traits connoting nurturance (as well as other stereotypically feminine traits), they are not designed to tap into the motivational or emotional bases of those tendencies. Similarly, although there are a variety of methods for assessing individual differences in parenting styles and child-rearing practices (e.g., Rickel & Biasatti, 1982), these measures focus primarily on behavior rather than the motivational and emotional underpinnings of those behaviors. More broadly, although a number of existing individual difference measures might be expected to correlate with activation of the parental care motivational system, there is no existing measure designed to assess this construct directly.

How might one tackle the assessment challenge presented by parental care motivation? Activation of a motivational system is generally inferred from the presence of emotions, cognitions, and actions that facilitate solutions to the underlying reproductive “problem” (Kenrick et al., 2010). In the case of the parental care system, the reproductive problem is the relative helplessness and vulnerability of children, and it is solved—over the course of many years—by the provision of protection and nurturance. At the very least, this requires a positive attitude toward children. But it implies more than mere liking; there must also be a willingness to protect children from harm, even if this necessitates aggressive action against others (Hahn-Holbrook, Holt-Lunstad, Holbrook, Coyne, & Lawson, 2011). An inclination to embrace the role of caregiver (i.e., to experience the provisioning of care to children as rewarding) is also important. Furthermore, given the strong link between the motivational state and its signature emotion, the strength of the parental care motive may also be indicated by the tendency to experience tenderness (e.g., the ease with which tenderness is aroused and the intensity of the tenderness experience when it is aroused). And as offspring outcomes depend not only on parental response to immediate needs (e.g., when a child is in pain or discomfort) but also on proactive nurturance of various kinds, it may be important to assess the extent to which individuals experience tenderness across a variety of situations involving children, including situations that are potentially aversive as well as those that are not. (Notably, some aversive situations—such as dirty diapers—may require caregivers to override reflexive *self*-protective responses driven by other motivational systems.)

Our attention to tenderness follows the lead of researchers who have developed self-report measures assessing chronic differences in the extent to which individuals experience the arousal of other emotions. A prototypical example is research on sensitivity to disgust (Haidt, McCauley, & Rozin, 1994; Olatunji et al., 2007; Tybur, Lieberman, & Griskevicius, 2009). Just as tenderness is the

signature emotion associated with the parental care motive, disgust is the signature emotion associated with the disease-avoidance motive (Aunger & Curtis, 2013; Schaller & Park, 2011). Individual differences in disgust sensitivity therefore provide an index of the extent to which the disease avoidance motive is chronically activated, and have proven to be useful in predicting a wide range of phenomena within social, cognitive, and clinical psychology (e.g., Cisler, Olatunji, & Lohr, 2009; Inbar, Pizarro, Iyer, & Haidt, 2012; Jones & Fitness, 2008; Navarrete & Fessler, 2006). By analogy, research on the parental care motivational system—and its implications—may be facilitated by a reliable means of assessing individual differences in its activation.

Overview of the Current Research

The research described here was designed to accomplish three goals: (a) to develop a self-report questionnaire to assess individual differences in the activation of the parental care motivational system, (b) to psychometrically validate this questionnaire, and (c) to empirically test the extent to which these individual differences predict important psychological phenomena.

The questionnaire (the Parental Care and Tenderness scale, or “PCAT” for short) was designed to be suitable for administration to parents and nonparents alike. It was developed according to the principles reviewed in the previous section—assessing protective and nurturant attitudes toward children, as well as the extent to which individuals experience tenderness in the presence of young children. (Given the diversity of content, we expected the PCAT questionnaire would comprise multiple underlying factors. Ideally, though, these factors should represent facets of a central underlying construct.) In addition to assessing the PCAT’s factor structure and internal reliability, we also assessed its temporal stability (test–retest reliability) and employed a variety of procedures to assess its construct validity.

Additional studies tested the PCAT’s ability to predict (a) transient emotional responses aroused by the visual perception of human infants, (b) the subjective reward value provided by infant faces, (c) inferences about baby-faced adults, (d) mate preferences, and (e) moral judgments. Those results not only further established the construct validity of the PCAT measure but also provided evidence bearing on the unique predictive and explanatory utility of the underlying construct: individual differences in activation of the parental care motive.

Study 1: Questionnaire Construction

Item Generation

Drawing on the conceptual background summarized in the Introduction, we (the authors, with input from additional students in our lab) generated a preliminary pool of 57 items that fit into two categories. In order to ensure applicability to nonparents as well as parents, all items referred to children generally (i.e., no items referred to respondents’ own offspring).

One category was defined by items that presented self-referential statements (e.g., “When I see infants, I want to hold them”; “I think that kids are annoying”). Respondents were instructed to “Rate how much you agree with the following statements,” and responses were recorded on a 5-point scale from 1

(*strongly disagree*) to 5 (*strongly agree*). In generating this set of items, our strategy was to focus on content relating to general attitudes toward young children, protective impulses toward young children, or caring feelings toward young children.

A second category was defined by items that asked respondents to imagine specific situations involving children and to rate the amount of tenderness they would feel in each situation. (To minimize idiosyncratic interpretation, the instructions explicitly defined tenderness as “a warm, gentle feeling of sympathetic affection.”) Responses to these items were recorded on a 5-point scale from 1 (*no tenderness at all*) to 5 (*a lot of tenderness*). For this category, we generated items depicting children engaged in either affectively pleasing activities (e.g., “You make a baby laugh over and over again by making silly faces”) or situations that could arouse negative affect (e.g., “You hear a child crying loudly on an airplane”).

Item Reduction and Item Selection

A questionnaire containing the preliminary pool of 57 items was presented to 307 adults residing in the United States who were recruited on Amazon’s Mechanical Turk website in exchange for minor monetary compensation (\$0.50). Mean participant age was 29.74 ($SD = 9.91$); 42% of the participants were women and 32.9% were parents.

The resulting data were subjected to a preliminary principal components analysis with an oblique rotation. Results revealed eight components with eigenvalues >1.0 , and which together accounted for 69.67% of the variance. Inspection of the pattern matrix revealed five interpretable components containing multiple items each. Those five components generally corresponded to our item-generation objectives, and can be summarized as follows: (a) tenderness aroused in situations involving generally positive stimuli (e.g., “You see a father tossing his giggling baby up into the air as a game”), (b) liking of children (e.g., “I think that kids are annoying” [reverse-scored]), (c) protective impulses regarding children (e.g., “I would use any means necessary to protect a child, even if I had to hurt others”), (d) tenderness aroused in situations involving negative stimuli (e.g., “You see that a baby is sick”), and (e) caring for children (e.g., “Babies melt my heart”). We selected five items from each of these five components to form a 25-item questionnaire. An effort was made to ensure that the items loaded strongly on their respective components while keeping the content diverse within components.

Factor Structure

An exploratory factor analysis on the selected 25 items with principal axis extraction and an oblique (promax) rotation revealed one dominant factor (eigenvalue = 12.32) that accounted for 49.29% of variance in the scores. Four smaller factors (with eigenvalues of 1.71, 1.05, 0.96, and 0.64) also emerged, accounting for 6.85%, 4.18%, 3.82%, and 2.56% of the variance, respectively.¹ Table 1 presents the 25 items and their factor loadings. In discussing these factors—and their associated subscale scores—we use the following abbreviated labels: Tenderness-Positive, Liking, Protection, Tenderness-Negative, and Caring. We refer to the entire instrument as the PCAT questionnaire.

Study 2: Reliability and Known-Groups Validity

As part of our initial validation of the PCAT, we administered an online survey containing only the retained 25 items to 467 adult participants recruited on Mechanical Turk, across two separate samples (combined M age = 32.31, $SD = 10.86$). A total of 49.3% were women and 40.7% were parents; among parents, the mean number of children was 1.98 and the mean age of their youngest child was 9.33. All participants completed the PCAT questionnaire as part of a larger battery of items.

Descriptive Statistics and Internal Consistency

PCAT subscale scores were computed as the means of the five items defining each of the five underlying factors (reverse scoring items on the Liking factor). Table 2 presents bivariate correlations among the subscales and internal reliability estimates. The PCAT’s internal reliability was high: Cronbach’s alpha for the total score was .95 and alphas for the subscale scores all exceeded .85. The total scale reliability was also high when computed separately for men and women ($\alpha_s = .92$ and $.96$), as well as separately for parents and nonparents ($\alpha_s = .90$ and $.95$).

Test–Retest Reliability

To examine the PCAT’s stability over time, participants were asked if they would be willing to participate in a follow-up study. Those who agreed ($n = 218$) were contacted at a later date, at which time they were given the opportunity to complete the PCAT questionnaire a second time (for an additional \$0.50 payment). For 113 of these participants, the retest was conducted approximately 3 weeks later; for 105 participants, the retest took place approximately 6 weeks later.

Results revealed high correlations between participants’ initial PCAT score and their retest score, for both the 3-week and the 6-week follow-ups ($r_s = .93$). These test–retest correlations were also high when computed separately for men (3-week, $r = .93$; 6-week, $r = .92$) and women ($r_s = .92$), as well as separately for parents ($r_s = .87$) and nonparents (3-week, $r = .93$; 6-week, $r = .91$). Test–retest correlations for subscale scores exceeded .77 for the 3-week follow-up and .80 for the 6-week follow-up.

Known-Groups Validity: Parent–Nonparent and Male–Female Differences

One means of assessing the construct validity of an individual-difference measure is to test whether scores reliably differ between categories of people who are expected to differ on the underlying construct (Cronbach & Meehl, 1955). For the reasons articulated in the Introduction, the parental care motivational system is likely to be activated more strongly among parents (compared with non-

¹ As two of the factors were interpretable but failed to meet the standard eigenvalue threshold of 1.0, a parallel analysis (Horn, 1965; Turner, 1998) with raw data permutation was conducted to verify the five-factor solution. The analysis was performed in SPSS using O’Connor’s (2000) RawPar script. A 95th percentile distribution and 1,000 permutations were selected. Five of the observed eigenvalues were greater than the 95th percentile values of the randomly permuted data, indicating that a five-factor solution was indeed appropriate.

Table 1
Results From a Factor Analysis of the 25-Item Parental Care and Tenderness (PCAT) Questionnaire

PCAT item	Factor				
	1	2	3	4	5
Factor 1 (Tenderness-Positive)					
20. You make a baby laugh over and over again by making silly faces.	.86	.04	.01	-.11	.06
22. A child blows you kisses to say goodbye.	.85	-.02	-.01	.01	.04
16. A newborn baby curls its hand around your finger.	.84	-.06	.00	-.05	.17
19. You watch as a toddler takes their first step and tumbles gently back down.	.77	.05	-.07	.01	.08
25. You see a father tossing his giggling baby up into the air as a game.	.70	.10	-.03	.03	.06
Factor 2 (Liking)					
05. I think that kids are annoying. (R)	-.01	.95	.06	-.06	.01
08. I can't stand how children whine all the time. (R)	-.12	.83	-.03	.11	.03
02. When I hear a child crying, my first thought is "shut up!" (R)	.04	.72	.01	.07	.01
11. I don't like to be around babies. (R)	.11	.70	-.01	-.11	.16
14. If I could, I would hire a nanny to take care of my children. (R)	.08	.58	-.02	.03	-.13
Factor 3 (Protection)					
07. I would hurt anyone who was a threat to a child.	-.13	-.02	.95	-.06	.03
12. I would show no mercy to someone who was a danger to a child.	.00	-.05	.74	-.06	.09
15. I would use any means necessary to protect a child, even if I had to hurt others.	.06	.08	.72	.05	-.04
04. I would feel compelled to punish anyone who tried to harm a child.	.07	.03	.68	.06	-.07
09. I would sooner go to bed hungry than let a child go without food.	.46	-.03	.36	.08	-.06
Factor 4 (Tenderness-Negative)					
18. You hear a child crying loudly on an airplane.	-.28	-.01	.04	.74	.41
21. You need to change a baby's soiled diaper.	-.23	.01	-.07	.69	.39
24. You see a child slip and fall onto the pavement.	.38	.02	-.02	.64	-.19
17. You hear a young child trip and fall, and begin to cry.	.36	.07	-.01	.59	-.07
23. You see that a baby is sick.	.36	.01	.04	.55	-.03
Factor 5 (Caring)					
01. When I see infants, I want to hold them.	.15	.01	-.04	.10	.72
06. Babies melt my heart.	.23	.18	.02	.08	.52
13. Babies generally smell great.	.12	-.07	.07	.23	.51
03. When I see a child in someone's arms, I feel warm inside.	.31	.11	.01	.07	.48
10. A baby's tiny fingers and toes are so adorable.	.52	-.04	.05	-.08	.47

Note. $N = 307$. Extraction method was principal axis factoring with an oblique (Promax with Kaiser Normalization) rotation. Factor loadings above .3 are bolded. Reverse scored items are denoted with an (R).

parents) and women (compared with men). Because 16 participants failed to provide sufficient demographic data, we conducted these analyses on data provided by 451 participants (parent $ns = 126$ women, 64 men; nonparent $ns = 104$ women, 157 men).

We conducted an analysis of variance to simultaneously test main effects and the interaction effect of parental status and sex on PCAT scores. There was a main effect of parental status, $F(1, 447) = 86.53, p < .001$: PCAT scores were higher among parents ($M = 4.02, SD = 0.53$) than nonparents ($M = 3.32, SD = 0.76$), $d = 1.03$. (PCAT scores were also higher among older participants, $r = .22, p < .001$, but the parent–nonparent difference

persisted even when statistically controlling for age, $F(1, 448) = 91.14, p < .001$). There was also a main effect of sex, $F(1, 447) = 23.80, p < .001$: PCAT scores were higher among women ($M = 3.84, SD = 0.79$) than men ($M = 3.38, SD = 0.64$), $d = 0.64$. The interaction was not significant, $F(1, 447) = 2.10, p = .15$, nor was it significant when controlling for age, $F(1, 446) = 2.10, p = .15$. Additional analyses revealed that the parent–nonparent difference was evident on all five PCAT subscale scores ($ps < .001$; ds ranged from 0.56 [Protection] to 1.0 [Liking]), and that the sex difference also emerged on all five subscale scores ($ps < .001, ds$ ranged from 0.34 [Protection] to 0.72 [Caring]).

Table 2
Correlations Between, and Internal Reliabilities of, the Underlying Facets of the Parental Care and Tenderness (PCAT) Questionnaire

PCAT subscale	PCAT subscale score				
	Caring	Liking	Protection	Tenderness-Positive	Tenderness-Negative
Caring	(.91)				
Liking	.75	(.87)			
Protection	.43	.41	(.86)		
Tenderness-Positive	.74	.64	.51	(.89)	
Tenderness-Negative	.58	.56	.36	.56	(.85)

Note. $N = 467$. Internal reliabilities (Cronbach's α) are indicated within parentheses on the diagonal.

Study 3: Convergent and Discriminant Validity

To more fully assess the PCAT's construct validity, we examined correlations between the PCAT and a variety of other individual difference measures—some of which were expected to correlate with the PCAT, and some of which were expected to be independent. These additional measures included those assessing broad-based (Big Five) dispositional tendencies, behavioral approach and avoidance, the intensity of affective experiences, prosocial and compassionate responding, parenting practices and attitudes, nonparents' desire to have children, and socially desirable responding. Our predictions were as follows.

First, individual differences in motive strength are conceptually distinct from, and complementary to, individual differences in behavioral traits (Winter et al., 1998). We therefore expected relatively modest correlations between the PCAT and the Big Five personality traits. Of particular interest were expected positive correlations with Agreeableness, Conscientiousness, and Extraversion (because of their aspects of tender-mindedness, mature self-discipline, and positive emotions, respectively; McCrae & John, 1992).

Second, because nurturance and protection of children requires approach-oriented behavioral responses—and even the risk-avoidant aspects of parental care often require approach behavior toward vulnerable children—one might expect PCAT scores to correlate with a general approach-orientated tendency. However, if PCAT scores reflect the activation of just one domain-specific motivational system, as intended, any correlation with a general approach-orientation (that manifests across domains) should be modest. We therefore expected to find positive (but moderate) correlations between the PCAT and the behavioral activation system (BAS; Carver & White, 1994). We had no specific predictions for PCAT associations with the behavioral inhibition system (BIS; Carver & White, 1994).

Third, there are strong theoretical reasons to expect that activation of the parental care motive is accompanied by the emotional experience of tenderness, and the PCAT questionnaire is constructed accordingly. Given these theoretical ties to a discrete emotional experience, the PCAT was expected to be positively correlated with individual differences in the intensity of affective experiences more broadly. The strongest associations should, however, be manifest with affective experiences similar to tenderness (e.g., those involving positive affect [Watson, Clark, & Tellegen, 1988] and the prosocial experience of emotional contagion [Doherty, 1997]). Similarly, if the psychology of parental care provides the basis for more broadly prosocial and compassionate tendencies, as has been suggested (Batson, 2006; Goetz et al., 2010; McDougall, 1908; Preston, 2013), then the PCAT should be positively correlated with (but not reducible to) measures that assess individual differences in prosocial and compassionate responding, such as nurturance (Jackson, 1967), empathic concern (Davis, 1983), interpersonal warmth (Wiggins, 1995), and femininity (Bem, 1981). At the same time, the PCAT would not be expected to correlate with complementary traits, such as masculinity (Bem, 1981) and personal distress (Davis, 1983).

Fourth, although there is a conceptual distinction between the motivational basis for parental care and the actual practices of parents when caring for children, some parenting practices are more attentive to a child's needs than others. We expected that

endorsement of nurturant parenting practices (Rickel & Biasatti, 1982), and the rejection of strongly punitive practices (Haskett, Scott, Willoughby, Ahern, & Nears, 2006; Plotkin, 1983), would be positively related to PCAT scores among both parents and nonparents. Among parents, we expected the PCAT to predict a strongly integrated parent-child relationship, perhaps manifesting as merging of the self and other (Aron, Aron, & Smollan, 1992) and parental involvement in their children's education (Fantuzzo, Tighe, & Childs, 2000). Among nonparents, we expected the PCAT to predict a stronger desire to have children.

Finally, measures that assess prosocial traits and other desirable attributes are potentially prone to a response bias in which participants respond strategically (rather than honestly) to promote a positive impression of themselves. We therefore examined the extent to which PCAT responses are influenced by such a response bias.

Method

Participants. Data were collected online from five samples of participants recruited on Mechanical Turk. Participants in all samples completed the 25-item PCAT questionnaire; other measures differed between the different samples (as described more fully below). Participants in Sample 1 were 257 adults (M age = 31.20, SD = 10.51; 51.4% were women and 34.6% were parents; M number of children = 2.09; M age of youngest child = 8.53). Participants in Sample 2 were 210 adults (M age = 33.68, SD = 11.17; 46.7% were women and 48.1% were parents; M number of children = 1.88, M age of youngest child = 10.03). Samples 1 and 2 comprised the same participants who provided data for Study 2. Participants in Sample 3 were 105 adults (M age = 31.79, SD = 11.92; 62.6% were women and 43.4% were parents; M number of children = 1.72; M age of youngest child = 9.60). Participants in Sample 4 were 112 adults (M age = 32.29, SD = 11.59; 37.2% were women and 29.6% were parents; M number of children = 1.88; M age of youngest child = 8.91). Participants in Sample 5 were 213 adults (M age = 33.55, SD = 11.27; 58.2% were women and 42.7% were parents; M number of children = 2.29; M age of youngest child = 10.71).

Materials

Big Five personality factors. Participants in Sample 2 (n = 210) completed the 44-item Big Five Inventory (John & Srivastava, 1999). Responses were recorded on a 5-point scale (1 = *disagree strongly*, 5 = *agree strongly*). From these responses, we computed composite indices of Extraversion (M = 3.00, SD = 0.88), Agreeableness (M = 3.75, SD = 0.67), Conscientiousness (M = 3.84, SD = 0.68), Neuroticism (M = 2.68, SD = 0.93), and Openness to Experience (M = 3.62, SD = 0.70); Cronbach's alphas ranged from .83 to .90.

Behavioral activation and behavioral inhibition. Participants in Sample 2 (n = 210) completed the 20-item BIS and BAS scales (Carver & White, 1994) to assess individual differences in the approach-oriented BAS and the avoidance-oriented BIS. Items were rated on a 4-point scale (1 = *very false for me*, 4 = *very true for me*). The BIS items (e.g., "I worry about making mistakes") form a single scale (M = 2.82, SD = 0.60), whereas the BAS items are divided into three subscales: BAS-Drive (M = 2.62, SD =

0.64; e.g., “I go out of my way to get things I want”), BAS-Fun Seeking ($M = 2.70$, $SD = 0.68$; e.g., “I’m always willing to try something new if I think it will be fun”), and BAS-Reward Responsiveness ($M = 3.25$, $SD = 0.48$; e.g., “When I get something I want, I feel excited and energized”). Cronbach’s alphas were .83, .86, .82, and .77, for the BIS, BAS-Drive, BAS-Fun Seeking, and BAS-Reward Responsiveness scales, respectively.

Emotionality. Participants in Sample 2 ($n = 210$) completed two measures assessing individual differences relevant to affective experiences. The Emotional Contagion questionnaire (Doherty, 1997) assessed a dispositional tendency to experience the emotions of others, and was comprised of 15 items with responses recorded on a 4-point scale (1 = *never true for me*, 4 = *always true for me*). In addition to a total score for emotional contagion ($M = 2.81$, $SD = 0.45$; Cronbach’s $\alpha = .83$), responses allowed computation of subscales assessing susceptibility to experience five discrete emotions: happiness ($M = 3.14$, $SD = 0.56$), sadness ($M = 2.61$, $SD = 0.71$), fear ($M = 2.64$, $SD = 0.64$), anger ($M = 2.50$, $SD = 0.60$), and love ($M = 3.17$, $SD = 0.65$); Cronbach’s alphas were .79, .71, .56, .47, and .82, respectively.

Participants also completed a trait version of the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), which assessed dispositional propensities to experience positive and negative affect. Positive and negative affect subscales were each comprised of 10 affective descriptors, and participants rated the extent to which they generally experienced these affective states on 5-point scales (1 = *very slightly or not at all*, 5 = *extremely*). Cronbach’s alphas were .92 and .91 for the Positive Affect ($M = 3.25$, $SD = 0.80$) and Negative Affect ($M = 1.64$, $SD = 0.67$) scales, respectively.

Nurturant dispositional tendencies. We administered four measures of nurturant and compassionate tendencies. Participants in Samples 4 and 5 ($n = 325$) completed 16 items comprising the Nurturance subscale of the Personality Rating Form (PRF; Jackson, 1967), designed to assess a dispositional need to provide nurturance to others. Responses were recorded on a 5-point rating scale (1 = *completely false*, 5 = *completely true*). From these responses, we computed a composite index of dispositional Nurturance ($M = 3.43$, $SD = 0.60$; Cronbach’s $\alpha = .82$).

Participants in Sample 3 ($n = 105$) completed the LM octant from the Revised Interpersonal Adjective Scales (Wiggins, 1995), consisting of eight trait adjectives indicative of interpersonal warmth (e.g., soft-hearted, tender). Responses were made on 8-point scales according to the accuracy of each trait as a self-descriptor (1 = *extremely inaccurate*, 8 = *extremely accurate*). From these responses, we computed a composite index of Interpersonal Warmth ($M = 6.14$, $SD = 1.00$; Cronbach’s $\alpha = .91$). These same 105 participants also completed the short form of the Bem Sex Role Inventory (Bem, 1981), consisting of 30 trait adjectives rated on a 7-point scale (1 = *never true*, 7 = *always true*). Two 10-item subscale scores were computed, assessing Femininity ($M = 5.55$, $SD = 0.89$; e.g., love children, sensitive to the needs of others; Cronbach’s $\alpha = .90$) and Masculinity ($M = 4.85$, $SD = 1.06$; e.g., assertive, forceful; Cronbach’s $\alpha = .89$).

Finally, participants in Samples 1 and 5 ($n = 470$) completed the Empathic Concern and Personal Distress subscales of the Interpersonal Reactivity Index (Davis, 1983). These subscales contain seven items each, rated on 7-point scales (1 = *not true*, 7 = *very true*). Empathic Concern ($M = 5.16$, $SD = 1.10$) reflects a propensity to feel

sympathy for the plights of others (e.g., “I often have tender, concerned feelings for people less fortunate than me”; Cronbach’s $\alpha = .86$). Personal Distress ($M = 3.47$, $SD = 1.17$) instead reflects a more egocentric affective response to others’ plights (e.g., “I tend to lose control during emergencies”; Cronbach’s $\alpha = .85$).

Parenting attitudes and practices. We administered four different measures assessing parenting attitudes. Parent and non-parent participants in Sample 3 ($n = 105$) completed the modified Block Child Rearing Practices Report (Rickel & Biasatti, 1982). This questionnaire consists of 40 items rated on a 6-point scale (1 = *not at all descriptive of me*, 6 = *extremely descriptive of me*). Parents responded with respect to their relationship with their children; nonparents were instructed to answer according to their likely attitudes and behaviors if they had children. Responses allowed computation of subscales assessing Parental Restrictiveness ($M = 3.52$, $SD = 0.67$; e.g., “I teach my child to keep control of control of his feelings at all times”; Cronbach’s $\alpha = .85$) and Parental Nurturance ($M = 4.91$, $SD = 0.72$; e.g., “I encourage my child to talk about his troubles”; Cronbach’s $\alpha = .91$).

Participants in Sample 5 ($n = 213$; both parents and nonparents) completed a questionnaire assessing attitudes and behavioral intentions that, it has been argued, may be diagnostic of a capacity for child abuse: the Child Vignette questionnaire (Haskett et al., 2006; Plotkin, 1983). The questionnaire contains 18 hypothetical vignettes describing child misbehavior. Participants were instructed to imagine that each scenario involved their own child and, for each scenario, rated their perceptions of annoyance (1 = *my child did not annoy me at all*, 9 = *the only reason my child did this was to annoy me*) and their intention to punish (1 = *I would not punish my child at all*, 9 = *I would punish my child a great deal*). We created a composite score as the mean of these 36 ratings ($M = 2.31$, $SD = 0.78$; Cronbach’s $\alpha = .93$).

A subset of participants in Sample 5 were parents of school-age children ($n = 47$; M age = 36.53, $SD = 6.84$; 70.2% women); these 47 parents completed a measure assessing involvement in their children’s education: the Family Involvement Questionnaire (Fantuzzo et al., 2000). Participants responded with respect to their youngest school-aged child. The 34-item questionnaire includes subscales specific to Home-Based Involvement ($M = 3.14$, $SD = 0.56$; e.g., “I bring home learning materials for my child (videos, etc.)”; Cronbach’s $\alpha = .88$), School-Based Involvement ($M = 2.37$, $SD = 0.79$; e.g., “I volunteer in my child’s classroom”; Cronbach’s $\alpha = .90$), and Home-School Conferencing ($M = 2.69$, $SD = 0.74$; e.g., “I talk to my child’s teacher about his or her difficulties at school”; Cronbach’s $\alpha = .92$), rated on 4-point scales (1 = *rarely*, 2 = *sometimes*, 3 = *often*, 4 = *always*). Cronbach’s alpha for the total Parental Involvement scores ($M = 2.77$, $SD = 0.61$) was .95.

Finally, among the subset of parents within Sample 3 ($n = 43$; M age = 36.07, $SD = 12.62$; 55.8% women), we administered a version of the single-item Inclusion of Other in the Self scale (Aron et al., 1992), designed to assess parents’ perception of the overlap in identity between themselves and their youngest child (in this sample, M age of youngest child was 9.6 years, $SD = 10.73$). Participants were presented with a series of seven geometric figures. Each figure—comprised by two circles representing the participant and their youngest child—differed in the degree to which the circles overlapped (ranging from no overlap at all to near-complete overlap). Participants identi-

fied the figure that best described the relationship between themselves and their child ($M = 5.45$, $SD = 1.59$).

Nonparents' desire to have children. Across all five samples, nonparent participants ($n = 515$; M age = 28.57, $SD = 9.12$; 44.7% women) were asked, "Do you want to have children in the future?" Responses were recorded on a 5-point scale (1 = *not at all*, 5 = *very much*; $M = 3.25$, $SD = 1.47$).

Socially desirable responding. Participants in Sample 1 ($n = 257$) completed the 20-item Impression Management subscale of the Balanced Inventory of Desirable Responding (BIDR-IM; Paulhus, 1998; example item: "I never cover up my mistakes"). Responses were recorded on a 7-point scale (1 = *not true*, 7 = *very true*). After reverse scoring the appropriate items, responses of "6" or "7" were recoded as "1," and all other values were recoded as "0." We then computed an overall index of socially desirable responding as the sum of the recoded scores ($M = 5.95$, $SD = 4.22$; Cronbach's $\alpha = .84$), on which higher values indicated a greater tendency to respond strategically in order to create and/or maintain a positive impression.

Results

Table 3 reports correlations between scores on the PCAT and scores on the additional individual difference measures. The statistics include zero-order correlations as well as partial correlations that control for any spurious relationship that might result from age, sex, or parental status differences.² We summarize these tabled results below.

Big Five personality factors. Results (the partial correlations in particular) indicated some positive relation between the PCAT and four of the Big Five dimensions (all except Neuroticism); these relations were weak to moderate in magnitude.³

Behavioral activation and behavioral inhibition. Results revealed that only BAS-Reward Responsiveness was meaningfully correlated with PCAT scores. The relation was positive, which is consistent with the notion that the psychology of parental care is primarily approach oriented. The relation was also only modest, indicating that the PCAT measures a construct that is distinct from a general tendency toward behavioral approach.

Emotionality. As expected, PCAT scores correlated positively with Emotional Contagion and with the dispositional tendency to experience Positive Affect. The correlation with Negative Affect was negligible.

Nurturant dispositional tendencies. PCAT scores were uncorrelated with Masculinity and Personal Distress, neither of which has any obvious conceptual link to the parental care motivational system. In contrast, PCAT scores were positively related to Nurturance, Interpersonal Warmth, Femininity, and Empathic Concern. Those four positive correlations were all moderately strong.⁴

Parenting attitudes and practices. PCAT scores were uncorrelated with Restrictive child rearing attitudes, but were positively correlated with Nurturant child rearing attitudes. As expected, PCAT scores were negatively correlated with the composite index assessing hostile responses to child misbehavior (i.e., scores on the Child Vignette questionnaire). Also as expected, the PCAT correlated positively with parental involvement in all aspects of their child's education and with parents' perception of self-child identity overlap.

Nonparents' desire to have children. Results revealed that, as expected, nonparents' desire to have children was positively correlated with PCAT scores. This relation persisted even when

controlling for participant sex and age (men and women did not differ in the desire to have children, $t < 1$).

Our data also revealed six other individual difference measures that predicted nonparents' desire to have children: Agreeableness, $r = .27$, $p = .006$; Emotional Contagion, $r = .31$, $p = .001$; Nurturance, $r = .30$, $p < .001$; Interpersonal Warmth, $r = .29$, $p = .028$; Femininity, $r = .35$, $p = .007$; and Empathic Concern, $r = .18$, $p = .003$. For each of these variables, we conducted bootstrapped mediation analyses to test whether the PCAT accounted for its relationship with the desire to have children. Results consistently revealed that the PCAT uniquely predicted the desire to have children (when controlling for correlations with the other individual difference variables) and significantly mediated the statistical relationships between those other individual difference variables and the desire to have children.⁵

Socially desirable responding. As expected, a weak positive relation between the PCAT and BIDR-IM emerged. This zero-order correlation was partially spurious, as indicated by the fact

² The pattern of relations was consistent across all subscales (as expected, given the extent to which all five subscales are positively correlated), and, with very few exceptions—*noted below*—the magnitudes of these relationships were similar as well. A supplemental table containing subscale correlations with the various individual difference measures is available from the first author upon request.

³ One additional result—involving subscale scores and sex differences—is worth noting here. Among men, there was a negligible relationship between Extraversion and the Tenderness-Negative subscale score ($r = .11$, $p = .29$), but among women, there was a substantial positive relationship between these two variables ($r = .40$, $p < .001$).

⁴ Additional analyses are worth noting. First, although the PCAT and Empathic Concern were positively correlated among both parent and nonparent samples, the correlation was stronger among parents ($r = .67$, $p < .001$) than among nonparents ($r = .46$, $p < .001$), and the difference was significant ($z = 3.26$, $p = .001$). Second, although all five PCAT subscales were positively correlated with Empathic Concern (r s $> .37$, p s $< .001$), only four of the five subscales were correlated significantly with Interpersonal Warmth and Femininity (r s ranged from .42 to .62; all p s $< .001$); the PCAT-Protection subscale was not significantly correlated with either Interpersonal Warmth ($r = .12$, $p = .21$) or Femininity ($r = .16$, $p = .12$).

⁵ When controlling for Agreeableness, the PCAT still predicted the desire for children ($\beta = .44$, $p < .001$), but when controlling for the PCAT, the effect of Agreeableness was reduced to nonsignificance ($\beta = .15$, $p = .14$) and the indirect effect of Agreeableness through the PCAT was significant, 95% confidence interval (CI) = [.05, .25]. Likewise, when controlling for Empathic Concern, the PCAT still predicted desire for children ($\beta = .58$, $p < .001$), but when controlling for the PCAT, the effect of Empathic Concern was nonsignificant, ($\beta = -.07$, $p = .32$), and the indirect effect of Empathic Concern through the PCAT was significant, 95% CI = [.22, .41]. When controlling for Emotional Contagion, the PCAT predicted a stronger desire for children ($\beta = .43$, $p = .001$), but when controlling for the PCAT, the effect of Emotional Contagion was nonsignificant ($\beta = .10$, $p = .41$), and the indirect effect of Emotional Contagion through the PCAT was significant, 95% CI = [.09, .44]. When controlling for Femininity, the PCAT predicted a stronger desire for children ($\beta = .57$, $p < .001$), but when controlling for the PCAT the effect of Femininity disappeared ($\beta = -.01$, $p = .93$), and the indirect effect of Femininity through the PCAT was significant, 95% CI = [.16, .62]. When controlling for Interpersonal Warmth, the PCAT predicted a stronger desire for children ($\beta = .67$, $p < .001$), but when controlling for the PCAT, Interpersonal Warmth did not ($\beta = -.16$, $p = .33$), and the indirect effect of Interpersonal Warmth through the PCAT was significant, 95% CI = [.23, .72]. Finally, when controlling for Nurturance, the PCAT still predicted the desire for children ($\beta = .53$, $p < .001$), but when controlling for the PCAT, the effect of Nurturance was reduced to nonsignificance ($\beta = -.05$, $p = .53$), and the indirect effect of Nurturance through the PCAT was significant, 95% CI = [.24, .48].

Table 3
Zero-Order Correlations and Partial Correlations (Controlling for Age, Sex, and Parental Status) Between PCAT and Other Individual Differences Measures

Measure	n	Correlation with PCAT	
		r	Partial r
Big Five personality factors			
Extraversion	210	.24***	.24***
Agreeableness	210	.32***	.29***
Conscientiousness	210	.24***	.17*
Neuroticism	210	-.05	-.08
Openness	210	.08	.21**
Behavioral Activation/Inhibition			
BAS-Drive	210	.03	.08
BAS-Fun Seeking	210	.01	.08
BAS-Reward Responsivity	210	.28***	.29***
BIS	210	.10	.03
Emotional Contagion			
Happiness	210	.53***	.48***
Sadness	210	.49***	.43***
Fear	210	.43***	.36***
Anger	210	.33***	.25***
Love	210	.24***	.19**
Positive Affect (PANAS)	210	.39***	.39***
Negative Affect (PANAS)	210	.37***	.38***
Nurturance (PRF)	210	-.09	-.06
Interpersonal Warmth (IAS-R-LM)	325	.64***	.60***
Femininity (BSRI)	105	.57***	.56***
Masculinity (BSRI)	105	.59***	.56***
Empathic Concern (IRI)	105	.06	.15
Personal Distress (IRI)	465	.54***	.49***
Child Rearing Practices	465	-.07	-.07
Parental Nurturance	112	.33***	.34***
Parental Restrictiveness	112	-.10	-.07
Child Vignette Questionnaire	213	-.32***	-.21**
Involvement in Child's Education	47	.42**	.46***
Home Involvement	47	.33*	.35*
School Involvement	47	.44**	.48***
Home-School Conferencing	47	.35*	.39**
Parents' Self/Child Identity Overlap (IOS)	43	.37*	.37*
Nonparents' Desire to Have Children	515	.53***	.65***
Socially Desirable Responding (BIDR-IM)	257	.28***	.18**

Note. PCAT = Parental Care and Tenderness; BAS = behavioral activation system; BIS = behavioral inhibition system; PANAS = Positive and Negative Affect Schedule; PRF = Personality Rating Form; IAS-R-LM = LM octant of the Revised Interpersonal Adjective Scales; BSRI = Bem Sex Role Inventory; IRI = Interpersonal Reactivity Index; IOS = Inclusion of the Other in the Self; BIDR-IM = Impression Management subscale of the Balanced Inventory of Desirable Responding.

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

that the degree of relationship between the PCAT and BIDR-IM was reduced when statistically controlling for age, sex, and parental status. Additional results revealed negligible relations between the PCAT and BIDR-IM in nonparents ($r_s = .08$ and $.14$ among male [$n = 93$] and female [$n = 67$] nonparents, respectively; $p_s > .25$). Among fathers ($n = 24$), the relation was also modest, $r = .23$, $p = .28$, but among mothers ($n = 65$) the relation was somewhat stronger, $r = .41$, $p = .001$.

For comparison, it is worth noting that individual differences in Empathic Concern (Davis, 1983) correlated slightly more strongly with the BIDR-IM across all participants ($r = .34$, $p < .001$; partial $r = .26$, $p < .001$) than did the PCAT, and almost as strongly among

the subsample of mothers, $r = .34$, $p = .006$. Thus, overall, our results indicate that socially desirable response biases pose no greater concern for the PCAT than they do when assessing other individual differences in broad domain of compassion and prosocial behavior. Nonetheless, researchers should be sensitive to the issue of impression management when administering the PCAT to any category of people who—like mothers—may feel an unusually strong social pressure to be perceived as “good” parents.

Study 4: Affective Responses to Infants

We conducted two studies (Studies 4a and 4b) testing the extent to which the PCAT predicted responses on a crucial criterion: the arousal of tender emotions elicited by the visual perception of human infants (including both distressed and nondistressed infants). Study 4a also directly compared the PCAT's prediction of responses to nondistressed infants with its prediction of responses to nondistressed adults. Complementarily, Study 4b compared the PCAT's prediction of responses to distressed infants with its prediction of responses to distressed adults. (Individual differences in activation of the parental care motivational system would be expected to predict emotional responses to any vulnerable individual—including distressed adults—but should most strongly predict responses to infants.)

In addition, we directly compared the predictive utility of the PCAT with the predictive utility of individual differences in general tendencies toward compassionate responding (assessed by Empathic Concern in both Study 4a and 4b, and also by Nurturance in Study 4b). The case for the construct validity of the PCAT—and for the unique predictive utility of the underlying construct—is strengthened if it predicts emotional responses to infants more strongly than do these general dispositional tendencies toward compassion.

Study 4a

Participants were 451 of the 467 adult participants (both parents and nonparents) who comprised Samples 1 and 2 in Study 3, and who, in addition to completing several questionnaires (including the PCAT), also completed a task assessing emotional responses to photographs. (Sixteen other participants in these samples failed to complete this task.) Participants were randomly assigned to view photographs of either (a) distressed babies ($n = 150$), (b) nondistressed babies ($n = 152$), or (c) nondistressed adults ($n = 149$).⁶ Each photo set consisted of eight color photographs (approximately 300×300 pixels each in size; primarily forward-facing head shots, with equal gender representation). Participants viewed the photos one at a time, at a pace of their choosing. After viewing the entire photo set, participants were presented with a list of 11 discrete emotional experiences (tenderness, caring, responsibility, anxiety, sadness, pride, affection, happiness, compassion, fear, and

⁶ Photo stimuli were collected online through Google Image searches using the following search terms: “crying baby,” “cute baby,” “cute man,” and “cute woman.” By using the identical modifier “cute” to search for photos of nondistressed babies and adults, we attempted to ensure that both sets of target photos would be affectively rewarding. It should be noted, however, that they are affectively rewarding for different reasons. Babies are typically considered “cute” if they have prototypical babyish features; in contrast, men and women are typically considered to be “cute” if they are highly physically attractive.

disgust), and rated the extent to which they experienced each emotion while viewing the photos. Ratings were made on a 5-point scale (1 = *not at all*, 5 = *very much*). Ratings of tenderness, caring, compassion, and affection were combined to create a single index of the extent to which Tender Emotions were aroused by the photographs ($M = 3.09$, $SD = 1.35$; Cronbach's $\alpha = .95$).

We conducted a multiple linear regression with PCAT scores and two dummy-coded condition variables entered at Step 1: C1 (distressed babies = 1, nondistressed babies = 0, adults = 0) and C2 (nondistressed babies = 1, distressed babies = 0, adults = 0). PCAT interactions with condition were entered at Step 2. The overall interaction with photo condition was significant ($\Delta R^2 = .09$, $p < .001$) indicating that, as expected, the effect of the PCAT on Tender Emotions varied according to the nature of the photos presented to participants. (Indeed, the PCAT interaction with condition was significant for effects involving both distressed babies, $PCAT \times C1$: $\beta = .68$, $p < .001$, and nondistressed babies, $PCAT \times C2$: $\beta = .56$, $p < .001$.) Critically, simple slopes analyses (reported in Table 4) revealed that the PCAT was a strong and significant predictor of Tender Emotions aroused by viewing distressed babies and nondistressed babies; but as expected, the PCAT did not predict Tender Emotions aroused by viewing nondistressed adults. The pattern of association remained unaffected when controlling for participant age, sex, and parental status (see Table 4).

For a subset of these participants (Sample 1; $n = 249$; $n = 83$ in each condition), we also collected data assessing individual differences in Empathic Concern (Davis, 1983; Cronbach's $\alpha = .87$). Empathic Concern's interaction with condition was significant ($\Delta R^2 = .04$, $p < .001$) for effects involving both distressed babies (Empathic Concern \times C1: $\beta = .37$, $p < .001$) and nondistressed babies (Empathic Concern \times C2: $\beta = .28$, $p = .004$). Simple slopes analyses indicated that, like the PCAT, Empathic Concern predicted Tender Emotions aroused by distressed babies ($\beta = .55$, $p < .001$) and nondistressed babies ($\beta = .38$, $p < .001$); however, these associations were weaker than those between the PCAT and Tender Emotions, in both the distressed babies ($z = 5.04$, $p < .001$) and nondistressed babies ($z = 5.02$, $p < .001$) conditions. Like the PCAT, Empathic Concern did not predict Tender Emotions aroused by nondistressed adults ($\beta = .03$, $p = .77$).

Importantly, the addition of the PCAT and its interactions (with condition) to the model contributed significantly to the prediction

of Tender Emotions beyond the effects of Empathic Concern ($\Delta R^2 = .16$, $p < .001$). When controlling for PCAT effects, Empathic Concern associations with Tender Emotions did not differ across the three photo conditions (interaction β s $< .06$, $ps > .65$). In contrast, when controlling for Empathic Concern effects, PCAT associations with Tender Emotions differed significantly across conditions (Interaction β s $> .49$, $ps < .005$): The PCAT remained a strong and significant predictor of Tender Emotions aroused by viewing both distressed babies ($\beta = .66$, $p < .001$) and nondistressed babies ($\beta = .54$, $p < .001$) when controlling for Empathic Concern effects, but the PCAT did not predict Tender Emotions aroused by nondistressed adults ($\beta = .04$, $p = .53$).

Recall (from Study 2) that a further subset of these participants also completed the PCAT questionnaire a second time, 6 weeks later. This allowed for a supplemental, more stringent test of the PCAT's predictive utility. Would the PCAT predict the strength of Tender Emotions aroused by viewing babies, even when measured at a substantially different time? Yes, the PCAT measured at Time 2 (6 weeks later) strongly predicted Time 1 Tender Emotions in both the distressed babies and nondistressed babies conditions ($rs = .84$ and $.76$, $ps < .001$, respectively). In comparison, Empathic Concern at Time 1 was a significantly weaker predictor of Time 1 Tender Emotions ($rs = .51$ and $.57$, $ps < .001$) than was Time 2 PCAT, in both the distressed babies, $t(30) = 3.95$, $p < .001$, and nondistressed babies, $t(36) = 2.15$, $p = .038$, conditions. A multiple regression analysis revealed that, when Time 2 PCAT scores were entered with Time 1 Empathic Concern scores (as well as participant sex, age, and parental status) as predictors of Time 1 Tender Emotions, Time 2 PCAT scores emerged as a unique predictor within both the distressed babies and nondistressed babies conditions (β s = $.69$ and $.86$, $ps < .001$). Empathic Concern did not (β s $\leq .11$, $ps \geq .40$). Thus, tender emotions aroused by visual perception of human infants were predicted better 6 weeks *retrospectively* by the PCAT than they were *concurrently* by Empathic Concern.

Study 4b

Participants were the 213 adult participants (both parents and nonparents) who comprised Sample 5 in Study 3. Among the measures completed by these participants were the PCAT (Cronbach's $\alpha = .94$), Empathic Concern (Cronbach's $\alpha = .86$), and the PRF Nurture subscale (Cronbach's $\alpha = .82$). In addition, participants completed a photo-viewing task in which they were randomly assigned to view photographs of either (a) distressed babies ($n = 72$), (b) distressed adults ($n = 77$), or (c) nondistressed adults ($n = 64$). (The distressed babies and nondistressed adult photos were identical to those used in Study 4a. The distressed adult photos portrayed crying adults; crying men and crying women were equally represented.) Immediately following the photo viewing, participants rated their emotions on the same measure employed in Study 4a. Accordingly, we computed a single index of the extent to which Tender Emotions were aroused by the photographs ($M = 2.97$, $SD = 1.22$; Cronbach's $\alpha = .92$).

We conducted a multiple linear regression with PCAT scores and two dummy-coded condition variables entered at Step 1: C1 (distressed babies = 1, distressed adults = 0, nondistressed adults = 0) and C2 (distressed adults = 1, distressed babies = 0, nondistressed adults = 0). PCAT interactions with condition were

Table 4

PCAT Simple Slopes From Separate Multiple Regression Analyses Predicting Self-Reported Tender Emotions Aroused by Photographs of Either Distressed Babies, Nondistressed Babies, or Nondistressed Adults

Experimental condition	Association between PCAT and Self-reported tender emotions	
	β	β controlling for age, sex, parental status
Distressed babies ($n = 150$)	.73*	.72*
Nondistressed babies ($n = 152$)	.62*	.61*
Nondistressed adults ($n = 149$)	.05	.05

Note. PCAT = Parental Care and Tenderness.

* $p < .001$.

entered at Step 2. The overall interaction with photo condition was significant ($\Delta R^2 = .08, p < .001$) indicating that, as expected, the effect of the PCAT on Tender Emotions varied according to the nature of the photos. (The PCAT interaction with condition was significant for effects involving both distressed babies (PCAT \times C1: $\beta = .69, p < .001$) and distressed adults (PCAT \times C2: $\beta = .37, p < .001$). Replicating Study 4a, simple slopes analyses (reported in Table 5) revealed that the PCAT was a strong and significant predictor of Tender Emotions aroused by viewing distressed babies. The PCAT also predicted Tender Emotions elicited by distressed adults (see Table 5), but the association was weaker than in the distressed babies condition, and this difference was significant ($z = 2.62, p = .009$). As in Study 4a, the PCAT did not predict Tender Emotions aroused by nondistressed adults. The pattern of association remained unaffected when controlling for participant age, sex, and parental status.

For comparison purposes, we conducted two separate multiple regression analyses with photo condition and (either) Empathic Concern or Nurturance entered as predictors of Tender Emotions. In each analysis, interactions with condition were entered at Step 2. The effects of Empathic Concern and Nurturance on Tender Emotions each varied according to photo condition: the overall interactions with Empathic Concern ($\Delta R^2 = .02, p = .04$) and Nurturance ($\Delta R^2 = .06, p < .001$) were significant. The Nurturance interaction with condition was significant for both the distressed babies (Nurturance \times C1: $\beta = .59, p < .001$) and distressed adults (Nurturance \times C2: $\beta = .42, p = .004$) manipulations. Empathic Concern interacted with the distressed babies manipulation (Empathic Concern \times C1: $\beta = .37, p = .03$), but not the distressed adults manipulation (Empathic Concern \times C2: $\beta = .10, p = .57$). Simple slopes analyses (also reported in Table 5) revealed that Nurturance and Empathic Concern were significant predictors of Tender Emotions aroused by distressed babies, but these associations were somewhat weaker than those with the PCAT; the difference in magnitude was significant for Empathic Concern ($z = 4.74, p < .001$), but not for Nurturance ($z = 0.24, p = .80$). In the distressed adults condition, the positive association between Nurturance and Tender Emotions was virtually identical to the association between the PCAT and Tender Emotions (see Table 5). Empathic Concern was also positively associated with Tender Emotions in the distressed adults condition, but neither Nurturance nor Empathic Concern predicted Tender Emotions in the nondistressed adults condition (see Table 5).

Table 5
Simple Slopes From Separate Multiple Regression Analyses Predicting Self-Reported Tender Emotions Aroused by Photographs of Either Distressed Babies, Distressed Adults, or Nondistressed Adults

Experimental condition	Individual difference measures predicting tender emotions		
	PCAT β	Empathic concern β	Nurturance β
Distressed babies ($n = 72$)	.81**	.52**	.67**
Distressed adults ($n = 77$)	.49**	.25*	.50**
Nondistressed adults ($n = 64$)	.12	.15	.08

Note. PCAT = Parental Care and Tenderness.
* $p < .05$. ** $p < .001$.

We conducted a final multiple regression analysis to examine whether the PCAT interactions with condition would remain significant when controlling for Empathic Concern and Nurturance. (Photo condition, PCAT, Empathic Concern, and Nurturance were entered at Step 1, and PCAT interactions with condition were entered at Step 2). As expected, the overall PCAT interaction with condition remained significant ($\Delta R^2 = .07, p < .001$) when controlling for Nurturance and Empathic Concern, and was significant for both the distressed babies (PCAT \times C1: $\beta = .69, p < .001$) and distressed adults (PCAT \times C2: $\beta = .37, p = .008$) manipulations. When controlling for overlap with Nurturance and Empathic Concern, the PCAT remained a significant predictor of Tender Emotions aroused by distressed babies ($\beta = .69, p < .001$) and, to a lesser extent, by distressed adults ($\beta = .37, p < .001$); the difference between distressed babies and distressed adults was significant ($z = 2.40, p = .016$). In contrast, the PCAT was not a significant predictor of Tender Emotions aroused by nondistressed adults ($\beta = .001, p = .99$). The pattern of association also remained unaffected when controlling for participant age, sex, and parental status.

In sum, results across both Studies 4a and 4b attest to the PCAT's construct validity and the unique predictive utility of individual differences in the parental care motive. The PCAT predicted emotional responses to babies (both distressed and nondistressed babies), did so to a greater extent than it predicted emotional responses to adults (including distressed adults), and did so even when controlling for other individual difference measures assessing compassionate response tendencies.

Study 5: Reward Value of Infant Faces

People are willing to expend time and effort to view affectively rewarding images, including images of infant faces (Aharon et al., 2001; Hahn, Xiao, Sprengelmeyer, & Perrett, 2013; Parsons et al., 2011; Sprengelmeyer, Lewis, Hahn, & Perrett, 2013). The subjective reward value of infant faces is likely to be higher among individuals for whom the parental care motive is more chronically activated. If indeed the PCAT provides a measure of this activation, then the PCAT should positively predict the reward value of infant faces, as indicated by individuals' willingness to expend time and effort to view those faces. Furthermore, if individual differences in parental care motivation are conceptually distinct from more general prosocial tendencies, the PCAT should uniquely predict the reward value of infant faces even when controlling for other individual differences in the prosocial domain.

Method and Results

Participants were 103 of the 112 adults who comprised Sample 4 in Study 3. (A total of eight participants failed to complete this task. Data from one participant were excluded because they were an extreme outlier [7.21 *SDs* above the mean] on the dependent variable.) In addition to completing the PCAT questionnaire (Cronbach's $\alpha = .95$) and the PRF Nurturance subscale (Cronbach's $\alpha = .80$), participants were also presented with a computer-based task that behaviorally assessed the subjective reward value of different visual images. (This task was modeled after tasks used in previous research; e.g., Aharon et al., 2001; Parsons et al., 2011;

Sprengelmeyer et al., 2013). Participants viewed a series of 30 photos (500 × 320 pixels in size) displayed one at a time in random order; 15 photos depicted cute babies and another 15 depicted attractive adults (similar to the nondistressed baby and adult images used in Study 4). Each photo had a default display time of 10 s, but participants could increase or decrease the display time by pressing the “up” or “down” arrow keys on their computer keyboard while the photo was on the screen. Each key press adjusted the display time by 1 s. A vertical bar displayed to the right of the photo depicted the time remaining, and it updated with each key press so participants could see the impact of their actions. We computed two composite viewing time measures. One measure assessed the mean time (after key-pressing adjustments) participants spent viewing the 15 photos of babies. A second measure assessed the mean time spent viewing the 15 photos of adults.

Participants generally pressed the “down” arrow key ($M = 7.64$ presses per photo) more often than the “up” arrow key ($M = 1.87$ presses per photo), and so mean viewing times for all photos were less than the default setting of 10 s. (This is unsurprising, given that participants—workers recruited on Mechanical Turk—had preexisting incentives to complete the task quickly.) Mean viewing times were longer for photos of babies (4.75 s [$SD = 4.63$]) than adults (3.69 s [$SD = 3.24$]), $t(102) = 2.44, p = .016, d = .24$. The key question was the extent to which these viewing times were predicted by the PCAT.

As expected, PCAT scores correlated positively with time spent viewing baby photos, $r = .55, p < .001$. (This association was primarily related to “up” arrow presses: The PCAT correlated positively with “up” arrow key presses on baby trials, $r = .38, p < .001$; the negative correlation with “down” arrow key presses was weaker, $r = -.19, p = .057$.) The correlation between the PCAT and time spent viewing baby photos was virtually identical among parents and nonparents ($r_s = .52$) and among women and men ($r_s = .52$ and $.51$, respectively). In contrast, the PCAT was *not* positively correlated with time spent viewing photos of adults ($r = -.12, p = .22$).

Nurturance also correlated positively with time spent viewing baby photos, $r = .36, p < .001$, but to a lesser extent than did the PCAT, $t(100) = 2.87, p = .005$. We conducted a multiple regression analysis on baby viewing time, with PCAT, Nurturance, and adult viewing time as predictors. Results revealed unique effects of adult viewing time ($\beta = .49, p < .001$) and PCAT ($\beta = .60, p < .001$); Nurturance had no unique predictive utility ($\beta = .003, p = .98$). A second multiple regression analysis with adult viewing time and participant demographics (age, sex, and parental status) entered as predictors of baby viewing time at Step 1, and PCAT entered at Step 2, revealed a significant increase in the proportion of variance explained via PCAT scores ($\Delta R^2 = .26, p < .001$); the unique effects of the PCAT ($\beta = .58, p < .001$) and adult viewing time ($\beta = .49, p < .001$) on baby viewing time held even when controlling for participant age ($\beta = .06, p = .44$), male sex ($\beta = -.18, p = .009$), and parenthood ($\beta = -.09, p = .25$).

In sum, for both men and women and for both parents and nonparents, the PCAT uniquely predicted the amount of time people actively chose to spend looking at photos of cute babies. This effect was specific to babies (no such effect was found on time spent looking at images of attractive adults—which are also rewarding, but for conceptually distinct reasons; Aharon et al., 2001). The implication is that people with higher PCAT scores

find the perceptual presence of infants to be more subjectively rewarding, and this incentive value guides their behavior accordingly. These results attest to the potential for individual differences in activation of the parental care motive to predict meaningful psychological consequences. Studies 6, 7, and 8 examined several additional consequences.

Study 6: Inferences About Baby-Faced Adults

Research in person perception reveals that impressions of babies overgeneralize, such that adults with relatively babyish facial features (e.g., small noses, big eyes, round cheeks) are stereotypically assumed to have other characteristics commonly associated with infants. Compared with more mature-faced men, baby-faced men are judged to be warmer and friendlier, for instance, but also less intellectually competent (Montepare & Zebrowitz, 1998). If indeed these biases represent an overgeneralization of responses to actual infants, then the magnitude of these biases may vary depending upon activation of the parental care motivational system. If so, then biased perceptions of baby-faced adults may be predicted by the PCAT.

Exactly how might the PCAT relate to these biased perceptions? Two conceptually distinct hypotheses seem plausible. One hypothesis follows from the possibility that higher-PCAT individuals may be more sensitive to perceptual cues connoting infants’ vulnerability, which would imply a stronger baby-face overgeneralization effect (i.e., higher-PCAT individuals may view baby-faced adults as warmer, but also less competent). A different hypothesis follows from the finding that higher-PCAT individuals find infants more rewarding (Study 5). This implies that they will respond to baby-faced adults as they would toward *any* rewarding stimulus: More positively (i.e., both warmer and more competent). These competing hypotheses were tested in this study.

Method and Results

We conducted a study on 58 undergraduate students (all of whom were nonparents; 79% women). The procedures included a trait inference task, in which participants were shown photographs of 16 different men and were asked to rate (on 9-point rating scales) each man on four traits. Two traits connoted warmth: “friendly” and “mean-spirited” (reverse scored). Two other traits connoted competence: “competent” and “unreliable” (reverse scored). Eight of the men were mature-faced, eight others were baby-faced.⁷ Combining ratings across target faces, we computed composite measures of warmth and competence for both baby-faced and mature-faced photo sets. We subtracted the mature-faced composites from the baby-faced composite to create a two difference scores indicting biased perceptions of warmth and competence. Higher values on these indices indicate more positive impressions—warmer, more competent—of baby-faced adults relative to mature-faced adults.

All participants also completed the PCAT measure (Cronbach’s $\alpha = .87$), assessed after the trait inference task. The procedures

⁷ Stimulus photos were selected from a larger set of photos used in previous research by Cassidy, Zebrowitz, and Gutchess (2012). Based on preratings collected by Cassidy et al., we ensured that the eight baby-faced men and eight mature-faced men were equated on overall physical attractiveness.

also included an experimental manipulation in an attempt to temporarily activate the parental care system: In one condition, participants used first-person pronouns to complete a set of sentences that described small children, whereas in a control condition, they used the same pronouns to complete a grammatically parallel set of sentences that described houseplants. The manipulation had no effect on biased impressions of baby-faced adults ($ps = .18$ and $.70$, for the warmth and competence index, respectively), nor did it affect PCAT scores ($p = .63$). Therefore, for the present analyses we do not consider the experimental manipulation any further.

Preliminary analyses tested whether there was any overall baby-face bias on the warmth and competence difference-score indices. There was evidence of a bias on the warmth index, as indicated by an overall mean significantly greater than zero ($M = 0.28$, $t[57] = 3.83$, $p < .001$). There was no evidence of any overall baby-face bias on the competence index ($M = 0.03$, $t[57] = 0.42$, $p = .68$).

Regardless of the magnitude of these overall biases, our primary analyses focused on the extent to which variability in biased inferences might be predicted by individual differences on the PCAT. Results revealed that the PCAT was positively correlated with the index assessing biased inferences about the warmth of baby-faced adults, $r = .29$, $p = .03$. To a somewhat lesser degree, the PCAT also was positively correlated with the index assessing biased inferences about the competence of baby-faced adults, $r = .22$, $p = .10$.

The exact nature of these results is notable. Higher PCAT was *not* associated with a greater tendency to perceive baby-faced adults as being more baby-like in their dispositions (i.e., more warm but less competent). Rather, higher PCAT was associated with a greater tendency to perceive baby-faced adults—compared with mature-faced adults—in a more generally favorable way; and this overall bias manifested most clearly on inferences about warmth. Two other things are notable. First, these are among the first results to document any personality variable that predicts variability in the baby-face overgeneralization effect. Second, the results reveal that the PCAT not only predicts psychological responses to babies, it also predicts responses to people who are very obviously adults, but who just happen to have babyish facial features.

Study 7: Mate Preferences

Historically, successful child rearing has been facilitated not merely by the care provided by solo parents, but by pairs of parents. Thus, in the case of human pair bonding, the personality characteristics of one's mate may profoundly influence the quality of care available to offspring. If so, the PCAT may predict preferences for mates who are especially likely to be reliable long-term relational partners and caring coparents (i.e., those with the potential to contribute maximally to offspring care). We conducted a study in which we tested whether the PCAT predicts such preferences in a mate.

Method and Results

Participants were 191 heterosexual residents of the United States (M age = 34.97, $SD = 12.93$; 49% women; 36% parents) recruited on Mechanical Turk. After completing a questionnaire assessing demographic details, participants completed tasks as-

sessing mate preferences in both long-term and short-term mating contexts. First, participants imagined that they were interested in entering a committed relationship with someone of the opposite sex, and were asked, "How important to you are the following characteristics in a LONG-term partner (committed relationship, marriage partner)?" After recording responses on a series of rating scales (to be described), participants then imagined that they were interested in having a casual sexual encounter and were asked, "How important to you are the following characteristics in a SHORT-term partner (one-night stand, week-long fling)?" For both the long-term and short-term contexts, participants used 7-point scales (1 = *not at all*, 7 = *very much*) to rate the importance of nine traits that are typically considered desirable in mates (Beall & Schaller, 2014). A principal components analysis, with varimax rotation, revealed two underlying factors (eigenvalues > 1). (The same 2 factors emerged in both long-term and short-term mating contexts, and also when the analysis was conducted separately for men and women.) Five traits loaded on a factor representing traits that are typically desirable in a long-term partner and parent: Kindness and Understanding, Qualities of a Good Parent, Faithfulness/Loyalty, Responsibility, and Stable Personality. The four other traits loaded highly on a factor representing traits connoting sexual attractiveness: Sex Appeal, Health, Physical Fitness, and Physical Attractiveness. We created two composite indices accordingly. (For the index assessing desirable long-term partner and parent traits, Cronbach's $\alpha s = .72$ and $.84$ in the long-term and short-term mating contexts, respectively. For the index assessing sexual attractiveness, Cronbach's $\alpha s = .65$ and $.82$, respectively.)

In addition to completing the PCAT questionnaire (Cronbach's $\alpha = .95$), participants also completed the nine-item Sociosexual Orientation Inventory (SOI-R; Penke & Asendorpf, 2008; Cronbach's $\alpha = .85$), assessing a dispositional tendency toward unrestricted mating. (Sociosexual orientation has previously been shown to predict mate preferences, and to correlate with emotional tenderness; Beall & Schaller, 2014; Simpson & Gangestad, 1992).

Results revealed that the PCAT was positively correlated with the rated importance of desirable long-term partner and parent traits, and this was the case in both long-term, $r = .48$, $p < .001$, and short-term, $r = .29$, $p < .001$, mating contexts. No such correlation was found between the PCAT and the importance placed on sexual attractiveness ($rs = .07$ and $.11$ in long-term and short-term mating contexts, respectively; $ps > .13$).

To more rigorously test the unique ability of the PCAT to predict mate preferences, we conducted regression analyses on the rated importance of desirable long-term partner and parent traits. In addition to the PCAT, the set of predictor variables included SOI-R, age, sex, parental status, and current relationship commitment level (single, committed, married).⁸ In long-term mating contexts, both parental status and current relationship commitment level had unique effects ($\beta s = .17$ and $.21$, respectively; $ps < .04$), and so did the PCAT ($\beta = .26$, $p < .001$). In short-term mating

⁸ The PCAT was positively correlated with current relationship commitment level ($r = .37$, $p < .001$). However, this correlation appears to be largely spurious, and disappeared when controlling for age, sex and parental status (partial $r = .08$, $p = .25$).

contexts, unique effects emerged for both the SOI-R ($\beta = -.21$, $p < .014$) and the PCAT ($\beta = .18$, $p = .036$).

In sum, in a sample that included men and women (and included both parents and nonparents), the PCAT positively predicted a preference for mates with traits indicative of a desirable long-term partner and parent. This effect persisted even when controlling for other variables (including parental status, relationship status, and sociosexual orientation) that predict mate preferences. This was the case not only when participants were specifically asked to consider a long-term partner—the same effect emerged (more weakly) even when rating the preferred qualities of a short-term sexual mate, perhaps because even one-night stands can have long-term relational consequences. It is notable that the PCAT did not predict generally higher standards in mates (it was uncorrelated with the rated importance of sexual attractiveness). Rather, the PCAT predicted a specific preference for mates with the qualities associated with effective parenting (and coparenting) of children.

Study 8: Moral Judgments

Prior research indicates that when the parental care system is activated, people are more risk-averse (Eibach & Mock, 2011; Gilead & Liberman, 2014). Because social norms provide buffers against threats of various kinds, this may have implications for moral judgments. Indeed, when parents are reminded that they are parents, they judge norm violators more harshly (Eibach, Libby & Ehrlinger, 2009). If activation of parental care motives—even among nonparents—mimics this risk-averse parental mindset, the PCAT should be positively correlated with the harshness of moral judgments—especially those involving threats to child welfare. If so, the effect of the PCAT on moral judgments would be expected to persist even when controlling for other individual difference variables that might plausibly predict the harshness of moral judgments. Much research shows that concerns about infection predict the harshness of moral judgments (Chapman & Anderson, 2013; Murray & Schaller, 2012). We therefore examined the unique effect of the PCAT on moral judgments when controlling for perceived vulnerability to disease. Empathic concern (Davis, 1983) was also examined as a control variable.

Method

Participants. Participants were 155 nonparent undergraduate students (79% women) who took part in two studies in which the PCAT and moral judgments were assessed. Both studies also included experimental manipulations immediately prior to the moral judgment measures. The manipulations—designed to potentially activate the parental care system—differed across the two experiments. In one study ($n = 72$), participants looked at photographs of either cute animals or furniture; in the other study ($n = 83$), participants completed sentences that described either children or houseplants. Neither manipulation had statistically significant effects on any of the moral judgment indices (all $ps > .09$). Therefore, for the present analyses, we combined results across experimental conditions and across both studies into a single data set.

Materials. Participants completed two measures assessing moral judgments. One measure consisted of 13 items describing potentially harmful transgressions of social norms (adapted from

Murray & Schaller, 2012). Participants were asked to rate how morally wrong each transgression is (1 = *not at all morally wrong*, 9 = *very morally wrong*). Three of these items described behaviors that potentially put children at risk (“A parent allows their child to ride in a car without wearing a seatbelt”; “A pregnant mother smokes cigarettes and drinks alcohol”; “A bus driver drives a busload of children through a busy city with an expired driver’s license”). The other 10 items did not invoke risk to children (e.g., “A surgeon uses tools that she knows have not been properly sanitized”; “A student cheats on a final exam”). We computed an overall norm transgression index as the mean rating across all 13 items (Cronbach’s $\alpha = .84$). We also conducted separate analyses on subscales corresponding to the three transgressions that put children at risk (Cronbach’s $\alpha = .49$) and the 10 other transgressions (Cronbach’s $\alpha = .82$).

On a separate measure, participants were presented with three scenarios describing people who violated cultural taboos. (One scenario described a starving woman who ate the body of a dead boy; another described a man who ate his pet dog after it was killed by a car; the third described cousins who had sexual intercourse). For each taboo violation, participants rated (on 7-point scales) how morally wrong it was and how severely the protagonist(s) should be punished. We computed a taboo violation index as the mean of the six ratings across the three scenarios (Cronbach’s $\alpha = .73$).

All participants completed the PCAT questionnaire (Cronbach’s $\alpha = .86$). In one of the two studies, the PCAT was completed at the beginning of the session, prior to completing the moral judgment measures; in the other study, the PCAT was completed at the conclusion of the session. In the latter study, there was no evidence that PCAT scores were affected by the experimental manipulation that occurred earlier in the session, $p = .32$. All participants also completed the Germ Aversion subscale of the Perceived Vulnerability to Disease questionnaire (Duncan, Schaller, & Park, 2009; Cronbach’s $\alpha = .76$). Participants in one of two studies ($n = 72$) also completed a measure of Empathic Concern (Davis, 1983; Cronbach’s $\alpha = .79$).

Results

Results revealed that the PCAT was positively correlated with both the taboo violation index, $r = .20$, $p = .011$, and the norm transgression index, $r = .21$, $p = .008$. Further analyses on the norm transgression index revealed a stronger effect on the three-item subscale comprised of items that put children at risk, $r = .32$, $p < .001$, than on subscale comprised of the other 10 items, $r = .14$, $p = .074$.

When both Germ Aversion and PCAT scores were entered as predictors in regression analyses, the PCAT still uniquely predicted moral judgments of taboo violators ($\beta = .22$, $p = .005$) and of norm violators who potentially put children at risk ($\beta = .32$, $p < .001$). When both PCAT and Empathic Concern scores were entered as predictors in regression analyses, neither the PCAT nor Empathic Concern uniquely predicted moral judgments of taboo violators ($ps > .18$), whereas the PCAT (but not Empathic Concern) did uniquely predict moral judgments of norm violators who put children at risk ($\beta = .36$, $p = .007$).

In sum, these results reveal that higher PCAT scores are associated with harsher moral judgments of people who violate cultural norms. The unique predictive utility of the PCAT emerges espe-

cially when these norm violations pose some evident threat to the welfare of children.

General Discussion

The PCAT questionnaire was designed to assess individual differences in activation of the parental care motivational system, and to do so among both parents and nonparents alike. The 25 PCAT items tap into a range of response tendencies—including liking for children, protective attitudes toward children, and a propensity to experience emotional caring and tenderness in the presence of young infants—as indicated by the underlying five-factor structure. High estimates of internal consistency and the presence of strong positive correlations among the underlying factors indicate that the PCAT questionnaire reliably taps into a single, coherent individual difference construct. Test–retest analyses showed high levels of stability over time. A variety of additional results attested to construct validity. PCAT scores were predictably higher among parents (compared with nonparents) and women (compared with men). The PCAT correlated positively with measures of nurturance, empathy, and other prosocial dispositions; with reward-responsiveness—a specific kind of approach-oriented motivational tendency; and with a trait-like tendency to experience emotions (especially positive emotions) more strongly than others. Among parents, the PCAT predicted responses indicating close caring relationships with offspring. Among nonparents, it predicted a desire to have children.

Among parents and nonparents alike, individual differences measured by the PCAT predicted the time individuals chose to spend looking at photos of cute babies (whereas they did not predict the time spent looking at attractive adults). Such individual differences proved strongly predictive of the intensity of tender emotions elicited by the visual perception of babies and, to a lesser extent, vulnerable adults. Additional studies revealed that the individual differences captured by the PCAT also predicted the tendency to form relatively positive impressions of baby-faced adults (relative to equally attractive mature-faced adults), to show a stronger preference for mates with traits that are diagnostic of a good coparent, and to judge norm violators more harshly (especially when the norm violation has the apparent potential to put children at risk). The latter set of findings indicate that individual differences in activation of the parental care motive have implications not just for psychological responses to children but also for a broader array of phenomena pertaining to social judgment and interpersonal interaction.

Importantly, even though this individual difference construct is predictably correlated with a variety of conceptually related constructs, it appears to have unique predictive utility—as indicated by the fact that the results summarized in the preceding paragraph persisted even when controlling for other conceptually relevant variables. For example, even when controlling for individual differences in broader dispositional tendencies toward nurturance and compassion, the PCAT still uniquely predicted the time spent viewing photos of babies, the intensity of tenderness responses elicited by babies, and moral judgments of people whose norm violations potentially put children at risk. Indeed, the PCAT helps explain correlations between other individual differences and certain kinds of psychological outcomes. For instance, other individual difference variables (including nurturance, empathic concern,

and femininity) also are correlated with nonparents' desire to have children, but these correlations were almost completely mediated by individual differences in activation of the parental care motive.

Considered in full, the results reported here provide substantial validation of the PCAT questionnaire as a measure of individual differences in the parental care motive, as well as preliminary evidence attesting to unique predictive and explanatory utility of this individual difference construct. Assessment of chronically activated parental care motivation may prove fruitful for testing many additional hypotheses bearing on a variety of different psychological phenomena. For instance, neuroimaging research has found that (among both parents and nonparents) the perception of young children stimulates increased activity in the dopaminergic reward pathway (Bartels & Zeki, 2004; Caria et al., 2012; Strathearn, 2011). This finding highlights the reward value of infant cues and attests to the operation of a motivational system governing affective response to such stimuli. If, as seems likely, this motivational system operates in the service of parental care, the effect of such stimuli on dopaminergic activity is likely to be greater among individuals who score more highly on the PCAT questionnaire.

Dispositional variability in parental care motivation might also moderate cognitive and behavioral consequences associated with the perceptual salience of young children and other stimuli with prototypically infantile features. When parents are temporarily led to think about their children, they consequently engage in more risk-averse decision making (Eibach & Moch, 2011); when nonparents are asked to look at cute baby animals, they exhibit greater caution in their motor movements (Sherman et al., 2009); and circumstances that make caregiving more salient lead both parents and nonparents to exhibit increased prejudice toward threatening outgroups (Gilead & Liberman, 2014). These effects, and others like them, may emerge more strongly among individuals with higher PCAT scores.

Individual difference measures are useful not only for testing hypotheses, but may assist in directing scientists' attention to those hypotheses in the first place. For example, research on the motivational psychology of disease-avoidance was invigorated in the 1990s by the development of a questionnaire assessing individual differences in the emotion associated with that motivational system (Haidt et al., 1994). In the absence of that practical tool, conceptual progress on the topic is likely to have proceeded more slowly. The same principles may apply to research on the parental care motivational system. It has been more than a century since McDougall (1908) observed that parental care is “the most powerful of instincts.” Yet inquiry into the implications of the parental care motivational system remains in infancy, crying out for systematic research attention. The PCAT measure may prove useful in that endeavor.

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