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ARTICLE

Perinatal women dominantly protect—rather than submissively cede—resources when interacting with threatening-looking others

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Abstract

When competing for resources, people appear particularly sensitive to social cues of threat, tending to submissively cede resources to more (vs. less) threatening-looking others. This tendency appears especially pronounced among those that are physically weaker and thus more vulnerable to harm. One phase of adult life during which humans are particularly vulnerable is the perinatal period, the months leading up to and immediately after parturition (giving birth). Previous evidence and models of parental care and motivation suggest that individuals would be especially sensitive to threats during this phase. Accordingly, here we tested for the first time the preregistered prediction that perinatal (vs. non-perinatal) women would submissively cede more to threatening-looking others when competing over resources. Contrary to these predictions, results showed that women in this phase ($n = 86$, tested at ~29 weeks gestation and 1-month postpartum) were less sensitive to social threat than were non-perinatal women ($n = 53$), dominantly protecting rather than submissively ceding resources against threatening-looking male strangers. These findings suggest that pregnancy may affect social and economic decision-making by reducing (rather than increasing) submissiveness to threat, consistent with a 'maternal aggression' response documented in many non-human mammals.

Valentina Proietti, Ilenia Mastroianni and Valentina Silvestri contributed equally to this work.

Viola Macchi Cassia and Shawn N. Geniole share last authorship.

[Correction added on 20 January 2026, after first online publication: In the Equal Contribution statement, the author name 'Valentina Silvestri' has been updated in this version.]

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KEYWORDS
economic decision-making, judgements, maternal aggression, perception, perinatal, pregnancy, threat, ultimatum game

BACKGROUND

Throughout much of human history, approximately 1 in 4 children died before their first birthday (reviewed in Volk & Atkinson, 2008). This vulnerability during early development is a defining characteristic of our ('altricial') species, which requires a range of cognitive and behavioural adaptations in parents to both assess and cope with threats in the environment (e.g., see Geary, 2000; Hahn-Holbrook et al., 2011). Protection motivation theory (Maddux & Rogers, 1983), for example, posits that individuals assess potential threats alongside their perceived ability to cope with them, which in turn motivates protective actions. Most relevant to offspring survival, several researchers (e.g., Hofer et al., 2018; Schaller, 2018) have more recently proposed that parental or offspring-related cues (e.g., infants crying) trigger the activation of a parental care motivation system, promoting protective and nurturant responses encompassing heightened vigilance, risk-averse attitudes, and defensive behaviours. Consistent with these theories, the arrival of children is typically associated with increased risk aversion (Eibach & Mock, 2011; Görlitz & Tamm, 2020) and a shift toward more socially conservative attitudes (Kerry et al., 2022). Parents also display greater disgust sensitivity and outgroup bias than do non-parents (Gilead & Liberman, 2014; Hahn-Holbrook et al., 2011; Marie & Xiao, 2024), as well as an enhanced perception of male strangers as menacing (Fessler et al., 2014). Even infantile visual or auditory cues (e.g., infant faces or crying) can trigger greater vigilance (e.g., Cheon & Esposito, 2020; Setoh & Esposito, 2019) and behavioural carefulness – finer, more delicate movements – in unrelated but potentially threatening tasks in parents than non-parents (Sherman et al., 2009; see also Murrugarra & Goldstein, 2024).

Critically, the expression of these cognitive and behavioural adaptations is likely amplified during pregnancy and the perinatal period (the months leading up to and after giving birth) given the increased vulnerability and resource allocation demands inherent to this life phase (Löf, 2011; van de Pol et al., 2006). Pregnant women experience reduced physical mobility, which makes them potentially more reliant on vigilance and threat avoidance. Furthermore, the significant energetic investment required for foetal and neonatal development necessitates a heightened sensitivity to potential risks that could compromise these resources or the well-being of both the parent and the developing infant. Along these lines, pregnancy is often accompanied by morning sickness and increased disgust responses to 'riskier' (i.e., contamination-prone) foods (Fessler et al., 2014; Flaxman & Sherman, 2008), a general increase in risk aversion (e.g., see Chen et al., 2020), and heightened neural responses to potentially threatening stimuli (e.g., Raz, 2014, 2025).

This heightened sensitivity to potential threats also extends to social domains and especially to the information conveyed by faces. Among social cues, the human face is particularly salient for threat evaluation. For example, when in novel and potentially threatening environments, we spend much of our time visually scanning for and processing faces (Ames et al., 2011). Moreover, when viewing novel faces, we rapidly form survival-relevant impressions or judgements (Oosterhof & Todorov, 2009; Willis & Todorov, 2006) which include assessments of threat that are often made within just 50 ms of exposure (Bar et al., 2006). Some work suggests that such face-based threat perceptions can also have some degree of accuracy (e.g., Carré et al., 2009; Palmer-Hague & Geniole, 2022; Sell et al., 2009; Třebický et al., 2015; Caton & Dixson, 2022; Zilioli et al., 2015; see meta-analysis in Foo et al., 2022).

Importantly for the present study, sensitivity to threat-related facial cues appears to increase during late pregnancy (Anderson & Rutherford, 2011; Byrne et al., 2019; Fiterman & Raz, 2019; Pearson et al., 2009). For example, pregnant women showed greater interference from fearful faces in an emotional Stroop task compared with non-pregnant women (Roos et al., 2012), indicating heightened attention to threat cues. They also tend to recognize threat-related emotions (anger and fear) more accurately

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in the third trimester than earlier in pregnancy (Pearson et al., 2009). Overall, these findings suggest enhanced sensitivity to social threat cues during late pregnancy.

Given this amplified vigilance, a crucial question arises regarding its impact on behaviours and attitudes related to the acquisition and prudent management of resources, a domain that is also critical for offspring survival (e.g., Campbell, 1999). Nevertheless, and although economic hardship is a common experience in perinatal women (Taylor et al., 2021), little is known about how threat sensitivity/vigilance influences these resource acquisition and protection goals specifically in the perinatal period. The present study aims to address this critical gap in the literature. One recently developed paradigm for investigating the specific link between threat sensitivity and resource-related behaviours is a competitively framed ultimatum game (the 'Threat Premium Task'; Geniole et al., 2017, 2019), in which participants are given a sum of money with the goal of maximizing earnings by sharing as little of it as possible. In the task, participants interact with multiple partners and decide how much of their resources they would be willing to share with each counterpart (vs. keep for themselves). Critically, the counterparts can either accept the proposed split of the resources—in which case, both parties receive their corresponding shares—or reject the proposal, causing both parties to receive nothing. Therefore, participants must carefully consider each decision, aiming to cede the fewest resource units possible, without risking a retaliatory rejection that carries greater financial costs/harm. Importantly, facial photographs of the counterparts are viewable throughout the task and, unbeknownst to participants, are manipulated to appear more or less threatening. Across multiple previous studies, participants appeared sensitive to this information, submissively ceding more resources when facing a more (vs. less) threatening-looking counterpart, likely in an attempt to limit such retaliation risk/cost (Geniole et al., 2017, 2019). Furthermore, this tendency to cede more resources to high (vs. low) threat individuals was especially pronounced among participants who were more vulnerable to real-world physical attacks (i.e., those who were physically weaker versus stronger; Geniole et al., 2017).

Here, for the first time, we tested the novel (preregistered) prediction that the perinatal period would be marked by an increased sensitivity to social threat as signalled by facial cues – with women in this phase showing an exaggerated tendency to cede resources to more (vs. less) threatening-looking male strangers, potentially limiting risk of costly retaliation. We thus recruited a sample of pregnant and non-pregnant women and examined their performance in the Threat Premium Task at two time points separated by a 2-month interval that, for pregnant women, was centred around delivery.

METHODS

Participants

Participants were recruited through the lab's Instagram page (Bicocca Child&BabyLab, 2026), posters displayed on campus, and word of mouth. Our goal was to recruit until July 31, 2023. We deviated from our preregistration in that we tested an additional 13 participants (perinatal group: $n = 11$, non-perinatal group: $n = 2$) past this initial stopping date given they had expressed interest in participating before this date. Consistent with our preregistered plans, we excluded those with perinatal complications ($n = 2$; spontaneous abortion and a clinical pregnancy involving a combination of preeclampsia, Graves disease, and multiple sclerosis) and/or incomplete surveys ($n = 19$; <50% completion). These exclusions resulted in a final sample of 139 participants: 86 Perinatal (i.e., pregnant) women ($M_{age} = 34.2$ $SD = 4.12$) tested in late pregnancy (29 weeks gestation) and 1 month postpartum, and a control group of 53 non-perinatal (i.e., non-pregnant) women ($M_{age} = 31.1$, $SD = 5.45$) tested twice with a 2-month gap between testing sessions, matching the two testing sessions in the perinatal group. Note that N varies across sessions because of factors such as participant availability, accessibility, etc. Figure 1 illustrates the timeline of participant recruitment and testing phases. All participants provided written informed consent before participating in the study, which was conducted in accordance with the WMA Declaration of Helsinki for research involving human subjects (BMJ 1991; 302: 1194) and approved by the Ethics Committee of University of Milano-Bicocca.

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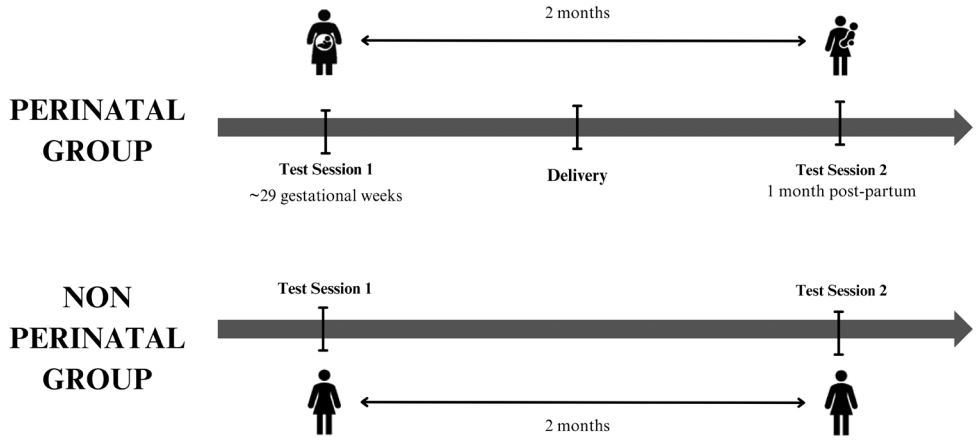

FIGURE 1 Timeline of testing sessions for the perinatal and non-perinatal groups.

FIGURE 2 Examples of the low-threat (left) and high-threat (right) stimuli used in the study. Edited versions of these facial photographs were reproduced with permission from Ma et al. (2015).

Stimuli

Stimuli consisted of 20 images of faces belonging to Caucasian male individuals, selected from the Chicago Face Database (Ma et al., 2015), and used/validated in previous studies (e.g., Geniole et al., 2019; Shuster et al., 2024). The stimuli were neutral faces modified through a transforming procedure to create two versions: one high in threat and one low in threat (thus a total of 40 stimuli, see an example in Figure 2). Note that these stimuli were designed to manipulate threat but in a way that was much less extreme than used in previous work (e.g., Geniole et al., 2017), so as to increase ecological validity and minimize demand characteristics (i.e., prevent participants from detecting that threat was manipulated explicitly; for more details on this threat morphing/transforming procedure, see Geniole et al., 2019; Shuster et al., 2024).

The total stimulus set of 40 face images (two versions – high and low threat – of each of 20 different face identities) was divided into two subsets to which participants were pseudorandomly assigned (based on even or odd birthdates). Each subset contained 20 face images: 10 face identities shown in their high-threat version and the 10 other face identities shown in their low-threat version. Whether a given face identity was shown in its high- or low-threat version was counterbalanced across the two stimuli subsets, such that each face appeared in both versions across participants, but any given participant saw only one version of each face. The order of face presentation was randomized. An exploratory, robust multilevel model on participants' perceptions of threat – which they

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provided at the end of the study, after the Threat Premium Task – confirmed that this manipulation was effective: faces manipulated to appear more (vs. less) threatening were indeed judged as more threatening (approximately 1-point higher on our 7-point scale: $b = 1.11$, $\beta = 0.33$, $SE = 0.08$, $t(61) = 14.44$, $p < .001$), validating the manipulation.[1]

Procedure

The experiment took place online and was programmed and administered using Qualtrics (Qualtrics, Provo, Utah, USA, https://www.qualtrics.com). The anonymity of the participants was ensured by pseudonymizing the data, creating and assigning them a numeric code, which was then used to track and combine responses across the two testing sessions.

As mentioned in our preregistration, socio-demographic information and other individual difference questionnaires were collected/administered for all participants throughout the testing sessions, although note that many of these measures were for potential exploratory purposes and not considered here when testing our main preregistered prediction regarding threat and perinatal status. Participants also completed a Dictator Game (Forsythe et al., 1994) used to measure generosity, again for exploratory purposes not covered here.[2] Afterwards, they performed the Threat Premium Task (Geniole et al., 2017, 2019), a competitively framed Ultimatum Game (Güth et al., 1982) as described in the Introduction. Participants were informed the game's goal was to maximize earnings by giving away as little money as possible. Specifically, they received 10 coins to split with 20 'responders'. In each interaction, participants saw an image of a responder's face and proposed an offer, indicating how many of the 10 coins they would be willing to give to that responder. If the offer was accepted, both the participant and the responder received their corresponding amounts (e.g., an offer of 4 meant the participant kept 6 and the responder received 4); if rejected, both received nothing (Geniole et al., 2017; Shuster et al., 2024) nothing. Thus, to maximize earnings, participants had to offer the fewest coins possible without triggering a retaliatory rejection from the ostensible responder. A standardized video explained the task. To incentivize engagement/performance and ensure decisions were consequential, participants were told one interaction would be randomly chosen, and its earnings converted into lottery ballots for a €20 cash prize.[3]

After completing this Threat Premium Task, participants viewed this series of faces two additional times; once to rate each on perceived attractiveness and again to rate each on perceived threat (7-point Likert scales: 1 = not at all [TRAIT]; 7 = very [TRAIT]). The attractiveness ratings were collected to answer additional research questions not covered here (although note that our main finding persists when controlling statistically for these ratings, see footnote 6), and the threat ratings were collected for

[1]We ran a robust mixed-level using the *robustlmm* package (Bates et al., 2015; Koller, 2016) [final model, after trimming until convergence: rlmer(ThreatRatings ~ center(facial_threat) + (1 + center(facial_threat)|ID) + (1 + center(facial_threat)|stimulus), data = DATASET, method = 'DASvar')] with *df* and *p* values determined using Satterthwaite approximations of degrees of freedom, as in Geniole et al. (2019). All predictors were centred before being entered into the model such that estimates represent the difference in resource units ceded by perinatal (vs. non-perinatal) women at Time 2 (vs. Time 1), and to high (vs. low) threat responders. To allow for greater comparability across predictors/models, we also report estimates when predictors in the model were standardized (i.e., standardized estimates).

[2]Nevertheless, note that our main findings regarding the Threat × Perinatal interaction persist when controlling for generosity in this task.

[3]To determine whether participants indeed treated the task as consequential, we also compared mean offers in this Threat Premium Task (where participants were informed retaliatory rejections were possible/costly) to offers in our generosity task (i.e., the Dictator Game, where retaliatory rejections were not possible/costly). If participants believed there were no consequences in the task – no financial risks associated with having their offers rejected – and decisions were purely hypothetical, we would not expect them to offer anything more than they would out of pure generosity (i.e., in the Dictator Game; see, e.g., Keuschnigg et al., 2016). If, on the other hand, they believed the task to be consequential (i.e., that rejections could be financially costly), then we might expect them to offer more in this Threat Premium Task, to minimize the risk of such costly rejections. When we inspect average offers in our two tasks, we find that participants offered ~54% more in this Threat Premium Task where rejections were possible than in the Dictator task where rejections were not possible. For comparison, when Keuschnigg et al. (2016) explicitly examined hypothetical or consequential decisions in these two tasks (the Ultimatum and Dictator Game), they found an increase of only 18% from the Dictator to the Ultimatum game when offers were hypothetical but, similar to our study, an increase of 54% when they were consequential. Therefore, this exploratory comparison suggests that participants indeed perceived their decisions to be consequential in the Threat Premium Task employed here.

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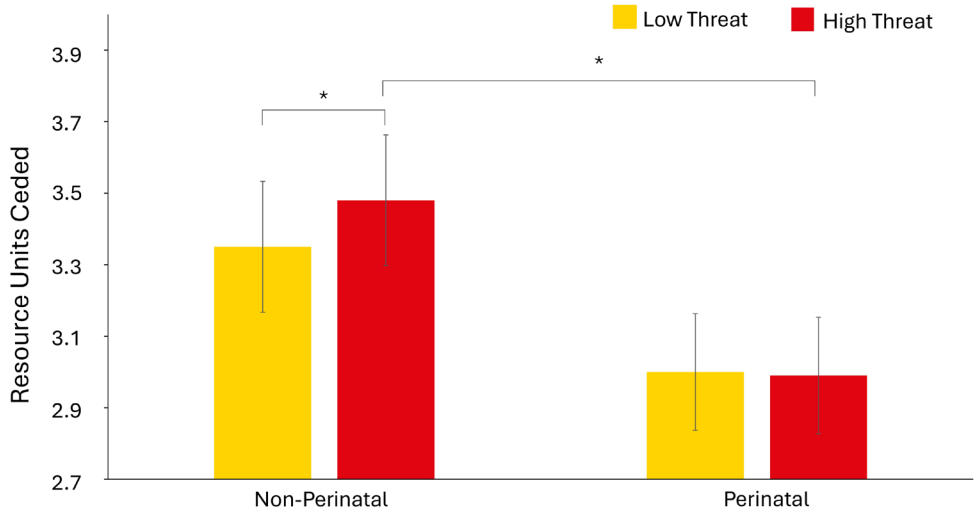

FIGURE 3 Bar plot showing resource units ceded in the Threat Premium Task as a function of perinatal status and the responder's (facial) threat. *$p < .05$.

exploratory purposes (and were used above, for stimulus validation). Note that the entire procedure, including all tasks and questionnaires, was repeated in the second testing session.

Statistical analyses

To investigate whether perinatal status influences offers in the Threat Premium Task, we used a robust multilevel regression model with participants' offers as the dependent variable, and time (pre- vs. post-parturition for perinatal women; Time 1 vs. Time 2 for non-perinatal women), perinatal status (perinatal vs. non-perinatal), social/facial threat (high vs. low), and their interactions as predictors.[4] These data are provided on OSF (https://osf.io/utz9y/overview?view_only=4a54afbf7e934ffcab66dbee1680c819).

RESULTS

A robust mixed-level model revealed a marginally significant interaction between perinatal status and facial threat, $\beta = 0.02$, $t(1874) = 1.94$, $p = .053$[5] (Figure 3). While non-perinatal women showed the anticipated threat effect, submissively ceding more resources to high (vs. low) threat male responders (*estimate* = 0.13, *standardized estimate* = 0.07; $SE = .05$, $z = 2.507$, $p = .012$), this effect was eliminated rather than enhanced in perinatal women (*estimate* = .01, *standardized estimate* = 0.01, $SE = .05$, $z = .24$, $p = .810$), directly

[4]As preregistered, we ran a robust mixed-level using the *robustlmm* package (Bates et al., 2015; Koller, 2016) with a structure mirroring that of Geniole et al. (2019), including centred terms, random slopes for the highest order interactions, and random intercepts. Participants and stimuli were set as grouping factors [final model structure: resources_ceded ~ center(perinatal_status) × center(facial_threat) × center(time) + (1 + center(facial_threat): center(time)|ID) + (1 + center(perinatal_status): center(facial_threat): center(time)|stimulus), data = dataset, method = 'DASvar']. Note that, as mentioned in footnote 1, df and p values were determined using Satterthwaite approximations of degrees of freedom as in Geniole et al. (2019). Interactions were probed using the *emmeans* package (Lenth, 2017). Standardized beta-coefficients (β) were calculated from the same models, after standardizing all predictor and outcome variables, using the *parameters* package (Hoffman, 2015; Neter et al., 1989; Rafi & Greenland, 2020). Standardized estimates for the pairwise comparisons were obtained using emmeans on standardized variables.

[5]This marginal interaction persisted ($p = .066$) even when the robust multilevel model was re-run with maximal specification (Barr et al., 2013) and trimmed until convergence. Further, as mentioned in an earlier footnote, this interaction also persisted when controlling statistically for generosity in the Dictator Game ($p = .025$).

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TABLE 1 Outputs of the robust multilevel regression model predicting resource ceding in the Threat Premium Task.

	Estimate	*SE*	*t*	df	*p*	*β*
Intercept	3.205	0.122	26.360	146	**<.001**	
Perinatal status	−0.418	0.241	−1.733	136	.085	.12
Facial threat	0.060	0.038	1.611	1621	.107	.02
Time	0.415	0.048	8.620	3874	**<.001**	.12
Perinatal status × facial threat	−0.146	0.076	−1.938	1874	**.053**	.02
Perinatal status × time	0.289	0.094	3.060	3878	**.002**	.04
Facial threat × time	0.099	0.075	1.318	121	.190	.01
Perinatal status × facial threat × time	0.041	0.207	0.200	25	.843	.003

Note: All predictors were centred before being entered into the model such that estimates represent the difference in resource units ceded by perinatal (vs. non-perinatal) women at Time 2 (vs. Time 1), and to high (vs. low) threat responders. *df* and *p* values were determined using Satterthwaite approximations of degrees of freedom as in Geniole et al. (2019).

contradicting our preregistered predictions. Additional follow-up analyses revealed that perinatal women were less willing to cede resources than non-perinatal women, especially when interacting with high-threat responders (*estimate* = 0.49, *standardized estimate* = 0.25, $SE = .24$, $z = 2.01$, $p = .044$) but not with low-threat responders (*estimate* = 0.35, standardized estimate = 0.18, $SE = .24$, $z = 1.41$, $p = .158$).

The model also revealed an unanticipated Perinatal Status × Time interaction, $\beta = 0.04$ $t(3878) = 3.06$, $p = .002$, such that perinatal women ceded less resources than non-perinatal women at Time 1 (*estimate* = 0.56, *standardized estimate* = 0.29, $SE = .25$, $z = 2.29$, $p = .022$) but not Time 2 (*estimate* = 0.27, *standardized estimate* = 0.15, $SE = .25$, $z = 1.11$, $p = .267$). See Table 1 for full model results.

DISCUSSION

Here, for the first time, we explored how resource-related decision-making is impacted by social perceptions of threat during the perinatal period. Given evidence that women appear particularly sensitive to threat during later stage pregnancy (e.g., Pearson et al., 2009; see also Raz, 2014), we predicted that women in the perinatal period – i.e. from 1 month before to 1 month after parturition – would cede more resources to more (vs. less) threatening-looking individuals. Contrary to this prediction, however, we found that this life phase was marked by a decreased willingness to cede resources, a pattern observed especially before (vs. after) delivery, and towards high-threatening (vs. low-threatening) looking male individuals.

While prior research has largely concentrated on how pregnancy affects face processing skills related to social perception (e.g., emotion perception; Raz, 2014; Roos et al., 2012; Rutherford et al., 2017), these findings offer novel insight into how threat perceptions directly impact competitive and resource-related decision-making in the immediate pre- and post-delivery periods. The pattern of results reported here suggests the perinatal period may initiate a shift towards prioritizing maintenance of possibly limited resources, even if it comes at a cost to safety from potential threats.

Critically, our results diverge from previous work (e.g., Eibach & Mock, 2011; Görlitz & Tamm, 2020; Pearson et al., 2009; see also Raz, 2014) and theories (e.g., Parental Care Motivational System, Schaller, 2018) that emphasize the perinatal period as a time of heightened vigilance and threat/conflict avoidance. In fact, in the current study, women in this phase (compared with non-perinatal women) appeared less inclined to submissively cede resources, especially when facing more threatening-looking individuals. While these findings contradict our preregistered predictions, they nonetheless do align with evidence in non-human mammals (e.g., rodents, cats, sheep, deer, lions) demonstrating increased aggression over the perinatal period, and especially during lactation (reviewed in Kaplan et al., 2025). A similar 'maternal aggression' or 'maternal defence' phenomenon has also been documented in humans (see reviews in Bakermans-Kranenburg & van IJzendoorn, 2017; Hahn-Holbrook et al., 2011),

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aligning with other studies reporting heightened aggression-related emotions (e.g., anger and hostility) during this period (e.g., Atzl & Narayan, 2025; Graham et al., 2002; Mastrogiacomo et al., 1983; Ou & Hall, 2018). Our findings appear consistent with this literature and suggest that the perinatal period in humans is perhaps best characterized by a willingness to dominantly protect rather than submissively cede resources when faced with potential threats/risks. Specifically, in our task, ceding fewer resources to threatening individuals represents a risky choice, given the increased likelihood of costly retaliatory rejection. That perinatal women nonetheless adopted this strategy is consistent with the idea that maternal defence prioritizes dominant protection of resources over more submissive (yet potentially safer) avoidance of interpersonal conflict.

Future studies are required to identify the biological and psychological mechanisms underlying these competitive, resource-protective behaviours. Multiple hormonal changes occur throughout pregnancy, which are known to regulate maternal behaviours including aggression (e.g., see reviews in Brunton et al., 2008; Hahn-Holbrook et al., 2011; Kaplan et al., 2025). These same biological factors may play a role in the competitive, resource-related decisions investigated here as well. Although much rodent work has focused on prolactin- and oxytocin-dependent mechanisms (e.g., Bosch, 2013; Bosch & Neumann, 2012; Georgescu et al., 2022; Stagkourakis et al., 2023; reviewed in Rieger et al., 2022), testosterone may also play a role in regulating maternal aggression directly or through its aromatization to estradiol (e.g., Unger et al., 2015). Indeed, concentrations of testosterone increase during pregnancy in humans (e.g., Bammann et al., 1980; Carlsen et al., 2006; Fleming et al., 1997), and administration of the hormone (vs. placebo) in men has been shown to increase the same type of dominant, resource-protective behaviour (i.e., lower offers to high-threat men in Geniole et al., 2019) observed here in perinatal women (for more on testosterone's effects related to or during pregnancy, and parenthood more generally, see Luberti & Carré, 2024; Grebe et al., 2019). Therefore, future studies could aim to track changes in testosterone throughout the perinatal period to determine the extent to which such hormonal changes map onto the resource-related perinatal effects observed here.[6]

Although this study was the first to examine how social threats influence women's resource-related decision-making during the perinatal period, there were several limitations. First, although most violence and aggression against pregnant women is committed by men (e.g., Chisholm et al., 2017; Román-Gálvez et al., 2021; Rzepczyk et al., 2024) and our stimuli involved only male faces, it will be important to determine if the current findings generalize to female–female competitions during the perinatal period as well. Second, although the present study involved a relatively large sample of pregnant women ($N = 86$) compared with those used in previous studies (e.g., $N = 17$ in Raz, 2014; $N = 35$ in Hahn-Holbrook et al., 2011; $N = 44$ in Roos et al., 2012), even larger samples are likely required to disentangle perinatal effects from those of parenthood, more generally. For example, it is possible that the perinatal effects observed here were an underestimate and that larger differences might have emerged had we compared the perinatal group exclusively to a larger group of nulliparous/non-parent women, as our current non-perinatal sample included both parents ($N = 15$) and nulliparous ($N = 38$) women.[7] A larger sample would also provide additional statistical power required to test more complex, hormone-mediated effects like those proposed above involving testosterone.

It is also important to note that any increases in survival/resource-related motives associated with pregnancy likely work in combination with potential reductions in mating-related motives. For example, studies suggest that pregnancy is accompanied by marked shifts in sexual motivation, partner-directed attraction, and relationship dynamics. For instance, sexual desire typically declines across pregnancy (Fernández-Carrasco et al., 2020; Sagiv-Reiss et al., 2012), and women exhibit

[6]It should also be noted that such hormonal changes may explain the more general perinatal × time effect observed here. Specifically, although testosterone rises during pregnancy, it also appears to show a quick decline after parturition (Fleming et al., 1997), which may explain the tendency for perinatal women to cede less resources overall (i.e., regardless of threat), before but not after giving birth (i.e., the time × perinatal effect).

[7]Consistent with this idea, when we repeat our main analysis but exclude non-perinatal parents (and thus compare perinatal women to nulliparous women), we find the same threat × perinatal interaction ($t_{1887} = 2.25$, $p = .024$), despite the smaller sample and reduced statistical power.

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reduced orientation towards mating opportunities and decreased responsiveness to male attractiveness cues (Magginetti & Pillsworth, 2020). Even among partnered women, the transition to parenthood is associated with lowered perceptions of one's own and one's partner's attractiveness (Blickman et al., 2025), which may dampen the motivational relevance of male facial cues more broadly. Taken together, these findings imply that perinatal women may be less attuned to mating-relevant morphological cues (e.g., facial masculinity), which overlap – to some extent – with cues of threat manipulated here. Therefore, it will be important to also track these motives across pregnancy in future studies and determine if they work in combination with or potentially counter the dominant, resource-protection effects observed here.[8]

Additionally, it is important to acknowledge that threat is a multifaceted construct comprising both one's ability and willingness to harm (captured by perceptions of dominance and trust/valence, respectively, as reviewed in Sutherland et al., 2013). While our stimuli used here had the intended effects on perceptions of threat (see stimuli validation in Methods), our design does not allow us to tease apart the potential role of these subcomponents, or rule out other related constructs such as competence and masculinity from playing a role. One possible avenue in future studies would be to separate these components to determine which (ability or willingness to harm) most strongly drives the effects reported here.

Despite these limitations and open questions, the current findings provide initial evidence that women in the perinatal period are less sensitive to social threat when managing resources, showing a tendency to dominantly protect, rather than submissively cede resources when interacting with threatening others.

AUTHOR CONTRIBUTIONS

Valentina Proietti: Conceptualization; writing – original draft; supervision. **Ilenia Mastroianni:** Data curation; methodology; investigation; writing – original draft; formal analysis. **Valentina Silvestri:** Methodology; software; data curation; project administration. **Martina Arioli:** Methodology; visualization; writing – original draft. **Viola Macchi Cassia:** Conceptualization; writing – review and editing; supervision; project administration. **Shawn N. Geniole:** Conceptualization; writing – original draft; formal analysis; supervision.

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CONFLICT OF INTEREST STATEMENT

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

DATA AVAILABILITY STATEMENT

The study design and analysis plan were preregistered on AsPredicted (https://aspredicted.org) on December 19, 2022, identification number 117050. All de-identified data supporting the main results of the study are openly available in the OSF repository at [https://osf.io/utz9y/?view_only=24463b964ae248a2a4fdd8f9adc4dddd], reference number utz9y.

[8]Although our current design provides limited insight regarding changes in women's mating motives across pregnancy, we did however ask participants to rate each of the stimulus faces on perceived attractiveness (to address alternative research questions not covered here). When we repeat our main analysis but control statistically for these attractiveness ratings, it is important to note that our main facial_threat × perinatal_status interaction persists ($t(1866) = 2.17$, $p = .031$). Therefore, it is unlikely that the dominant, resource-protective effects observed here are primarily driven by such potential changes in mating motives during pregnancy.

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