

Stranger Danger

Parenthood Increases the Envisioned Bodily Formidability of Menacing Men

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19 **Abstract**

20

21 Due to altriciality and the importance of embodied capital, children’s fitness is contingent
22 on parental investment. Injury suffered by a parent therefore degrades the parent’s fitness
23 both by constraining reproduction and by diminishing the fitness of existing offspring.

24 Due to the latter added cost, compared to non-parents, parents should be more cautious in
25 hazardous situations, including potentially agonistic interactions. Prior research indicates
26 that relative formidability is conceptualized in terms of size and strength. As erroneous
27 under-estimation of a foe’s formidability heightens the risk of injury, parents should
28 therefore conceptualize a potential antagonist as larger, stronger, and of more sinister
29 intent than should non-parents; secondarily, the presence of one’s vulnerable children
30 should exacerbate this pattern. We tested these predictions in the U.S. using reactions to
31 an evocative vignette, administered via the Internet (Study 1), and in-person assessments
32 of the facial photograph of a purported criminal, collected on the streets of Southern
33 California (Study 2). As predicted, parents envisioned a potential antagonist to be more
34 formidable than did non-parents. Significant differences between parents with children
35 and non-parents without children in the threat that the foe was thought to pose (Study 1)
36 were fully mediated by increases in estimated physical formidability.

37

38 Keywords: parenthood, relative formidability, threat detection, violence, children

39

40 **1. INTRODUCTION**

41

42 Humans are unique among primates in both the altriciality of our offspring and
43 the degree to which learning and other forms of embodied capital can affect offspring
44 fitness (Kaplan et al., 2003). This combination creates the potential for a high rate of
45 return on parental investment. We can therefore expect natural selection to have favored
46 the evolution of multiple psychological adaptations regulating a variety of behaviors
47 related to parenting. To date, considerable work has explored factors bearing directly on
48 parental investment, including, for example, mechanisms active in attraction to infants
49 (Glocker et al., 2009; Parsons et al., 2011), parent-infant bonding (Bowlby, 1982; Carter,
50 2005; Feldman et al., 2010), and discriminative parental solicitude (Daly & Wilson,
51 1995). More recently, investigators have begun to explore the consequences of
52 parenthood for social relations with third parties, a notable example being the effects of
53 lactation on maternal aggression toward transgressing adults (Hahn-Holbrook et al.,
54 2011). Such work dovetails with studies in animal behavioral ecology that explore
55 responses to the risk of infanticide (van Schaik & Janson, 2000). Importantly, logic
56 suggests that the consequences of parenthood for relations with potentially dangerous
57 third parties extends beyond the period when offspring are infants, and, indeed, beyond
58 situations in which offspring are in harm's way. Specifically, the potential for
59 substantially enhancing the success of one's children through continued investment over
60 a period of many years means that parental injury degrades a parent's fitness not merely
61 by limiting or truncating the parent's reproduction, but also by reducing the fitness of
62 existing offspring (Hurtado & Hill, 1992; Scelza, 2010). Correspondingly, for

63 individuals pursuing a reproductive strategy involving substantial parental investment,
64 parenthood should notably influence social cognition with regard to potentially agonistic
65 situations.

66

67 The impact of parenthood on social cognition in potentially agonistic contexts can
68 be decomposed into at least three separable but interrelated components. First, given the
69 consequences of parental injury for offspring fitness, we can expect parenthood to be
70 accompanied by a decrease in the propensity to take risks with one's health and welfare:
71 when the probabilities of both positive and negative outcomes are known, relative to non-
72 parents, parents should display a reduced preference for options that, though potentially
73 yielding large rewards, are also accompanied by a risk of injury (Campbell, 1999; Hahn-
74 Holbrook et al., 2011; Wang et al., 2009). As a consequence, in general, when facing an
75 antagonist, parents should be less inclined to engage in combat than non-parents. One
76 important exception to this generalization concerns situations in which the antagonist
77 threatens the parent's child, in which case, by virtue of their vested interest in the child's
78 welfare, parents can be expected to be more inclined than non-parents to engage in
79 combat (Maestriperi, 1992). Second, when others' intentions are unclear, parents should
80 display more conservative error management strategies (Galperin & Haselton, in press) in
81 estimating said intentions. The threshold for presuming that another harbors hostile
82 intent should thus be lower in parents than in non-parents, as this will reduce the
83 likelihood that the perceiver will fail to identify an assailant – in short, parents should
84 assess potential assailants as more malevolent in ambiguous situations, since failing to
85 identify an attack is more costly than is falsely suspecting attack in a benign context.

86 With the exception of the reversal of parents' aversion to combat in parental defensive
87 aggression when attack is imminent (Hahn-Holbrook et al, 2011), the presence of one's
88 child should intensify parental misgivings about others' intentions in ambiguous
89 situations, as the child's vulnerability increases the value of a pessimistic estimation in
90 this regard. Third, when faced with an apparently agonistic context, in deciding whether
91 to fight, attempt to negotiate, or flee, parents should be more pessimistic than non-parents
92 in estimating the fighting capacity, or formidability, of an antagonist relative to
93 themselves, as this will reduce the likelihood that the parent will suffer injury due to
94 inaccurate predictions of possible outcomes. In this case, too, the presence of one's child
95 should intensify the pattern of pessimism. Here, after reviewing existing evidence in
96 support of parental combat avoidance, risk-aversion, and distrust, we present results from
97 two studies concerning the influence of parenthood on the estimation of physical
98 formidability, a hitherto unexplored topic.

99

100 Parental avoidance of combat is a subsidiary category of a predicted general
101 propensity for high-investing parents to be more averse than non-parents to situations
102 involving a risk of injury (i.e., physical risk). One indirect index consonant with the
103 predicted pattern is the finding that, across anthropoid primates, sex differences in
104 survival rates reflect the degree and direction of sex differences in parental care (Allman
105 et al., 1998). However, survival rates are admittedly determined by many factors; to date,
106 surprisingly little research addresses the question of whether parents are less likely to
107 engage in physical risk-taking in general, and violence in particular, than non-parents.
108 Beginning with the animal literature, studies of mice (Parmigiani et al., 1999) and howler

109 monkeys (Cancelliere, 2012) reveal increases in precautionary behavior – presumably
110 corresponding with increased aversion to physical risk – in females with dependent
111 offspring. In humans, given the links between testosterone and aggression and related
112 forms of risk-taking (reviewed in Yildirim & Derksen, 2012), it is suggestive that
113 paternal testosterone declines following the birth of a child (Gettler et al., 2011; Gray &
114 Campbell, 2009); cross-sectional evidence suggests that similar patterns occur in women
115 as well (Kuzawa et al., 2010). However, the applicability of these observations is limited
116 in that the principal proximate determinant of aggressiveness may be the plasticity of
117 testosterone levels rather than baseline testosterone levels (Carré et al., 2011). Baseline
118 testosterone is associated with financial risk-taking (Stanton et al., 2011), and, for both
119 sexes, parents have a lower tolerance for financial risk than non-parents (Chaulk et al.,
120 2003). Relatedly, among non-parents, women, but not men, show greater risk-aversion in
121 a gambling task when a baby will share the proceeds compared to when the recipient is
122 an adult (Fischer & Hills, 2012). However, the relevance of these findings is unclear
123 given that financial risk-taking may be a poor predictor of participation in activities
124 entailing a risk of injury (Blais & Weber, 2006).

125

126 Criminal offending frequently entails the possibility of violence and injury. For
127 both men and women, high-investing parenthood is associated with reduced offending
128 (Ganem & Agnew, 2007), particularly for individuals of higher socioeconomic status
129 (Giordano et al., 2011). In regard to social conflict in more everyday settings, compared
130 to non-parents, parents report lesser likelihood of engaging in risky behaviors in two
131 domains, within-group competition and between-group competition, both of which entail

132 the possibility of violence (Wang et al., 2009). A small interview study finds reduced
133 self-reported male physical risk-taking following the birth of a child (Garfield et al.,
134 2010), although the qualitative nature of the results limits their robustness. More broadly,
135 a large economic survey documents that parents are more willing than non-parents to pay
136 for programs that reduce the risk that they will suffer serious health problems (Cameron
137 et al., 2010).

138

139 In a series of papers, Eibach and colleagues explore the relationship between
140 parenthood, perceptions of danger, and related considerations such as distrust.
141 Correlating reported perceptions of increases in danger in society with the year in which
142 participants' children were born, Eibach, Libby, and Gilovich (2003) find that parenthood
143 appears to make the world seem more dangerous (similarly, Drottz-Sjöberg and Sjöberg
144 [1990] find that parents perceive nuclear energy to be more dangerous than do non-
145 parents). Subsequent studies indicate that reminding individuals of their status as parents
146 (by placing a demographic question concerning parenthood prior to dependent measures)
147 enhances parents' perceptions of the dangerousness of a variety of features of the world,
148 including the dangerousness of extreme sports, and the risk of criminal victimization
149 (Eibach & Mock, 2011; Eibach et al., 2012). Somewhat surprisingly, one of these studies
150 found no difference in perceptions of danger between parents and non-parents when
151 parents were not reminded of their parenthood (Eibach & Mock, 2011). Consonant with
152 the above patterns, Eibach and Mock (2011) also found that, when (and only when) their
153 status as parents was primed, parents reported greater distrust of strangers than non-

154 parents, and made less trusting (and less risky) decisions in hypothetical economic
155 games.

156

157 Lastly, turning to parents' concerns for the welfare of their children rather than
158 themselves, obsessive and intrusive postpartum ideation concerning potential hazards to
159 infants occurs in both mothers and fathers, albeit more so in the former (Abramowitz et
160 al., 2003). More broadly, when compared with parental concerns regarding other hazards
161 present in the contemporary environment, fear that one's children will be harmed by
162 strangers looms disproportionately large in light of the actual risks that such individuals
163 pose, a distortion explicable in terms of the operation of psychological mechanisms that
164 evolved in a world in which conspecifics were a prominent threat (Hahn-Holbrook et al.,
165 2010).

166

167 To summarize the above, although the literature is surprisingly sparse given both
168 the theoretical and the practical importance of the topic, nevertheless, there is some
169 evidence that, compared to non-parents, parents are more likely to avoid risk-taking in
170 general, physical risk-taking in particular, and violence as a specific case. The small
171 subset of studies among these that tap issues of parental distrust of other's intentions are
172 similarly consonant with theoretical expectations that parents should be more pessimistic
173 in this regard than non-parents. Against this backdrop, we turn to the background for our
174 novel prediction, that parents will be more pessimistic than non-parents in estimating the
175 formidability of a potential assailant.

176

177 Formidability is always relative to a given agonistic context, as the outcome of a
178 violent conflict hinges not on one's absolute fighting capacity, but on one's fighting
179 capacity relative to that of one's foe. A wide variety of factors contribute to relative
180 formidability, including strength, body size, sex, health, the possession of weapons,
181 combat expertise, and the size and cohesiveness of coalitions. Such variety poses a
182 challenge. In situations of potential violent conflict, individuals must rapidly decide
183 whether to fight, flee, appease, or negotiate – the actor faces the problem of needing to
184 consider multiple diverse attributes of the foe and of the self and quickly arrive at a
185 decision as to how to act. When manifold factors contribute to a decision, it is often
186 useful to compile the relevant information into a single representation. An emerging
187 corpus of work indicates that, consonant with the phylogenetic antiquity and ontogenetic
188 ubiquity of size and strength as important variables in this regard, the diverse
189 determinants of relative formidability are summarized in a representation that employs
190 the dimensions of size and strength: in essence, the greater the foe's formidability relative
191 to one's own, the larger and stronger the foe is conceptualized as being. It is important to
192 emphasize here that the aforementioned thesis refers to issues of representation, not to
193 issues of perception. Size and strength are features of a minds-eye image that
194 summarizes a wide variety of tactical assets and liabilities possessed by the prospective
195 combatants – the mind represents potential foes as large and muscular when the foe
196 possesses notable tactical advantages over oneself, and as small and non-muscular when
197 the opposite obtains. There is thus no suggestion that actual perceptual processes (or, at
198 the least, 'perception-for-action' processes – [Milner & Goodale, 2008]) will be
199 influenced by tactical attributes of either party – indeed, it would likely be maladaptive

200 were this to occur, as, at a minimum, it would lead to a reduction in the effectiveness of
201 offensive or defensive tactics (e.g., missed blows stemming from inaccurate perceptions
202 of the opponent's height, etc.).

203

204 Consistent with the above hypothesis, knowing that a man possesses a gun or a
205 knife increases estimations of his size and muscularity (Fessler et al., 2012); conversely,
206 the presence of allies who could assist in a fight diminishes such estimations (Fessler &
207 Holbrook, 2013a). Likewise, learning that the leader of a terrorist group has suffered
208 military defeats, or, alternately, experienced successes, leads participants to respectively
209 decrease or increase their estimations of the size and strength of a representative terrorist
210 (Holbrook & Fessler, 2013). Being temporarily physically incapacitated leads men to
211 perceive an antagonist as larger and stronger, and themselves as smaller (Fessler &
212 Holbrook, 2013b), while a man's own strength is inversely correlated with his
213 estimations of an antagonist's physical formidability (Fessler et al., in press [a]).
214 Knowing that an individual is relatively indifferent to the possibility of injury or death –
215 and thus is unlikely to back down in a conflict – increases estimations of his size and
216 strength (Fessler et al., in press [b]). Racist stereotypes portraying outgroup members as
217 dangerous are accompanied – and mediated – by conceptualizations of increased size and
218 muscularity (Holbrook et al., n.d.). More broadly, being made to feel powerful leads
219 participants to underestimate a target individual's size (Yap et al., 2013; Duguid &
220 Goncalo, 2012) and overestimate their own (Duguid & Goncalo, 2012).

221

222 The above findings concerning the representation of relative formidability provide
223 an avenue for exploring parental pessimism in formidability assessment, as asking
224 parents and non-parents to provide estimates of another individual’s size and muscularity
225 constitutes an unobtrusive means of measuring predicted differences in the degree to
226 which they are pessimistic in evaluating the formidability of a potential assailant. We
227 therefore conducted two studies in the U.S., the first online and the second in person, in
228 which we asked participants to estimate the height, body size, and muscularity of a target
229 individual presented as a likely foe. If parental pessimism occurs, then parents should
230 envision the stranger as larger and more muscular than should non-parents.

231

232 In Study 1, we asked participants to read an evocative vignette (adapted from
233 Petralia & Gallup, 2002; see ESM) wherein the reader imagines him- or herself alone in a
234 dark parking lot, having been followed – and ultimately approached – by an unfamiliar
235 man; participants are then asked to estimate the antagonist’s bodily characteristics. This
236 design also affords an auxiliary exploration of parental distrust, as we can ask participants
237 to judge the man’s intentions and the corresponding danger that he poses, then explore
238 the relationship between these judgments and perceptions of the man’s relative
239 formidability.

240

241 To investigate the predicted exacerbating effect of the presence of one’s child on
242 both parental pessimism in formidability assessment and parental distrust, in a separate
243 condition, we modify the vignette, asking parents to envision themselves accompanied by
244 their child (see ESM). However, should we observe that these parents respond

245 differently than the parents who envisioned themselves alone, this observation by itself
246 would not allow us to determine whether this effect is unique to the parent-child dyad. It
247 is likely that, in the contemporary United States, most people believe that adults have a
248 responsibility to protect children. As a consequence, while kin selection considerations
249 predict an enhanced effect of the presence of one's own child compared to the effect of
250 the presence of an unrelated child, nevertheless, the presence of any child may lead to
251 increased caution in detecting potentially hostile agents and assessing their relative
252 formidability. To tease apart these respective contributions, we add a condition in which
253 parents are asked to envision themselves accompanied by an unrelated child (see ESM).
254 Lastly, because the same broad moral considerations apply to non-parents, we add a
255 condition in which non-parents are asked to envision themselves accompanied by an
256 unrelated child (see ESM).

257

258 **2.0 STUDY 1 METHODS**

259

260 **2.1 Participants**

261

262 Via the nationwide market research firm uSamp (Encino, CA), 650 adult residents
263 of the U.S. were recruited to participate in an online study described as a “survey of
264 social intuitions” in exchange for \$1. To be eligible, prospective participants had to be
265 married (thus ensuring comparability between parents and non-parents with regard to
266 relationship status), between the ages of 26 and 35 (a common age range for parents of

267 young children), and, for those who were parents, have at least one child under the age of
268 5 (thus ensuring that the envisioned child would be vulnerable to aggression).

269

270 Data were pre-screened to ensure that participants met the eligibility criteria and
271 provided complete responses. The final sample consisted of 609 adults (53.2% female),
272 with a mean age of 31.5 years ($SD = 2.26$). Although we had contracted for equal
273 numbers of parents and non-parents, some individuals identified by uSamp as non-
274 parents reported having children: 74.7% of the sample were parents (52.1% mothers),
275 with a mean of 2.25 children ($SD = .96$). Among parents, the mean age of their youngest
276 child was 2.83 years ($SD = 1.63$). The ethnicity of the sample was 83.4% White, 7.1%
277 Asian, 4.9% Hispanic, and 4.6% Black.

278

279 **2.2 Materials and procedures**

280

281 After providing informed consent, participants were assigned to read one of three
282 different vignettes in which the reader is the protagonist (see ESM). In the *alone*
283 condition, non-parents read a vignette in which the protagonist is alone and is approached
284 by a potentially threatening unfamiliar man. In the *with child* condition, the non-parent
285 sample read a similar vignette in which the protagonist is accompanied by the 4-year-old
286 child of a neighbor with whom the protagonist has a passing acquaintance (this detail was
287 added to ensure plausibility regarding the presence of the child while minimizing
288 ancillary strategic considerations, such as how treatment of the child might affect the
289 protagonist's relationship with the child's parents, etc.) (see ESM). Parents also read

290 vignettes in which the protagonist is alone or with the neighbor's child. Finally, parents
291 in the *own child* condition read a version in which the reader is accompanied by his or her
292 own young child (see ESM). Thus, there were five conditions: non-parents alone ($N =$
293 69), parents alone ($N = 166$), non-parents with a neighbor's child ($N = 85$), parents with a
294 neighbor's child ($N = 159$), and parents with their own child ($N = 130$).

295

296 After reading the assigned vignette, participants were asked to estimate the
297 physical attributes of the unfamiliar man; the vignettes contained no cues as to his bodily
298 characteristics. In fixed order, participants estimated the stranger's height, overall body
299 size, and muscularity. Height was estimated in feet and inches; two arrays of six images
300 each were used to estimate overall size and muscularity, respectively (see ESM Fig. 1).
301 For each of these three ratings, standardized z-scores were calculated by subtracting the
302 mean rating in the entire sample from the individual rating, then dividing this difference
303 by the standard deviation for the sample. To simplify between-condition contrasts, the
304 target's estimated physical formidability was then composited using the standardized
305 values of the three ratings ($\alpha = .51$) (although a score of at least .7 is generally considered
306 necessary to establish statistical reliability, lower scores are acceptable in exploratory
307 studies such as this, particularly if the measure is comprised of few or notably non-
308 redundant items [Nunnally, 1978; Robinson, Wrightsman, & Andrews, 1991]).
309 Composite scores greater than zero are thus above average for the entire sample, and
310 composite scores less than zero are below average for the entire sample.

311

312 Following the estimations of the stranger’s bodily traits, participants rated the
313 threat they imagined him to pose by answering two questions: “How dangerous do you
314 think the man is?” (1 = *Not at all dangerous*, 9 = *Extremely dangerous*), and “What sort
315 of intentions do you think the man has?” (1 = *Innocent / non-violent intentions*, 9 =
316 *Extremely violent intentions*). These two scores were composited to create an overall
317 threat score ($\alpha = .89$).

318

319 Participants next answered demographic questions. Our predictions concerned
320 the effects of parenthood on mental representations of a potential foe, distinct from the
321 influence of individual differences likely to correspond with parenthood. In order to take
322 such differences into account, we included items measuring political orientation (1 =
323 *Very liberal*, 7 = *Very conservative*), annual household income, and education level.

324

325 Finally, participants were probed for suspicion about the hypotheses, thanked, and
326 debriefed. Consistent with both the contents of the vignettes and the nature of the threat
327 questions, several participants speculated that the study involved perceptions of threat.
328 However, importantly, none connected this issue to parenthood or child presence.

329

330 **3.0 STUDY 1 RESULTS**

331

332 **3.1 Preliminary analyses**

333

334 Preliminary ANOVAs were conducted to test for demographic differences
335 between parents and non-parents in income, politics, education, and age. Parents and
336 non-parents significantly differed in political orientation (parents: $M = 4.20$; $SD = 1.76$;
337 non-parents: $M = 3.88$; $SD = 1.77$; $p = .05$), and age in years (parents: $M = 31.7$; $SD =$
338 2.26 ; non-parents: $M = 31.0$; $SD = 2.16$; $p < .001$). Parents and non-parents also differed
339 in education level; on average, parents had partially completed the requirements for an
340 Associate's degree, whereas non-parents had partially completed the requirements for a
341 Bachelor's degree ($p = .02$). The difference in annual household income was not
342 significant (parents: $M = \$62,000$; $SD = \$28,256$; non-parents: $M = \$64,221$; $SD =$
343 $\$27,267$; $p = .40$). Individual differences in politics, education, and age were therefore
344 controlled for in all subsequent tests comparing parents and non-parents. (Controlling for
345 these differences does not alter the overall pattern of results.)

346

347 **3.2 Envisioned relative formidability of stranger by parenthood status**

348

349 To conduct a first-pass test for differences between parents and non-parents, we
350 pooled results across the conditions within each parenthood category. Consistent with
351 predictions, a one-way ANCOVA revealed that parents estimated the stranger to be more
352 physically formidable ($M = .07$; $SD = .72$) than non-parents ($M = -.18$; $SD = .64$), $F(1,$
353 $604) = 13.60$, $p < .001$, $\eta^2_p = .02$ (see Fig. 1). A follow-up MANCOVA assessing the
354 individual estimations of height, size, and muscularity revealed a significant multivariate
355 main effect of condition, $F(3, 602) = 6.27$, $p < .001$, $\eta^2_p = .03$. Parents envisioned the
356 stranger as taller, larger, and more muscular, although only relative height and

357 muscularity differed significantly between conditions (see Table 1 for descriptives).
358 There was no effect of participant sex on estimates of the stranger's height or size;
359 however, men estimated the target male to be slightly more muscular ($M = 2.97$; $SD =$
360 1.27) than did women ($M = 2.76$; $SD = 1.19$), $F(1, 607) = 4.52$, $p < .05$, $\eta^2_p = .01$. There
361 were no interactions between parenthood status and participant sex, $ps > .14$.

362

363 **3.3 Threat assessment of stranger by parenthood status**

364

365 Parents did not evaluate the stranger as more threatening than non-parents ($p =$
366 $.18$), perhaps due to a ceiling effect, as both groups rated the man as highly menacing
367 (see Table 1). Women evaluated the stranger as more threatening ($M = 5.06$; $SD = 1.22$)
368 than did men ($M = 4.73$; $SD = 1.33$), $F(1, 607) = 10.32$, $p = .001$, $\eta^2_p = .02$. Follow-up
369 tests revealed no interaction between parenthood and participant sex on threat
370 assessment, $p > .8$.

371

372 **3.4 Envisioned relative formidability of stranger by child-presence condition**

373

374 We next assessed differences in assessments of physical formidability and threat
375 between child-presence conditions. Contrary to predictions, a preliminary test comparing
376 parents' ratings in the *own child* versus *unrelated child* conditions revealed no significant
377 differences in either composite physical formidability scores or individual ratings of
378 height, size, or muscularity, $ps > .1$. To simplify analyses, in subsequent tests the *own*

379 *child* and *unrelated child* conditions were therefore pooled into a single *parent with child*
380 condition.

381

382 A one-way ANCOVA detected a significant effect of condition on estimated
383 composite formidability, $F(3, 602) = 6.24, p < .001, \eta^2_p = .03$ (see Fig. 2; see Table 2 for
384 descriptives). Planned contrasts revealed that, as predicted, parents in the *alone* condition
385 estimated the stranger to be more physically formidable than non-parents in the *alone*
386 condition, $p < .01$. Parents in the *alone* condition did not estimate the stranger to be
387 more physically formidable than non-parents in the *with child* condition, $p > .3$.
388 Consistent with predictions, parents in the *with child* condition rated the stranger as more
389 physically formidable than both non-parents in the *with child* condition, $p = .017$ and
390 non-parents in the *alone* condition, $p < .001$. However, although the means were in the
391 predicted direction, parents in the *with child* condition did not rate the stranger as
392 significantly more formidable than parents in the *alone* condition, $p = .10$. Likewise,
393 non-parents in the *with child* condition did not envision the stranger as more physically
394 formidable than non-parents in the *alone* condition, $p > .10$, although the means were
395 again in the predicted direction.

396

397 **3.5 Threat assessments by child-presence condition**

398

399 A one-way ANCOVA detected a significant main effect of condition, $F(1, 602) =$
400 $2.79, p = .04, \eta^2_p = .01$ (see Table 2 for descriptives). Planned contrasts showed that,
401 consistent with predictions, parents in the *with child* condition rated the stranger as more

402 threatening than non-parents in the *alone* condition ($p < .01$). Further, non-parents in the
403 *with child* condition envisioned the stranger as more threatening than non-parents in the
404 *alone* condition ($p < .05$). Parents in the *alone* condition did not estimate the stranger to
405 be significantly more threatening than non-parents in the *alone* condition, $p = .14$,
406 although the means were in the predicted direction. Likewise, parents in the *alone*
407 condition did not estimate the stranger to be significantly less threatening than parents in
408 the *with child* condition, $p = .11$. Finally, there was no significant difference between
409 parents and non-parents in the *with child* condition ($p > .70$).

410

411 **3.6 Mediation Analysis**

412

413 As predicted, the starkest differences in both envisioned formidability and threat
414 were between non-parents in the *alone* condition and parents in the *with child* condition.
415 To test whether envisioned physical formidability mediated the difference between these
416 two conditions in threat scores, we ran a bootstrapping procedure (5,000 samples), using
417 the INDIRECT macro for SPSS (Preacher & Hayes, 2008). First, we created a new
418 composite formidability variable using standardized height, size, and muscularity
419 estimates from the sample of non-parents in the *alone* condition and parents in the *with*
420 *child* condition ($\alpha = .55$). We then entered this composite physical formidability score as
421 the mediating variable, non-parent *alone* versus parent *with child* condition as the
422 independent variable, and threat rating as the dependent variable, controlling for
423 differences in age, politics and education. Consistent with predictions, the direct effect of
424 condition on threat rating ($b = .48, SE = .17, p < .01$) was no longer significant with

425 composite physical formidability included in the model ($b = .26, SE = .17, p > .12$),
426 whereas the indirect effect of composite physical formidability on threat remained
427 significant ($b = .55, SE = .09, p < .001$), and the bias-corrected and accelerated
428 confidence intervals did not overlap with zero (95% CI = [.115, .342]. In sum,
429 perceptions of relatively greater physical formidability fully mediated the effects of the
430 non-parent *alone* versus parent *with child* condition on envisioned threat.

431

432 **4.0 STUDY 1 DISCUSSION**

433

434 The results of Study 1 reveal that, as predicted, parents conceptualize a
435 hypothetical potential antagonist as larger and more muscular than do non-parents, a
436 pattern consistent with greater pessimism among the former regarding the relative
437 formidability of the foe. In contrast to the stark effects of parenthood status, the effects
438 of child presence do not reach statistical significance. Nevertheless, there are hints that,
439 consistent with the tactical liability posed by the presence of a child for whom one is
440 responsible, among parents and non-parents alike, imagining a child to be present may
441 lead participants to envision the antagonist as more formidable. Interestingly, contrary to
442 kin selection considerations, the latter effect does not vary as a function of relatedness to
443 the child, a pattern that may reflect either a) the tactical liability that any child poses to
444 someone responsible for them; b) the increased need to avoid danger that such
445 responsibility entails; or c) both (a) and (b). Lastly, underscoring the predicted pattern of
446 parental pessimism, when the categories predicted by theory to be most divergent
447 (parents with children versus non-parents alone) are compared, those expected to be most

448 pessimistic indeed viewed the antagonist as more threatening than did those expected to
449 be least pessimistic, a pattern mediated by differences in the conceptualized size and
450 strength of the foe.

451

452 While the results from Study 1 provide initial support for the predicted effects of
453 parenthood – and hint at possible effects of child-presence – on assessments of relative
454 formidability, this study is subject to important limitations. First, even the most
455 evocative vignette constitutes a relatively weak stimulus compared to the inputs
456 employed in real life by mechanisms that calculate relative formidability. Second, Study
457 1 did not measure differences in own formidability between parents and non-parents. If,
458 for example, owing to more time for recreation, non-parents are more physically fit, or
459 have more time for martial arts training, than parents, this alone could potentially explain
460 the differences between participants in these two categories in the envisioned
461 formidability of the antagonist. We therefore conducted a second study designed to
462 address these limitations. Pursuing enhanced ecological validity, we recruited participants
463 on the streets of Southern California either accompanied by children or not, and asked
464 them to judge the bodily characteristics of a criminal depicted in a facial photograph,
465 while also completing measures of their ability to defend themselves from physical
466 assault.

467 As is often true, in the design of Study 2, ecological validity comes at the expense
468 of experimental control, as i) ethical considerations precluded varying participants'
469 proximity to young children accompanying them on the street, and ii) due to the highly
470 gendered nature of childcare in the U.S., women are far more likely than men to be

471 accompanied by young children in public, hence only women were recruited. To ensure
472 that participants would classify the target individual as a potential antagonist, we
473 displayed a photo of an angry young man's face, describing him as a criminal (see Fig. 2,
474 ESM); to minimize the likelihood that participants would use the researcher as a
475 reference point in estimating the bodily attributes of the target, all data were collected by
476 female research assistants. The unambiguously threatening nature of the target precluded
477 meaningful assessment of differences in perceived threat, hence we did not collect such
478 data. Lastly, to address the possibility of differences in own formidability between
479 parents and parents, we deployed two additional measures. First, we asked participants to
480 report their self-assessed ability to defend themselves from violence. Second, following
481 Muñoz-Reyes et al. (2012), we employed handgrip strength as a proxy for upper-body
482 strength, a key factor in fighting ability.

483

484 **5.0 STUDY 2 METHODS**

485

486 **5.1 Participants**

487

488 117 adult women who were either alone or in the presence of one or more
489 children were recruited on public streets in exchange for \$3 compensation. Six
490 participants who did not complete the study were dropped, leaving a final sample of 111
491 women, with a mean age of 32.3 years ($SD = 7.87$). This sample consisted of 61 mothers
492 (14 of whom were alone, and 47 of whom were accompanied by children) and 50 non-
493 mothers (43 of whom were alone, and 7 of whom were with children). In the subsample

494 of women accompanied by children, the mean child age was 2.74 years ($SD = 1.83$), and
495 the mean number of children present was 1.33 ($SD = .51$). The ethnicity of the sample
496 was 48.6% White (Mothers: 53.7%; Non-mothers: 43.9%), 16.2% Hispanic (Mothers:
497 20.4%; Non-mothers: 12.3%), 14.4% Asian (Mothers: 11.1%; Non-mothers: 17.5%),
498 10.8% African American (Mothers: 7.4%; Non-mothers: 14.0%), and 9.9% mixed or
499 Other (Mothers: 7.4%; Non-mothers: 12.3%).

500

501 **5.2 Materials and procedures**

502

503 The study was framed as involving various forms of “visual perception and
504 intuition”. Following several filler / distracter measures involving visual judgment,
505 participants were shown a facial photograph of a target male face, displaying anger,
506 depicted in grayscale, and cropped to mask his bodily characteristics (see Fig. 2, ESM);
507 the image was described as “a convicted criminal’s mugshot”. Participants estimated the
508 target man’s height in feet and inches, and used the same 6-item pictorial arrays
509 employed in Study 1 to estimate his overall body size and muscularity. Demographic
510 items followed, including self-reported relationship status, annual income, education,
511 political orientation, and parity. Relationship status was reported using a 4-point scale (1
512 = *No current relationships*; 2 = *Dating (Non-exclusively)*; 3 = *Dating (Exclusively)*; 4 =
513 *Married or Engaged*). An item assessing self-perceived defensive fighting ability was
514 embedded within the demographic items: “Relative to other people of your gender, how
515 good at physical fighting would you be, if attacked?” (1 = *No good at all / defenseless*; 7
516 = *Extremely capable / Lethal if necessary*). Finally, handgrip strength was measured

517 using a hydraulic dynamometer (manufacturer: Baseline). Participants were encouraged
518 to squeeze as hard as possible with their dominant hand. Participants repeated this grip
519 strength measure three times ($\alpha = .97$); these values were averaged to create a grip
520 strength score.

521

522 Upon completion, participants were debriefed, thanked, and questioned for
523 suspicion about the purpose of the study. None evinced suspicion that the study
524 addressed parenthood.

525

526 **6.0 STUDY 2 RESULTS**

527

528 **6.1 Preliminary analyses**

529

530 Preliminary ANOVAs were conducted to test for demographic differences
531 between mothers and non-mothers in income, politics, education, age, and relationship
532 status. There were no significant differences in politics ($p = .10$) or education ($p = .83$).
533 On average, mothers were older ($M = 34.9$; $SD = 7.94$) than non-mothers ($M = 29.1$; $SD =$
534 6.56), $F(1, 109) = 16.98, p < .001, \eta^2 = .14$. Mothers also reported being in significantly
535 more committed relationships ($M = 3.62$; $SD = .87$; median = “married or engaged”) than
536 non-mothers ($M = 2.62$; $SD = 1.18$; median = “dating exclusively”), $F(1, 109) = 26.40, p$
537 $< .001, \eta^2 = .20$. Finally, mothers reported greater household income ($M = \$78,644$; SD
538 $= \$77,725$) than non-mothers ($M = \$50,900$; $SD = \$61,858$), $F(1, 109) = 4.19, p < .05, \eta^2$
539 $= .04$. Individual differences in age, relationship status, and household income were

540 therefore controlled for in all subsequent tests comparing mothers and non-mothers. In
541 tests comparing mothers and non-mothers, we also controlled for the presence of
542 children. Because only 14 of the women recruited while alone identified as mothers, and
543 only 7 women recruited while accompanied by children identified as non-mothers, we
544 were not able to test for a main effect of child presence independent of the effect of
545 motherhood.

546

547 A one-way ANCOVA (controlling for child presence, age, relationship status, and
548 household income) revealed no significant difference between mothers and non-mothers
549 on self-assessed fighting ability, $p = .32$. Likewise, a one-way ANCOVA (controlling for
550 child presence, age, relationship status, and household income) revealed no significant
551 difference between mothers and non-mothers in handgrip strength, $p = .23$.

552

553 **6.2 Effects of motherhood on envisioned physical formidability**

554

555 Composite physical formidability scores were created by averaging the
556 standardized estimates of height, overall size, and muscularity ($\alpha = .70$). As predicted,
557 the estimates of the composite formidability of the target man provided by mothers ($M =$
558 $.27$, $SD = .82$) were greater than the estimates provided by non-mothers ($M = -.33$, $SD =$
559 $.61$). We assessed the unique influence of motherhood on formidability estimation by
560 entering motherhood status, child presence, age, relationship status, and household
561 income into a simultaneous linear regression. As predicted, motherhood significantly
562 predicted estimated formidability in the model that emerged (see Table 3). None of the

563 covariates significantly predicted estimated formidability in the model. We next assessed
564 the influence of motherhood on individual estimations of height, size, and muscularity
565 with a one-way MANCOVA (controlling for child presence, age, relationship status, and
566 household income). There were significant effects of motherhood on all three
567 dimensions of formidability, although the difference in estimated size was only
568 marginally significant (see Table 4).

569

570 We next conducted exploratory tests, within the child-present condition, to assess
571 whether being the mother of one of the children present influenced formidability
572 estimates. Echoing the results of Study 1, in which imagining the presence of one's own
573 child exerted equivalent effects to imagining the presence of an unrelated child, there
574 were no significant differences in estimated height, size, or muscularity related to being
575 the mother of a present child, $ps > .60$. We also assessed whether the number of children
576 present predicted estimated formidability within the child-present condition, finding no
577 such relationship, $p > .99$. However, within mothers in the child-present condition, a
578 marginally significant negative correlation was observed between the average age of the
579 children present and the estimated composite formidability of the target male, $r(47) = -$
580 $.27, p = .07$. Although this correlation did not reach statistical significance, it is
581 consistent with the proposition that mothers are particularly sensitive to the danger that
582 hostile males pose to younger, more vulnerable children.

583

584 **7.0 STUDY 2 DISCUSSION**

585

586 Study 2 replicated the core finding of Study 1: parenthood again exercised an
587 independent influence on the envisioned formidability of a prospective antagonist, as
588 mothers envisioned the angry male target as larger and more muscular than did non-
589 mothers. The absence of differences in either self-assessed fighting ability or handgrip
590 strength between mothers and non-mothers suggests that the aforementioned pattern is
591 unlikely to be due differences in actual formidability between the two classes of
592 participants. In Study 2, most of the women recruited in the presence of children in were
593 mothers. As a consequence, we were not able to provide a test of the mixed results from
594 Study 1 that had suggested that the presence of a young child – whether one’s own child
595 or someone else’s – might also enhance assessments of the foe’s formidability. Future
596 research on the unique effects of child presence on threat assessment should obtain larger
597 samples of non-mothers in the presence of children.

598

599 **8.0 GENERAL DISCUSSION**

600

601 Across two studies, we find support for our core prediction that being a parent is
602 associated with more pessimistic assessments of the relative formidability of a
603 prospective foe – parents consistently estimated the potential assailant to be more
604 physically formidable than did non-parents, a pattern that, when operationalized in actual
605 agonistic contexts, would reduce the likelihood that a parent would suffer injury due to
606 underestimation of a foe’s fighting capacity. Importantly, this appears to reflect a trait-
607 level difference between parents and non-parents, as we find this pattern in Study 1
608 despite not having primed participants’ status vis-à-vis parenthood (recall that

609 recruitment procedures made no mention of parenthood, and demographic questions were
610 presented after all dependent measures had been completed), and we find this pattern in
611 Study 2 regardless of whether a mother's child is present at the time of participation.
612 This stands in contrast to Eibach and associates' (Eibach & Mock, 2011; also Eibach et
613 al., 2012) prior work on parental risk-aversion and parental distrust that finds only state-
614 level effects of parenthood (but see also Eibach et al., 2003). Given that both the
615 phenomena being investigated and the methods employed differ somewhat across the
616 respective studies, it is difficult to determine what is responsible for these differences.
617 However, theory does suggest that we should expect trait-level effects to occur. In
618 ancestral hunter-gatherer societies, fathers, and mothers of weaned toddlers and young
619 children, would have frequently been separated from their offspring during subsistence
620 activities, hence it would be inefficient indeed if parents failed to adaptively alter their
621 behavior absent reminders of their status as parents. That said, it is plausible that, via
622 proximate pathways such as empathy, reminders of parental status may well exaggerate
623 the differences between parents and non-parents. Indeed, the trends evident in Study 1
624 suggesting that the presence of a child might increase perceptions of the formidability of
625 a foe are consistent with the possibility that both trait and state processes could be
626 working in tandem to facilitate parental precaution. More research is needed to tease
627 apart the unique contributions of parenthood status and child presence.

628

629 Although the means were in the predicted directions, our two-question measure of
630 threat assessment in Study 1 revealed neither a stark pattern of parental distrust nor an
631 unambiguous exacerbating effect of child presence on distrust: statistically significant

632 differences are evident only between the two conditions predicted to be poles on this
633 spectrum, namely non-parents alone versus parents with a child. The muted character of
634 these patterns may reflect limitations of our methods. First, the menacing nature of the
635 interaction depicted in the vignettes may have reduced variation in the perceived threat
636 posed by the stranger. Second, given the dramatic content of the vignettes, asking
637 participants to provide propositional assessments of the threat posed by the stranger
638 inevitably entailed demand characteristics, thereby potentially reducing endogenously-
639 produced differences in reactions. In contrast, judgments about the bodily attributes of
640 the stranger likely tapped intuitions rather than explicit propositional reasoning, making
641 them less subject to demand issues, and thus more reflective of endogenous differences.
642 Indeed, building on prior work examining implicit representations of relative
643 formidability, the current investigation was structured on this supposition; our probes
644 regarding perceived threat were an auxiliary component to the project. Against this
645 backdrop, we find it compelling that the significant differences in perceived threat are
646 nonetheless fully mediated by differences in estimated bodily attributes, suggesting that
647 representations of relative formidability inherently capture threat assessments that include
648 issues of another's malevolent intentions.

649

650 At the broadest level, the pattern of parental pessimism in assessments of relative
651 formidability documented here reveals a potentially important facet to the system
652 generating representations of relative formidability. Such parental pessimism can be
653 understood as reflecting differences between parents and non-parents in the fitness costs
654 of injury. This is an instance of a larger class of considerations, namely the size of the

655 stakes at issue in a conflict. In principle, stake size could be addressed by an entirely
656 different system than that responsible for assessing relative formidability. However, the
657 postulated function of representations of relative formidability is the facilitation of rapid
658 decision-making in situations of agonistic conflict. Incorporating considerations of
659 relative stake size into such representations is efficient, as only a single representation
660 need be consulted in deciding how to address the threat at hand. Parental pessimism may
661 therefore well be the tip of the iceberg in regard to how formidability assessment is
662 moderated by factors that increase the costs of defeat or injury.

663

664 Our findings should be considered preliminary, as our investigations are subject to
665 a number of limitations. First, there is the possibility that our participants are not
666 representative of parents and non-parents more broadly in the U.S. That said, it is
667 important to note that our findings suggest that parents, and, possibly, non-parents
668 accompanied by small children, will be particularly concerned when approached by a
669 stranger in public, with the most cautious among them declining the invitation to
670 participate in research. Accordingly, it is likely that the results of Study 2 understate,
671 rather than overstate, the core phenomena at issue, as those who most strongly evinced
672 the predicted patterns would have elected not to participate. Second, our exclusive use of
673 U.S. samples means that caution is in order in inferring the presence of species-typical
674 psychological mechanisms. Third, our measures of own fighting capacity – absent in
675 Study 1, but employed in Study 2 – are imperfect: participants’ self-reported ability to
676 defend themselves could be subject to impression management and/or inaccurate due to
677 lack of experience in the population sampled, while handgrip strength may be a poor

678 proxy for somatic contributors to fighting capacity (see Fessler et al., in press [a]).
679 Fourth, because we employed cross-sectional designs, we cannot rule out the possibility
680 that self-selection is responsible for the documented differences between parents and
681 non-parents, as individuals who elect to become parents likely differ in many ways from
682 those who do not. Although we controlled for differences in gross demographic variables
683 and, in Study 2, found no differences in own formidability, these measures may not have
684 captured underlying features relevant to evaluating potentially agonistic situations. The
685 added decrement in fitness which injury poses for parents relative to non-parents should
686 scale with i) the degree of dependency of the child, expected to be largely a function of
687 the child's age, ii) the number of existing children, and iii) the level of parental
688 investment. Our recruitment procedures do not allow us to cleanly examine (i) and (ii);
689 in the interests of minimizing the invasiveness of our study (thereby maximizing
690 participant compliance), we did not investigate (iii). Nevertheless, all three factors are
691 potentially amenable to investigation.

692

693 An expanding body of research explores the psychological changes that occur
694 following the birth of a child. The methods employed in the two studies reported here are
695 readily administered; could be used in longitudinal investigations; could be employed in
696 small-scale societies; could be modified to vary the physical presence of children at the
697 time of participation; and could be enhanced through the use of both larger samples
698 (capturing greater variation in number and age of children) and measures probing level of
699 parental investment. In light of these possibilities, we look forward to further
700 investigations of the concepts presented here.

701

702

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703

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707

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Figure Legends

911

912 **Fig. 1** Judgments of the stranger's composite physical formidability (standardized scores)

913 by parenthood status.

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915 **Fig. 2** Judgments of the stranger's composite physical formidability (standardized scores)

916 by parenthood status and child-presence condition.

Figure 1
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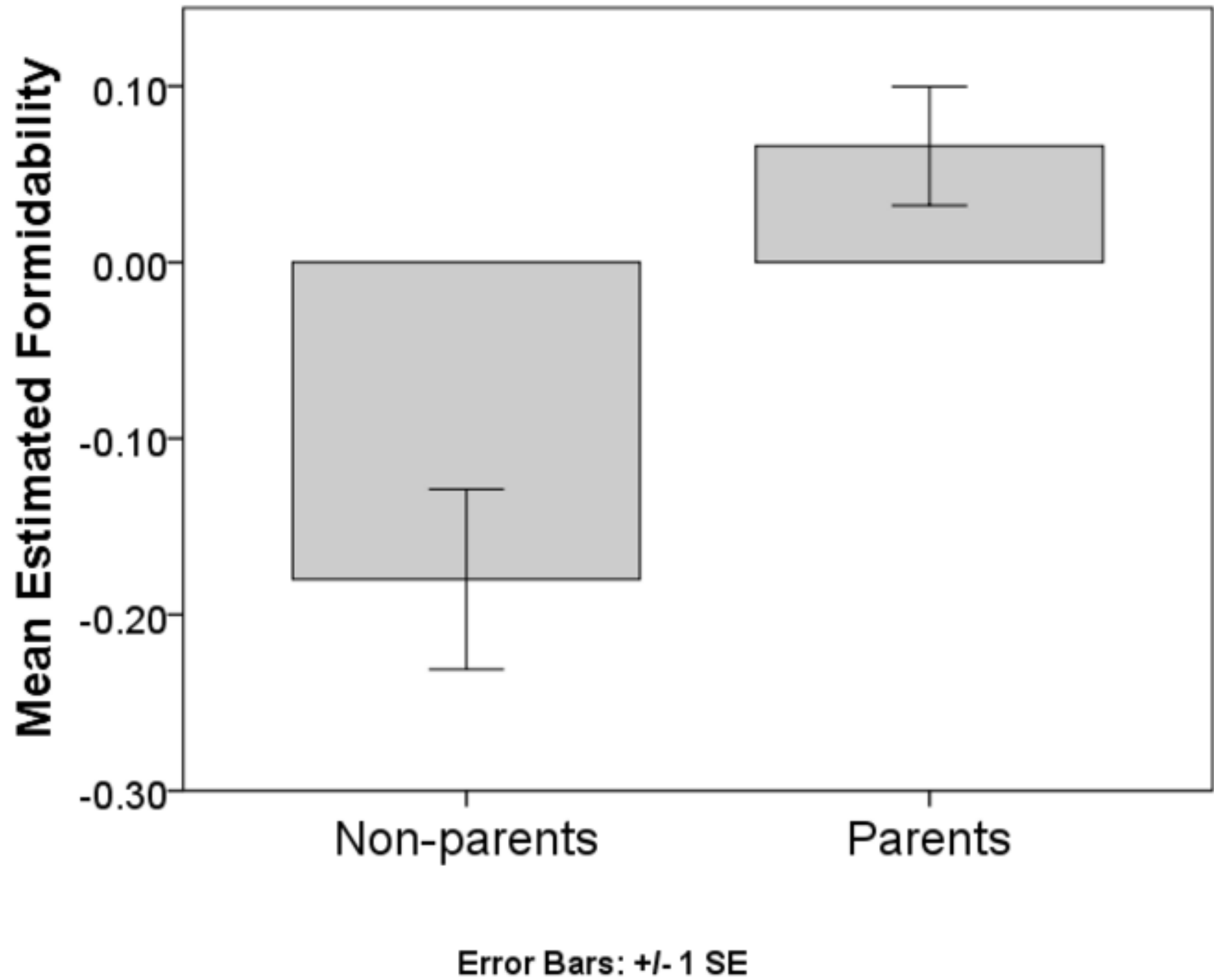


Figure 2
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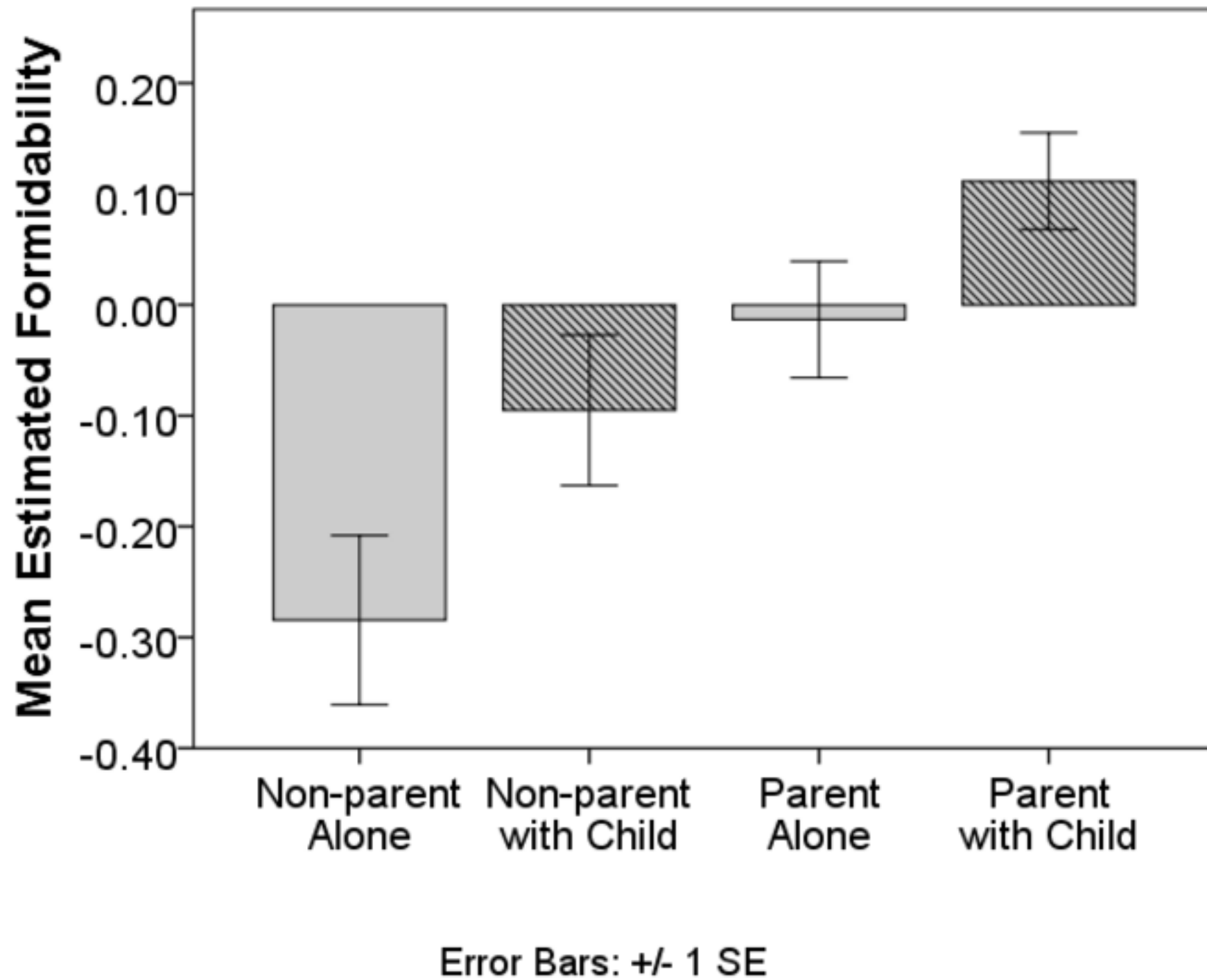


Table 1. Mean estimated height, size, muscularity, and threat by parenthood status

	Non-parents		Parents		<i>F</i>	<i>p</i>
	<i>(N = 154)</i>		<i>(N = 455)</i>			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Height	72.88	3.31	73.80	4.02	6.03	.014
Size	4.68	.84	4.81	.82	2.16	.143
Muscularity	2.53	1.02	2.97	1.28	15.20	.001
Threat	4.84	1.20	4.93	1.31	1.84	.176

Note. Estimated heights are in inches.

Table 2. Mean estimated height, size, muscularity, and threat by child-presence condition

	Non-parent alone (<i>N</i> = 69)		Non-parent with child (<i>N</i> = 85)		Parent alone (<i>N</i> = 166)		Parent with child (<i>N</i> = 289)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Height	71.68 ^a	3.87	73.86 ^{b, c}	2.39	73.17 ^b	4.12	74.16 ^c	3.92
Size	4.73 ^a	.86	4.65 ^a	.83	4.80 ^a	.83	4.81 ^a	.82
Muscularity	2.46 ^a	.98	2.59 ^a	1.06	2.89 ^b	1.24	3.01 ^b	1.31
Threat	4.64 ^a	1.31	5.00 ^b	1.09	4.81 ^{a, b}	1.33	5.00 ^b	1.29

Note. Means with different superscripts are significantly different with alpha at .05. Estimated heights are in inches.

Table 3. Linear regression of motherhood and covariates on estimated physical formidability

	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>p</i>
Motherhood	.565	.204	.357	.007
Child Presence	.114	.182	.072	.533
Age	-.016	.010	-.156	.114
Relationship Status	.058	.069	.083	.408
Household Income	.000	.000	-.025	.786

N = 111

Table 4. Mean estimated height, size, and muscularity, by motherhood condition (Study 2)

	Non-mother		Mother		<i>F</i>	<i>p</i>
	<i>(N = 50)</i>		<i>(N = 61)</i>			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Height	68.91	2.07	70.48	3.06	4.80	.031
Size	3.43	.92	4.08	1.12	3.92	.050
Muscularity	2.32	.89	3.07	1.28	5.04	.027

Note. Estimated heights are in inches. Significance tests controlled for individual differences between mothers and non-mothers in child presence, age, relationship status, and household income.

Electronic Supplementary Materials

To Accompany

Stranger Danger: Parenthood Increases the Envisioned Bodily Formidability of Menacing Men

Daniel M.T. Fessler, Colin Holbrook, Jeremy S. Pollack, and Jennifer Hahn-Holbrook

Stimuli employed in Study 1

Participants were asked to read a single vignette (modified from Petralia & Gallup, 2002) that varied in the details across condition. Versions were as follows:

Imagine that you and your child have just spent the evening visiting a friend who is in the hospital with a broken leg. As the two of you leave the building, you realize that it is much later than you thought and that the area is now deserted. You zip up your jacket in the cold, and make sure that your child is bundled up as well. It is a long walk out to your car on the far end of a parking lot, which is on the other side of a small wooded area. On this dark night, not even the dim glow of the outside lights seems to illuminate the dark parking lot. You look up to the sky to see where the moon is, but you realize the sky is clouded over and no moon can be seen. “No wonder it’s so dark tonight,” you think as you and your child begin the trek to your car.

It’s late and you’re tired, so without thinking you lead your child on a shortcut through the pine trees that stand between you and the parking lot. In the shadow of the trees, you must help your child to avoid tripping on the large tangled roots along the woodland ground. Suddenly, you hear a noise, perhaps another footstep, but in the darkness you can’t discern what it is. A chilling gust of wind strikes and causes you to tighten your coat and quicken your step. You hear something else. What was that? Was it a noise or just the wind?

The two of you make it through the trees. You don’t like walking alone with your child this late at night and you’re glad to have the darkness of the pine trees behind you. Now the parking lot is just ahead. As the wind picks up, you hear another noise and look back. You see the silhouette of a man emerging from the pine trees and the sight of him startles you. Again, you quicken your pace, pulling your child by the hand.

At the edge of the vacant parking lot, you pause and look for your car. You see the car a short distance away, parked between two of the few remaining vehicles—a beat-up old pick-up truck and one of those family vans. Happy with the sight of your car, you reach into your pants pocket for your keys and find that they are not there. As you begin to feel around for them in your back pockets, you notice that strange man again, now walking behind you. This time he appears to be headed directly towards you and your child. Walking quickly, you reach your car. You now feel the approaching man’s eyes upon you and frantically search for your keys in your jacket pocket. Finally, your fingers make contact with your

keys and you pull them out of your jacket. As you fumble to unlock the car, you feel the man's cold hand on your shoulder . . .

The references to a child were omitted in the "alone" conditions. In the "unrelated child" conditions, the following explanatory passage was added to the beginning:

Imagine that a new neighbor from down the street, whom you've only spoken to a few times, has broken her leg and is currently in the hospital. She hasn't met too many people in the area yet, so as a favor she asked you to bring her 4-year-old child by the hospital to visit her for a few minutes, then drop the child off with one of your neighbor's relatives.

Dependent measure arrays employed in Studies 1 and 2

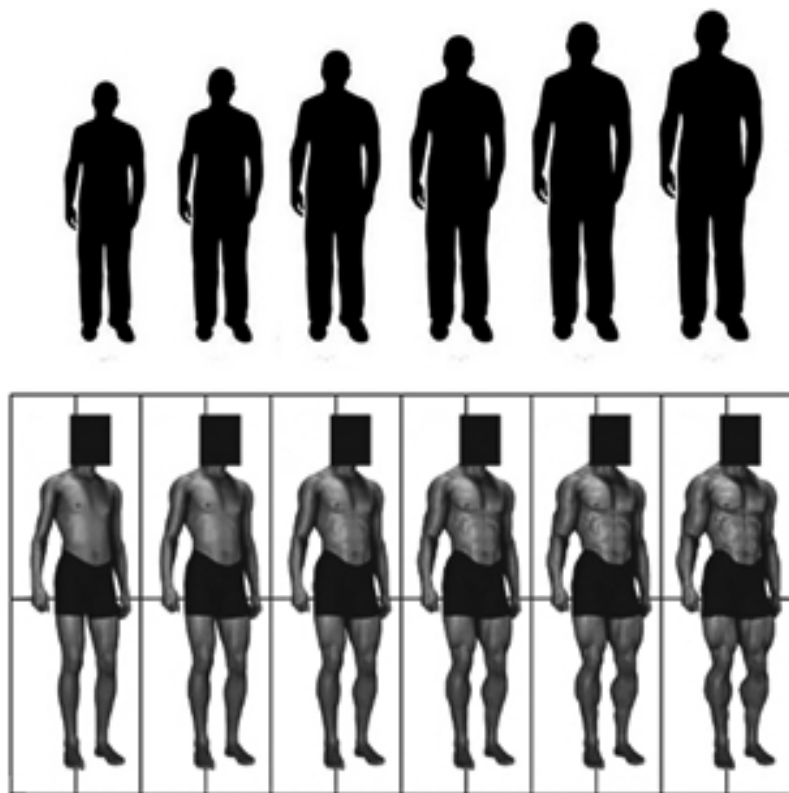


Fig. 1 Image arrays were used to estimate size (top) and muscularity (bottom). The muscularity array was modified from Frederick and Peplau (2007).

Procedural Note

In Study 1, for logistical reasons, data collection for the “parents with own child” and “non-parents alone” conditions opened one week prior to data collection for the other conditions.

Stimulus employed in Study 2



Fig. 2 Participants in Study 2 estimated the physical characteristics of this individual. The cropped face photo was framed as a “convicted criminal’s mugshot”; in reality, the image was modified from the Radboud Faces Database (Langner et al. 2010).

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