


Individual Differences in Activation of the Parental Care Motivational System: An Empirical Distinction Between Protection and Nurturance

Social Psychological and
Personality Science
2018, Vol. 9(8) 907-916
© The Author(s) 2017
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/1948550617728994
journals.sagepub.com/home/spp


Marlise K. Hofer¹, Erin E. Buckels¹, Cindel J. M. White¹,
Alec T. Beall¹, and Mark Schaller¹

Abstract

Previous research reveals that individual differences in parental caregiving motives have implications (among both parents and nonparents) for a wide range of psychological outcomes. Here we report reanalyses of existing data sets to examine the extent to which these outcomes are uniquely predicted by two conceptually distinct factors underlying the parental caregiving motive: *protection* and *nurturance*. In doing so, we also psychometrically validate a brief self-report measure designed to efficiently assess individual differences in protection and nurturance. Results reveal that individual differences in parental protection uniquely predict a specific subset of attitudes and judgments (e.g., endorsement of restrictive parenting practices, harsher moral judgments of adults who violate social norms), whereas individual differences in parental nurturance uniquely predict a different subset of attitudes and judgments (e.g., nonparents desire to have children, preferences for committed romantic partners, more lenient moral judgments of children who violate social norms).

Keywords

parental care, motivation, individual differences, moral judgment, scale validation

The provision of parental care to offspring has implications for reproductive fitness; as a consequence, humans—both parents and nonparents—possess a motivational system that facilitates caring responses to human infants (Preston, 2013; Rilling, 2013). The activation of this system varies across individuals, and these individual differences have unique implications for a wide range of psychological responses (Buckels et al., 2015). The associated responses include some that are obviously relevant to parental caregiving (e.g., parents' emotional responses to infants) and others that are less so (e.g., nonparents' mate preferences, moral judgments, and impressions of baby-faced adults). Here we examine two conceptually distinct factors underlying parental caregiving: inclinations to protect and inclinations to nurture. We report results testing the extent to which these factors have similar versus different implications for various psychological outcomes. In doing so, we also describe a new short (10-item) self-report measure that assesses individual differences in parental protection and nurturance.

The conceptual significance of—and distinction between—parental protection and nurturance follows from the observation that offspring fitness is facilitated by parental behaviors that (1) protect offspring from immediate harm and (2) provide the kind of nurturant support that allows offspring to thrive and

flourish. These two dimensions of parental behavior are evident in the behavior of nonhuman animals. Female rodents display both maternal aggression and maternal nurturance (Bosch, 2013), and these two components of parental care function in distinct ways: Female rodents will display nurturance for unrelated pups but do not protect them from intruders (Martín-Sánchez et al., 2015). Two dimensions of parental care are also evident in the study of human affect, cognition, and behavior. The existence of a protection dimension of parental care in humans is empirically supported by research documenting that breastfeeding mothers are more aggressive toward hostile strangers than formula-feeding mothers or women who are not mothers (Hahn-Holbrook, Holt-Lunstad, Holbrook, Coyne, & Lawson, 2011) and by results showing that both parents and nonparents exhibit an exaggerated negative response to threat when a parental mind-set is experimentally induced (Gilead & Liberman, 2014). The existence of a nurturance dimension

¹University of British Columbia, Vancouver, British Columbia, Canada

Corresponding Author:

Marlise Hofer, Department of Psychology, University of British Columbia, 2136 West Mall, Vancouver, British Columbia, Canada V6T 1Z4.
Email: hofer@psych.ubc.ca

of parental care is empirically supported by evidence—among parents and nonparents alike—that the visual appearance of babies is rewarding, elicits feelings of warmth and tenderness, and induces an inclination to provide care (Alley, 1983; Buckels et al., 2015; Glocker et al., 2009).

Although recent research has revealed that individual differences in parental caregiving motives have implications for a wide range of psychological outcomes (Buckels et al., 2015), it is unknown whether those effects reflect the unique implications of a motivational inclination to protect, nurture, or both. This uncertainty stems in part from limitations of the available measures and in part from limitations of prior research employing these measures.

One relevant instrument is the Fundamental Social Motives Inventory (Neel, Kenrick, White, & Neuberg, 2015), which—among many other items assessing other motives—includes a 6-item subscale that assesses individual differences in motivational inclinations toward parental caregiving. This subscale is limited in two ways: It is targeted specifically to parents (all items explicitly make reference to respondents' own children); and its small pool of items provides no means of reliably discriminating between protective and nurturant inclinations.

Another relevant measure is the Parental Care and Tenderness (PCAT) Scale (Buckels et al., 2015), a 25-item questionnaire designed solely to assess individual differences in parental care motivation. It can be administered to both parents and nonparents. It contains 5 subscales—one of which (comprised by 5 items) pertains specifically to an inclination to protect children from harm, while the other four subscales (comprising a total of 20 items) assess liking for children, caring responses to children, feelings of tenderness toward children engaged in endearing actions, and feelings of tenderness toward children engaged in aversive actions. According to results reported by Buckels et al. (2015), the latter four subscales correlate highly with each other (r s ranging from .56 to .75), whereas their relations to the Protection subscale are weaker (r s ranging from .36 to .51)—suggesting that a more conceptually fundamental distinction between protection and nurturance may underlie the set of positively correlated subscales. The results reported by Buckels et al. (2015) focused on *total* PCAT scores rather than subscale scores and thus do not reveal the extent to which underlying protective and nurturant tendencies might differentially predict the various outcomes predicted by PCAT. More recently, Beall and Schaller (in press) found that motivational inclinations toward short-term mating correlated positively with the PCAT-Protection subscale and negatively with subscales assessing liking, caring, and tenderness—a result suggesting that, although related, protective and nurturant inclinations may indeed have distinct psychological implications.

The primary purpose of this article, therefore, is to directly address the extent to which attitudes and judgments associated with parental care reflect protective tendencies, nurturant tendencies, or both. In doing so, we also created a new, short version of the PCAT Questionnaire (PCAT-pn) that provides a better balance between items assessing these two

conceptually distinct caregiving tendencies and contains just two subscales: one assessing parental protection and the other one assessing parental nurturance. We reanalyzed the data sets reported by Buckels et al. (2015)—which linked PCAT total scores to a variety of outcomes in the domain of attitudes and social cognition (e.g., child-rearing attitudes, mate preferences, impressions of baby-faced adults)—in order to assess the extent to which the Protection and Nurturance subscales uniquely predicted those outcomes. We also reanalyzed several additional data sets to more rigorously assess the extent to which the Protection and Nurturance subscales uniquely predict moral judgments.

Method and Results

Creation and Validation of the PCAT-pn

Item selection. Item selection for PCAT-pn Scale was based on data obtained from 2,511 participants who completed the 25-item PCAT Questionnaire (as well as a variety of other measures; see below). Each participant was allowed to complete the scale only once; duplicate responses were removed. For expository ease, we refer to this data set as “Sample 1.” (Sample size was determined by using all data available to the researchers; this sample size surpasses minimum sample size requirements for factor analysis; MacCallum, Widaman, Zhang, & Hong, 1999.) This data set includes data from previously published studies (Buckels et al., 2015) as well as data from several additional unpublished studies. The sample included 1,796 adults recruited from Amazon's Mechanical Turk website, and 715 university students who participated in exchange for extra credit in undergraduate psychology courses. Some participants neglected to provide requested demographic information; among those who did, 1,413 were female and 1,069 were male, and 855 were parents and 1,622 were nonparents. The mean age was 29.48 ($SD = 11.58$) and ranged from 16 to 76 years old.

To ascertain whether protection and nurturance were the primary conceptual factors underlying the 25 PCAT items, we performed an exploratory factor analysis (principal axis and oblimin rotation) in all 25 items, restricting extraction to two factors. One factor contained high loadings for all 5 protection items ($>.4$). A second factor, in which all 5 reverse-scored items loaded highly ($>.5$), was interpreted as a method factor. The remaining 15 items loaded almost equally onto the protection and method factors. To account for the presence of a method (reverse scored) factor, we conducted a second exploratory factor analysis, which constrained extraction to three factors. This produced three clearly identifiable factors: protection, nurturance, and method. These results informed selection of 10 items to comprise the PCAT-pn measure. Reverse-scored items were eliminated from consideration, in order to avoid reversed-item method bias (Weijters, Baumgartner, & Schillewaet, 2013). The Protection subscale was comprised of the four highest loading items on the protection factor. The Nurturance subscale was comprised of 6 items

Table 1. Structure Matrix Loadings for the 10 Items of the Parental Care and Tenderness -pn Scale on Protection and Nurturance Components (Sample 1).

PCAT-pn Item	Nurturance	Protection
1. I would hurt anyone who was a threat to a child.	.29	.83
2. I would show no mercy to someone who was a danger to a child.	.31	.78
3. I would use any means necessary to protect a child, even if I had to hurt others.	.30	.68
4. I would feel compelled to punish anyone who tried to harm a child.	.38	.63
5. Babies melt my heart.	.77	.28
6. You watch as a toddler takes their first step and tumbles gently back down.*	.77	.33
7. When I see infants, I want to hold them.	.72	.24
8. You make a baby laugh over and over again by making silly faces.*	.72	.35
9. You see that a baby is sick.*	.64	.32
10. You hear a young child trip and fall, and begin to cry.*	.62	.29

Note. $N = 2,511$. Items without an asterisk were accompanied by the following instructions: "Please rate how much you agree with the following statements." Items marked with an asterisk were accompanied by a different set of instructions: "Tenderness describes a warm, gentle feeling of sympathetic affection. Below are various hypothetical scenarios that may or may not evoke this feeling. Please rate how much tenderness you would feel in each situation. If you are unsure, go with your gut reaction." For details on accompanying response scales, see Buckels et al. (2015).

satisfying the selection criteria that the items (a) loaded highly on the nurturance factor (>0.6), (b) evenly represented the 3 PCAT subscales that were included in the nurturance factor, and (c) had diverse semantic content. The final 10 items are displayed in Table 1.¹

Verification of the two-factor structure. In order to verify the two-factor solution, the 10 PCAT-pn items were entered into an exploratory factor analysis (principal axis and oblimin rotation). Factor loadings indicated a two-factor structure (factor loadings are displayed in Table 1).

Parallel analysis was conducted to compare observed eigenvalues to those expected from randomly generated data. Parallel analysis adjusts for the effects of sampling error and provides a more accurate estimate of factors than the often used "eigenvalue > 1 " criterion (Hayton, Allen, & Carpello, 2004). Eigenvalues observed in the data were compared to mean eigenvalues from 5,000 randomly generated data sets. When eigenvalues observed in the data were larger than those generated by chance, the factor was retained. Results verified a two-factor solution (Figure 1).

Confirmatory factor analysis. A separate sample of 1,733 participants ("Sample 2") completed the 10-item PCAT-pn Questionnaire. The sample was recruited from Amazon's Mechanical Turk website, and includes all available data, with the exception of 65 individuals who failed to respond appropriately to "attention check" questions. Among participants who provided demographic information, 1,020 were

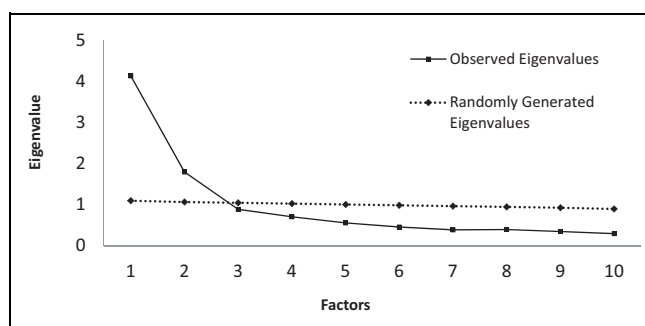


Figure 1. Solid line represents scree plot of observed eigenvalues. Dashed line represents mean eigenvalues from 5,000 randomly generated data sets. Factor 1 (nurturance) and Factor 2 (protection) were retained as their eigenvalues exceeded eigenvalues obtained from randomly generated data.

female and 711 were male, and 772 were parents and 957 were nonparents. Mean age was 36.67 ($SD = 12.71$) and ranged from 18 to 86 years old. Using this data set, the 10 items in the PCAT-pn Scale were entered into a confirmatory factor analysis. Because the exploratory factor analysis indicated a two-factor solution, we tested a two-factor model, with the 4 items referring to child protection loading on one factor (protection) and the remaining 6 items loading on a second factor (nurturance). This two-factor model provided a much better fit to the data, $\chi^2(34) = 1,043.96$, $p < .001$, Comparative fit index (CFI) = .91, Root mean square error of approximation (RMSEA) = .13, than did an alternative one-factor model, $\chi^2(35) = 3,470.60$, $p < .001$, CFI = .68, RMSEA = .24. However, according to exact fit or approximate fit measures, the two-factor model did not provide a satisfactory model fit (see recommendation by Hu & Bentler, 1999; Kline, 2011). Therefore, to further improve model fit, we included correlated residuals for the three pairs of items in the PCAT-pn Nurturance subscale that loaded on three separate factors of the full 25-item PCAT Scale (Buckels et al., 2015). This model provided a good fit to the data, $\chi^2(31) = 135.29$, $p < .001$, CFI = .99, RMSEA = .04² (for loadings, structure, item level descriptive statistics, and item correlation matrix, see Figure S1 and Table S2 in the Supplemental Material).

Given these results, a Protection subscale was computed as the mean response to the first 4 items in Table 1, and a Nurturance subscale was computed as the mean response to the remaining 6 items. The two subscales are moderately positively correlated ($r_s = .39$ and $.49$ in Samples 1 and 2, respectively).

Psychometric properties of the PCAT-pn. Among Sample 1 participants, overall scores on the 10-item PCAT-pn Scale correlated highly with overall scores on the original 25-item PCAT measure, $r = .92$. A subsample of 218 participants from Sample 1 completed all PCAT items at two different points in time, separated by either 3 weeks ($n = 113$) or 6 weeks ($n = 105$), allowing us to assess test-retest reliability for the PCAT-pn Scale: for the overall PCAT-pn, test-retest $r = .89$; for the Protection and Nurturance subscales, test-retest $r_s = .76$ and

Table 2. Mean [and 95% Confidence Interval] Values of Parental Care and Tenderness (PCAT)-pn Total Scores and Subscale Scores, Among Different Demographic Categories of Participants (Sample 2).

Demographic Category	Total PCAT-pn	n	PCAT-pn Subscale	
			Nurturance	Protection
Female				
Parents	4.21 [4.16, 4.26]	520	4.25 [4.19, 4.31]	4.14 [4.08, 4.21]
Nonparents	3.60 [3.52, 3.67]	497	3.53 [3.44, 3.61]	3.70 [3.62, 3.78]
Male				
Parents	3.87 [3.79, 3.94]	458	3.80 [3.71, 3.89]	3.96 [3.87, 4.06]
Nonparents	3.37 [3.29, 3.45]	252	3.19 [3.10, 3.28]	3.64 [3.56, 3.73]

Note. $N = 1,727$. Original sample size of 1,733 is reduced by six people who did not respond to demographics questions.

.90, respectively. We assessed internal consistency on data obtained from Sample 2 participants. Results revealed high internal consistency for the total PCAT-pn score (Cronbach's $\alpha = .90$) and for both the Protection and Nurturance subscales (Cronbach's α s = .90 and .88, respectively). Means, standard deviations, and item correlations between PCAT-pn items are presented in Table S2 of the Supplemental Material.

Female/male and parent/nonparent differences. Table 2 summarizes mean values on the PCAT-pn measure separately among four subcategories of participants from Sample 2, according to participants' identification as either female or male and as either parent or nonparent. A 2 (sex) \times 2 (parental status) analyses of variance was conducted on both Nurturance and Protection subscale scores. On the Nurturance subscale, there were statistically significant main effects for both sex, $F(1, 1723) = 78.85, p < .001, \eta^2 = .04$, and parental status, $F(1, 1723) = 227.25, p < .001, \eta^2 = .12$. On the Protection subscale, there were also statistically significant—but less pronounced—main effects for both sex, $F(1, 1723) = 7.43, p = .006, \eta^2 < .01$, and parental status, $F(1, 1723) = 75.52, p < .001, \eta^2 = .04$. On neither subscale was there an interaction effect ($ps > .14; \eta^2$ s $< .01$); however, it is worth noting that there was a statistically significant mean difference between female and male nonparents on the Nurturance subscale, but not on the Protection subscale (see confidence intervals in Table 2).³

Assessment of Unique Predictive Utilities of the Protection and Nurturance Subscales

Reanalyses of results reported in Buckels et al.'s study. Across a series of studies, Buckels et al. (2015) reported two kinds of results: (a) Results that validated the 25-item PCAT measure by assessing its correlation with a variety of personality trait measures (e.g., dispositional warmth and empathic concern) and measures of tender emotional responses to infants, and (b) results revealing that the overall PCAT score was a statistically significant predictor of specific social attitudes and social judgments. The former set of results are of minimal conceptual

interest here (because the measures documenting convergent validity are transparently more relevant to nurturance than to protection—an expectation borne out by results documented in the Supplemental Material, Table S5). Therefore, the reanalyses reported below focus on the latter set of results reported by Buckels et al. (2015). These reanalyses were designed, for each outcome that was previously shown to be predicted by PCAT, to assess the extent to which it is uniquely predicted by inclinations toward parental protection and parental nurturance. Accordingly, for each outcome, we computed partial correlations in which the PCAT-pn Protection and Nurturance subscales were used to predict outcomes while controlling for the other subscale. (In a second analysis, we computed partial correlations that also controlled for any effects due to participants' sex and parenthood status.)

For each analysis, we employed data sets described by Buckels et al. (2015), all of which were subsets of Sample 1. No data were excluded, and sample sizes were determined by the constraints of the existing data sets.⁴

Table 3 identifies each of the key outcome measures and partial correlations. In the following paragraphs, we provide additional methodological details (for more complete methodological information, see Buckels et al., 2015).

Child-rearing attitudes. Parents and nonparents ($n = 101$) completed the modified Block child-rearing practices report (Rickel & Biasatti, 1982). It contains two subscales: one assessing attitudes toward nurturing parenting practices (parental n) and the other assessing attitudes toward restrictive parenting practices (parental restrictiveness). Results revealed that only the Nurturance subscale uniquely predicted the former, while only the Protection subscale uniquely predicted the latter.

Punitive attitudes toward children. Parents and nonparents ($n = 208$) completed a questionnaire assessing punitive attitudes toward children's misbehavior (Haskett, Scott, Willoughby, Ahern, & Nears, 2006). Only nurturance uniquely (and negatively) predicted these punitive responses.

Parental involvement in child's education. Parents ($n = 47$) completed a questionnaire assessing their personal involvement in their youngest child's education (Fantuzzo, Tighe, & Childs, 2000). Only nurturance uniquely predicted parental involvement in child's education.

Parents' self/child identity overlap. Parents ($n = 43$) responded to a modified single-item Inclusion of Other in the Self Scale (Aron, Aron, & Smollan, 1992), designed to assess the extent to which they perceived their own identity to overlap with their youngest child. Neither subscale had a statistically significant unique effect on inclusion of child in the self (although the effect associated with nurturance approached significance; and low sample size is a nontrivial inferential constraint).

Nonparents' desire to have children. Nonparents ($n = 515$) rated the extent to which they wished to have children in the future. Only nurturance uniquely predicted their desire to have children.

Table 3. Reanalyses of Buckels et al. (2015): Partial Correlations (With *p* Values) [95% Confidence Intervals] Between Parental Care and Tenderness (PCAT)-pn Subscales and Specific Attitudes and Social Judgments.

Measure	<i>n</i>	Correlation With Nurturance		Correlation With Protection	
		<i>r</i> ₁	<i>r</i> ₂	<i>r</i> ₁	<i>r</i> ₂
Child-rearing attitudes					
Parental Nurturance	101	.30 (.002) [.14, .48]	.29 (.004) [.13, .49]	.09 (.377) [−.12, .31]	.09 (.395) [−.12, .30]
Parental restrictiveness	101	−.14 (.180) [−.28, .05]	−.10 (.309) [.29, .09]	.21 (.035) [−.01, .40]	.22 (.034) [.01, .40]
Punitive attitudes toward children	208	−.26 (<.001) [−.39, −.12]	−.17 (.013) [−.31, −.04]	.04 (.529) [−.10, .19]	.05 (.446) [−.09, .19]
Parental involvement in child's education	47	.32 (.031) [.02, .56]	.29 (.051) [−.08, .58]	.21 (.167) [−.05, .45]	.21 (.172) [−.06, .46]
Parents' self/child identity overlap	43	.30 (.057) [−.08, .60]	.29 (.064) [−.07, .56]	.20 (.205) [−.05, .47]	.20 (.210) [−.05, .50]
Nonparents' desire to have children	515	.45 (<.001) [.37, .53]	.47 (<.001) [.39, .54]	.02 (.619) [−.06, .11]	.01 (.748) [−.08, .10]
Time spent looking at cute babies	103	.47 (<.001) [.29, .59]	.42 (<.001) [.24, .55]	−.05 (.597) [−.24, .13]	−.05 (.639) [−.22, .13]
Inferences about baby-faced adults					
Competence	58	.17 (.213) [−.06, .38]	.13 (.356) [−.14, .36]	.02 (.912) [−.25, .24]	.03 (.849) [−.24, .24]
Warmth	58	.16 (.250) [−.07, .38]	.12 (.391) [−.16, .34]	.22 (.102) [−.08, .48]	.23 (.090) [−.09, .48]
Short-term mate preferences					
Sexual attractiveness	191	.00 (.956) [−.15, .14]	−.06 (.398) [−.20, .07]	.13 (.076) [.00, .26]	.13 (.079) [−.01, .25]
Committed partner/parent traits	191	.33 (<.001) [.19, .45]	.22 (.002) [.07, .37]	−.14 (.054) [−.28, .04]	−.15 (.045) [−.30, .01]
Long-term mate preferences					
Sexual attractiveness	191	.05 (.542) [−.11, .20]	−.06 (.419) [−.08, .23]	.01 (.940) [−.14, .16]	.01 (.917) [−.12, .15]
Committed partner/parent traits	191	.42 (<.001) [.29, .53]	.23 (.002) [.08, .36]	.09 (.246) [−.07, .23]	.08 (.254) [−.07, .24]

Note. Partial correlations labeled *r*₁ control for the other PCAT-pn subscale; partial correlations labeled *r*₂ control for the other PCAT-pn subscale and control also for participants' sex and parental status. Participants who neglected to provide demographic information (less than 2%) are excluded from *r*₂ partial correlations. In samples with all parents (or all nonparents), parental status was omitted. Bold items are statistically significant at *p* < .05. Additional details—including descriptive statistics bearing on each variable and zero-order correlations between variables—are presented in the Supplemental Materials.

Time spent looking at cute babies. Parent and nonparent participants (*n* = 103) viewed 15 photos of cute babies, displayed one at a time. Each photo had a default display time of 10 s, and participants could increase or decrease the display time by pressing designated keys. Mean viewing time was computed. Only nurturance uniquely predicted viewing time.

Inferences about baby-faced adults. Nonparents (*n* = 58) were shown photographs of 16 men, 8 of which were mature faced and 8 of which were baby faced. Based on these photos, they rated their impressions of each man on traits connoting either competence or warmth. Mean ratings of mature-faced men were subtracted from mean ratings of baby-faced men to create indices measuring the extent to which there was a baby-face bias in perceptions of competence and warmth. Neither subscale had a statistically significant unique relationship with either index (although low sample size is a nontrivial inferential constraint).

Mate preferences. Parents and nonparents (*n* = 191) rated the extent to which various traits were important qualities of a short-term mating partner and also important qualities of a long-term mating partner. Some traits connoted sexual attractiveness; other traits represented characteristics of a committed partner and parent. Composite indices were computed accordingly. No correlation was found between the PCAT-pn subscales and the importance placed on sexual attractiveness. The Nurturance subscale was positively correlated with the rated importance of committed partner/parent traits, in the context of both short-term and long-term mating. The Protection subscale was negatively correlated with the rated importance of committed partner/parent traits in the context of short-term mating.

Reanalyses conducted on additional data sets focusing on moral judgments. Parental caregiving is associated with risk aversion (Eibach & Mock, 2011; Gilead & Liberman, 2014),

Table 4. Reanalyses Conducted on Additional Data Sets Pertaining to Moral Judgments: Partial Correlations (With *p* Values) [and 95% Confidence Intervals] Between Parental Care and Tenderness (PCAT) and Moral Judgment Measures.

Measure	<i>n</i>	Correlation With Nurturance		Correlation With Protection	
		<i>r</i> ₁	<i>r</i> ₂	<i>r</i> ₁	<i>r</i> ₂
Potentially harmful norm violations	351	.17 (.001) [.07, .27]	.13 (.019) [.02, .23]	.13 (.012) [.04, .23]	.14 (.007) [.04, .23]
Taboo violations	351	.15 (.004) [.04, .26]	.11 (.050) [.00, .21]	.12 (.030) [.01, .22]	.13 (.018) [.02, .23]
High-disgust norm violations by adults	210	−.05 (.511) [−.19, .06]	−.04 (.567) [−.18, .11]	.16 (.026) [.02, .27]	.15 (.037) [.03, .27]
Low-disgust norm violations by adults	200	−.05 (.457) [−.21, .13]	−.05 (.454) [−.21, .11]	.18 (.013) [.00, .34]	.18 (.011) [.02, .33]
High-disgust norm violations by children	210	−.26 (<.001) [−.38, −.11]	−.27 (<.001) [−.40, −.12]	.05 (.450) [−.10, .20]	.05 (.477) [−.10, .19]
Low-disgust norm violations by children	200	−.24 (.001) [−.39, −.06]	−.19 (.006) [−.35, .01]	−.10 (.145) [−.27, .07]	−.10 (.161) [−.26, .07]

Note. Partial correlations labeled *r*₁ control for the other PCAT-pn subscale; partial correlations labeled *r*₂ control for the other PCAT-pn subscale and control also for participants' sex and parental status. Participants who neglected to provide demographic information (less than 2%) are excluded from *r*₂ partial correlations. In samples with all parents (or all nonparents), parenthood status was omitted. Bold items are statistically significant at *p* < .05. Descriptive statistics and zero-order correlations for these variables are available in Supplemental Material.

and—because people who break social norms may pose risks to others—this has implications for moral judgments about social norm violations. When parents are reminded of their parental status, they make harsher moral judgments (Eibach, Libby, & Ehrlinger, 2009). Additionally, Buckels et al. (2015) reported results showing that PCAT scores are positively correlated with the harshness of moral judgments about adults who engaged in a variety of potentially harmful or taboo activities. In order to more clearly examine the relationship between parental protection and nurturance on moral judgments, additional participants were added to the data set described by Buckels et al. (2015). In addition, we conducted analogous reanalyses on an additional data set in which participants completed the 10-item PCAT-pn measure and made moral judgments about transgressions committed by either adults or children.

These reanalyses were designed to assess the extent to which each moral judgment measure was uniquely predicted by inclinations toward parental protection and parental nurturance. Accordingly, we computed partial correlations in which the PCAT-pn Protection and Nurturance subscales were used to predict these outcomes while controlling for the other subscale. (In a second analysis, we computed partial correlations that also controlled for any effects due to participants' sex and parenthood status.) Data sets described here were originally collected for other purposes, and sample sizes were determined by the constraints of the existing data sets (for considerations bearing on statistical power, see Note 4). Table 4 identifies each outcome measure and reports the partial correlations. The following paragraphs provide additional details.

Moral judgments about potentially harmful norm violations. Combining across two separate samples, 351 undergraduate students (273 women, 78 men; *M*_{age} = 20.05, *SD* = 2.34; all nonparents) were presented with nine brief descriptions of

adults engaging in potentially harmful counternormative behavior (e.g., “A car mechanic installs a car part that he knows might be unsafe”) and rated the moral wrongness of each norm violation.⁵ A composite moral judgment index was computed as the mean of these nine ratings. Participants also completed the 25-item PCAT Questionnaire; on the basis of these responses, we computed the Nurturance and Protection subscale scores. Both the Nurturance and Protection subscales uniquely predicted the harshness of moral judgments.

Moral judgments of taboo violations. The same 351 undergraduate students were presented with three scenarios describing adults who violated cultural taboos (e.g., incest and cannibalism) and rated each taboo violation according to how morally wrong it was and how severely it should be punished. A composite moral judgment index was computed as the mean of the six ratings across the three scenarios. Both the Nurturance and Protection subscales uniquely predicted the harshness of these moral judgments.

Moral judgments of disgusting norm violations. A subset of 410 participants from Sample 2 (228 women, 182 men; 164 parents, 245 nonparents; *M*_{age} = 35.77, *SD* = 12.55) read two vignettes describing potentially disgusting norm violations. Participants were randomly assigned to read about norm violations that either elicited high levels of disgust (e.g., a houseguest who “smears a handful of his own feces all over your bathroom wall”; *n* = 210) or lower levels of disgust (e.g., a houseguest who “smears a handful of grape jelly all over your living room wall”; *n* = 200). Within conditions, one vignette identified the perpetrator as an adult, whereas the other identified the perpetrator as a young child. Participants rated each norm violation according to how “morally wrong,” “inappropriate,” “offensive,” and “deserving of punishment” it was and also rated the extent to which they would “forgive” (reverse scored),

“avoid,” “have goodwill” (reverse scored), and “find it difficult to act warmly” toward the perpetrator. A composite moral judgment index was computed as the mean of the eight ratings (Cronbach’s $\alpha = .88$ and $.84$, for adult and child perpetrators, respectively). Participants also completed the 10-item PCAT-pn Questionnaire. White and Schaller (2017) reported that the overall PCAT-pn score predicted harsher moral judgments of adult perpetrators and more lenient judgments of child perpetrators. Reanalyses reveal that only Protection uniquely predicted harsher judgments about adults (this was the case for both high- and low-disgust violations), whereas only nurturance uniquely predicted more lenient judgments about young children (this was the case for both high- and low-disgust violations).

Discussion

These results complement previous research on the motivational psychology of parental care (e.g., Buckels et al., 2015; Eibach & Mock, 2011; Hahn-Holbrook et al., 2011; Gilead & Liberman, 2014) and make several novel contributions—both conceptual and practical—to the study of individual differences in parental caregiving motives.

The results suggest that there are two major conceptual factors that underlie individual differences in activation of the parental care motivational system. One factor reflects a motivational inclination to protect young children from imminent harm. The other factor reflects an approach-oriented response toward children (as indicated by the tendency to view children as affectively rewarding) and a motivational inclination to treat children in a supportive and nurturant manner. These two factors (which we have called “protection” and “nurturance”) can be measured efficiently and reliably by the 10-item PCAT-pn Questionnaire.

The distinction between protection and nurturance is evident in the kinds of psychological outcomes that are, and are not, predicted by these two underlying factors. The protection motive uniquely predicted attitudes endorsing restrictive parenting practices, whereas the nurturance motive uniquely predicted attitudes and behaviors that are emblematic of supportive, involved, and nonpunitive parenting styles. Nonparents’ desire to have children is strongly predicted by nurturance, but not at all by protection. Also, a preference for short-term mates who are likely to be committed and caring partners was positively predicted by nurturance, whereas it was *negatively* predicted by protection.

Of particular note are results bearing on moral judgments. Previous research has shown that the activation of parental caregiving motives is associated with harsher moral judgments (Buckels et al., 2015; Eibach et al., 2009) but did not address whether this result reflected motivational inclinations toward protection, nurturance, or both. Our results suggest that the answer may indeed be both. Reanalyses of results reported by Buckels et al. (2015) and Hofer (2015) revealed that the Protection and Nurturance subscales had unique effects of equivalent magnitude on moral judgments.

Reanalyses of a different data set revealed that protection (but not nurturance) predicted harsher moral judgments in response to adults’ transgressions, whereas nurturance (but not protection) predicted more lenient judgments in response to the same transgressions by children. These various results suggest that the relative influence of protective and nurturant motivational tendencies on moral judgments may vary depending upon the specific context. And even though the specific pattern of results differed across these different moral judgment studies, the results consistently attest to the conceptual distinction between the protective and nurturant elements of parental caregiving.

The distinction between parental protection and parental nurturance is also evident in the size of sex differences that emerged on each subscale. Whereas the sex difference was substantial on PCAT-Nurturance scores, it was much smaller on PCAT-Protection scores. These findings fit with evolutionary perspectives on parenting (e.g., Geary, 2000; Taylor et al., 2000). Sex differences in reproductive physiology (e.g., lactation) compel human mothers (but not fathers) to maintain physical contact with and provide specific forms of nurturance to newborn offspring. In contrast, sex differences in reproductive physiology do not impose the same constraints on protective behaviors (e.g., both mothers and fathers may readily engage in behaviors that protect infants from predatory attacks). It is likely that, historically, both nurturant and protective behavioral inclinations were substantially associated with female inclusive fitness; in contrast, male inclusive fitness may have been associated somewhat more with protective inclinations than with nurturant inclinations.

The distinction between parental nurturance and parental protection may correspond to broader conceptual distinctions that have been identified within the motivational literature, such as the approach/avoidance distinction and the promotion/prevention distinction (Higgins, 1997). Our results provide some evidence bearing on the former, in the form of correlations with individual differences in behavioral approach and avoidance (the BIS/BAS Scales; Carver & White, 1994; see Table S5 in the Supplemental Material). Although PCAT-Nurturance scores do correlate positively with individual differences in reward sensitivity—which is associated with behavioral approach—and Protection subscale scores do not, neither subscale correlates with individual differences in behavioral avoidance. Conceptually, the provision of parental nurturance would appear to require approach-oriented behavior toward offspring; but, depending on the particular circumstances, the provision of protection may require either approach-oriented behavior (e.g., aggression against a predatory threat) or avoidance-oriented behavior (e.g., avoidance of a source of parasitic infection). The distinction between nurturance and protection may correspond more readily with orientations toward the promotion of positive outcomes versus the prevention of negative outcomes. We obtained no evidence that directly addresses this possibility; it remains for future research to more rigorously articulate connections to this and other domain-general motivational distinctions.

In addition to its conceptual contributions, this research provides a practical tool for researchers interested in measuring activation of the parental care motivational system. Overall, the PCAT-pn Scale (which is available in the Appendix) correlates very highly with overall scores obtained from the original 25-item PCAT scale, and other psychometric properties of the two scales are similar. Therefore, the PCAT-pn Scale offers a useful short alternative to the full PCAT in research contexts within

which time or resources are constrained. And, although its underlying factor structure is less nuanced than that of the 25-item PCAT Questionnaire, the 10-item PCAT-pn reliably assesses the two most conceptually fundamental factors that underlie individual differences in the parental care motive. Rigorous empirical attention to these two factors may facilitate a more nuanced understanding of the parental care motivational system and its psychological consequences.

Appendix

Table A1. PCAT-pn Questionnaire.

A. Instructions: The first part of this questionnaire relates to your personality and personal preferences. Please rate how much you agree with the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. When I see infants, I want to hold them.	1	2	3	4	5
2. I would feel compelled to punish anyone who tried to harm a child.	1	2	3	4	5
3. I would hurt anyone who was a threat to a child.	1	2	3	4	5
4. Babies melt my heart.	1	2	3	4	5
5. I would use any means necessary to protect a child, even if I had to hurt others.	1	2	3	4	5
6. I would show no mercy to someone who was a danger to a child.	1	2	3	4	5

B. Instructions: TENDERNESS describes a “warm, gentle feeling of sympathetic affection.” Below are various hypothetical scenarios that may or may not evoke this feeling. Please rate how much TENDERNESS you would feel in each situation. If you are unsure, go with your gut reaction.

	No tenderness at all				A lot of tenderness
7. You hear a young child trip and fall, and begin to cry.	1	2	3	4	5
8. You watch as a toddler takes their first step and tumbles gently back down.	1	2	3	4	5
9. You make a baby laugh over and over again by making silly faces.	1	2	3	4	5
10. You see that a baby is sick. ^a	1	2	3	4	5

^aA thoughtful reviewer pointed out that all but one of the nurturance items specifically refer to babies or infants, whereas all of the protection items refer to children. Thus, researchers may choose to compensate for this difference by replacing “child” with “baby” in some of the protection items.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by Insight Grant #435-2012-0519 from the Social Sciences and Humanities Research Council of Canada.

Acknowledgments

The author(s) thank Dr. Kurt G. Hofer for valuable feedback and edits on an earlier version of this manuscript.

Supplemental Material

The supplemental material is available in the online version of the article.

Notes

1. We also confirmed these results by conducting tests using a graded-response multidimensional item response theory approach (Chalmers, 2012; for analytic details, see Supplemental Material).
2. Because the likelihood of a significant χ^2 value increases with sample size, and this analysis has $N = 1,733$, χ^2 does not provide a diagnostic indicator of model fit. Therefore, we base our interpretation primarily on approximate fit measures (CFI and RMSEA).
3. We also conducted tests of measurement invariance to assess the appropriateness of comparing mean differences across these sets of demographic categories (Milfont & Fischer, 2010). Both comparisons (men vs. women and parents vs. nonparents) demonstrated metric and scalar invariance, indicating that the different mean scores between groups was not caused by different methods of responding to scale items, and group means can be meaningfully compared. Full details of measurement invariance can be found in the Supplemental Material.
4. A power analysis revealed that, with power = 80%, and $\alpha = 0.05$, a sample size of $N = 84$ would be necessary in order for our

statistical model to produce a statistically significant effect if one assumes a medium effect ($r = .30$). Given the constraints of the existing data sets, some of the analyses described are conducted on smaller samples. The results should be interpreted accordingly.

5. Buckels et al. (2015) reported results from one of these two samples: 155 participants who rated the moral wrongness of 13 norm violations. Nine of these norm violations were rated by an additional sample of 196 participants (Hofer, 2015). Ratings of the nine violations completed by all participants are analyzed here.

References

- Alley, T. (1983). Infantile head shape as an elicitor of adult protection. *Merrill-Palmer Quarterly*, *29*, 411–427.
- Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, *63*, 596–612. doi:10.1037/0022-3514.63.4.596
- Beall, A. T., & Schaller, M. (in press). Evolution, motivation, and the mating/parenting trade-off. *Self and Identity*. doi:10.1080/15298868.2017.1356366
- Bosch, O. J. (2013). Maternal aggression in rodents: Brain oxytocin and vasopressin mediate pup defence. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *368*, 1–11. doi:10.1098/rstb.2013.0085
- Buckels, E. E., Beall, A. T., Hofer, M. K., Lin, E. Y., Zhou, Z., & Schaller, M. (2015). Individual differences in activation of the parental care motivational system: Assessment, prediction, and implications. *Journal of Personality and Social Psychology*, *108*, 497–514. doi:10.1037/pspp0000023
- Carver, C. S. & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology*, *67*, 319–333. doi:10.1037/0022-3514.67.2.319
- Chalmers, R. P. (2012). mirt: A multidimensional item response theory package for the R environment. *Journal of Statistical Software*, *48*, 1–29. doi:10.18637/jss.v048.i06
- Eibach, R. P., Libby, L. K., & Ehrlinger, J. (2009). Priming family values: How being a parent affects moral evaluations of harmless but offensive acts. *Journal of Experimental Social Psychology*, *45*, 1160–1163. doi:10.1016/j.jesp.2009.06.017
- Eibach, R. P., & Mock, S. E. (2011). The vigilant parent: Parental role salience affects parents' risk perceptions, risk-aversion, and trust in strangers. *Journal of Experimental Social Psychology*, *47*, 694–697. doi:10.1016/j.jesp.2010.12.009
- Fantuzzo, J., Tighe, E., & Childs, S. (2000). Family involvement questionnaire: A multivariate assessment of family participation in early childhood education. *Journal of Educational Psychology*, *92*, 367–376. doi:10.1037/0022-0663.92.2.367
- Geary, D. C. (2000). Evolution and proximate expression of human paternal investment. *Psychological Bulletin*, *126*, 55–77. doi:10.1037/0033-2909.126.1.55
- Gilead, M., & Liberman, N. (2014). We take care of our own: Caregiving salience increases out-group bias in response to out-group threat. *Psychological Science*, *25*, 1380–1387. doi:10.1177/0956797614531439
- Glocker, M. L., Langleben, D. D., Ruparel, K., Loughhead, J. W., Gur, R. C., & Sachser, N. (2009). Baby schema in infant faces induces cuteness perception and motivation for caretaking in adults. *Ethology*, *115*, 257–263. doi:10.1111/j.1439-0310.2008.01603.x
- Hahn-Holbrook, J., Holt-Lunstad, J., Holbrook, C., Coyne, S. M., & Lawson, E. T. (2011). Maternal defense: Breast feeding increases aggression by reducing stress. *Psychological Science*, *22*, 1288–1295. doi:10.1177/0956797611420729
- Haskett, M. E., Scott, S. S., Willoughby, M., Ahern, L., & Nears, K. (2006). The Parent Opinion Questionnaire and child vignettes for use with abusive parents: Assessment of psychometric properties. *Journal of Family Violence*, *21*, 137–151. doi:10.1007/s10896-005-9010-2
- Hayton, J. C., Allen, D. G., & Scarpello, V. (2004). Factor retention decisions in exploratory factor analysis: A tutorial on parallel analysis. *Organizational Research Methods*, *7*, 191–205. doi:10.1177/1094428104263675
- Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, *52*, 1280–1300.
- Hofer, M. K. (2015). *Parenting & precaution: How the parental care motivation impacts moral judgments of social norm violations* (master's thesis). University of British Columbia, Canada. doi:10.14288/1.0165766
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1–55. doi:10.1080/10705519909540118
- Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York, NY: Guilford Press.
- MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods*, *4*, 84–99. doi:10.1037/1082-989X.4.1.84
- Martín-Sánchez, A., Valera-Marín, G., Hernández-Martínez, A., Lanuza, E., Martínez-García, F., & Agustín-Pavón, C. (2015). Wired for motherhood: Induction of maternal care but not maternal aggression in virgin female CD1 mice. *Frontiers in Behavioral Neuroscience*, *9*, 197. doi:10.3389/fnbeh.2015.00197
- Milfon, T. L., & Fischer, R. (2010). Measurement invariance across groups: Applications in cross-cultural research. *International Journal of Psychological Research*, *3*, 111–121. doi:10.21500/20112084.857
- Neel, R., Kenrick, D. T., White, A. E., & Neuberg, S. L. (2015). Individual differences in fundamental social motives. *Journal of Personality and Social Psychology*, *110*, 887–907. doi:10.1037/pspp0000068
- Preston, S. D. (2013). The origins of altruism in offspring care. *Psychological Bulletin*, *139*, 1305–1341. doi:10.1037/a0031755
- Rickel, A. U., & Biasatti, L. L. (1982). Modification of the Block child rearing practices report. *Journal of Clinical Psychology*, *38*, 129–134. doi:10.1002/1097-4679
- Rilling, J. K. (2013). The neural and hormonal bases of human parental care. *Neuropsychologia*, *51*, 731–747. doi:10.1016/j.neuropsychologia.2012.12.017
- Taylor, S. E., Klein, L. C., Lewis, B. P., Gruenewald, T. L., Gurung, R. A. R., & Updegraff, J. A. (2000). Biobehavioral responses to stress in females: Tend-and-befriend, not fight-

or-flight. *Psychological Review*, 107, 411–429. doi:10.1037/0033-295X.107.3.411

Weijters, B., Baumgartner, H., & Schillewaet, N. (2013). Reversed item bias: An integrative model. *Psychological Methods*, 18, 320–334.

White, C. J. M., & Schaller, M. (2017). *Are children perceived to be morally exceptional? Different sets of psychological variables predict adults' moral judgments about adults and about young children*. Unpublished manuscript, University of British Columbia, Canada.

Author Biographies

Marlise Hofer is a PhD student in the social–personality psychology program at UBC. She studies human social relationships and communication.

Erin E. Buckels is a PhD student in the social–personality psychology program at UBC. She studies the personality determinants of human behavior with a particular interest in the moral domain.

Cindel J. M. White is a PhD student in the social–personality psychology program at UBC. She studies human social cognition and religious beliefs.

Alec T. Beall is a postdoctoral scholar in the psychology department at UBC. He studies human parenting, romantic attraction, and how they interact.

Mark Schaller is a professor of psychology at UBC. He conducts research on human motivational systems and their implications for social cognition and social behavior.

Handling Editor: Gregory Webster