

## Review

# Why scarcity can both increase and decrease prosocial behaviour: A review and theoretical framework for the complex relationship between scarcity and prosociality

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In recent years, scholars from different fields have studied the effects of scarcity on social behaviour, producing mixed findings. This review synthesizes the most recent literature on the topic and proposes a framework to organize the evidence. According to this framework, scarcity produces an attentional shift towards the scarce resource and a cognitive load that triggers heuristic thinking; this affects social behaviour in various ways, depending on individual and contextual factors, which can be transient (e.g., emotional states or social expectations), or enduring (e.g., personality or social environment). We then apply this framework to explain when and how scarcity influences parochialism. We conclude with a caution against the uncritical use of scarcity salience as a tool for social behavioural change.

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Scarcity mindset, Prosociality, Parochialism, Social expectations, Behavioural change.

**Introduction**

Scarcity — the *feeling* of not having enough of what one needs — has been described as a catalyst for a *scarcity mindset*, a psychological state characterized by altered cognitive abilities and behaviours [1–4], often

exacerbating conditions of poverty by increasing reliance on risky, short-term strategies aimed at acquiring the missing resource [5], like resorting to high-interest predatory loans or engaging in gambling [6–8].

Much of the literature on scarcity has focused on consumer behaviours [9–12], economic and health outcomes [13–15], and strategies to improve them [16,17]. More recently, scholarly attention has expanded towards understanding how a scarcity mindset may impact social behaviours like cooperation, honesty, or trust. This exploration has yielded mixed findings [18], with scarcity at times promoting [19] and other times hindering [20] prosocial behaviours. Understanding how scarcity may influence social behaviours is of pivotal importance to explain and predict collective actions in situations where people experience scarcity of resources (e.g., money, food, water), such as pandemics, wartimes, or the climate emergency, and to develop behavioural interventions aimed at increasing prosocial behaviour in these contexts.

Here, we synthesize recent literature on this topic and propose a framework in two steps: 1) scarcity affects cognition, through attentional tunnelling and cognitive load which, in turn, 2) influences social behaviour. Crucially, the latter relationship depends on individual and contextual factors. Both these factors can be enduring or transient, the former enter as moderators, the latter as mediator (see [Figure 1](#)). Considering this framework, we then discuss the specific case of parochialism, and conclude discussing the importance of context for interventions that use scarcity salience as a nudge.

**Effects of scarcity on cognition**

Previous literature has identified a series of psychological effects of scarcity on cognitive functions, such as increased attentional focus on the scarce resource (tunnelling) and increased cognitive load that impairs cognitive flexibility and working memory caused by scarcity-induced preoccupations [1–6,21,22]. These findings have been established in various applied settings [23,24]. Attentional tunnelling can result in sub-

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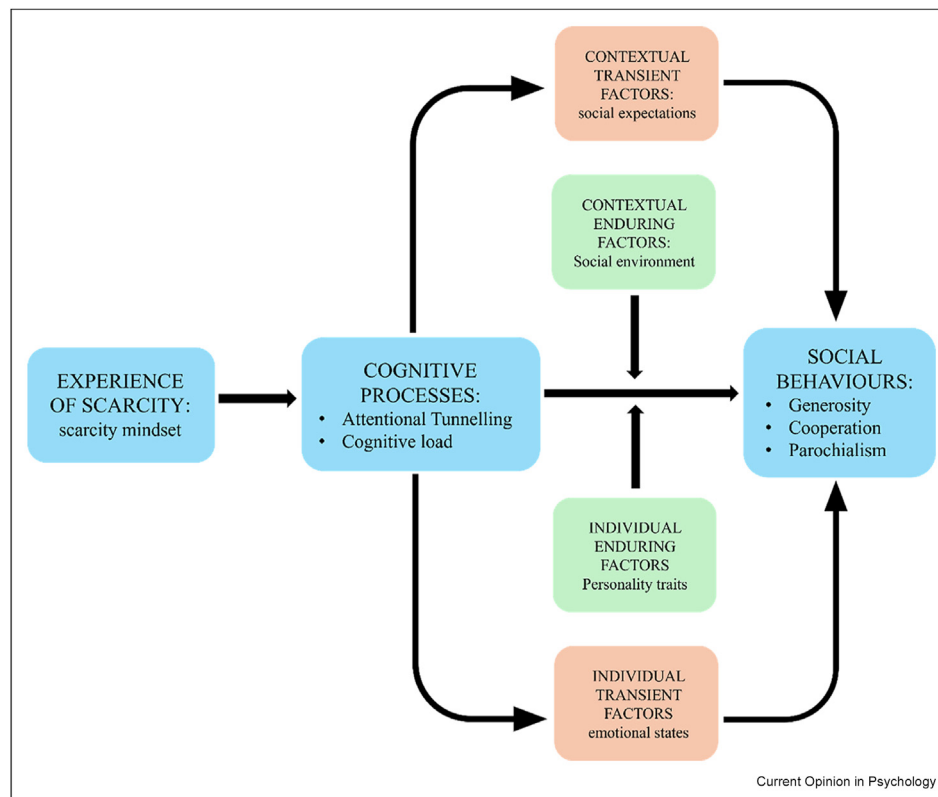
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Figure 1



Theoretical framework of how experiences of scarcity, operationalized as a scarcity mindset, can influence social behaviours. A scarcity mindset alters cognitive processes by increasing attentional tunnelling and cognitive load, which, in turn, influence social behaviours. Transient contextual and individual factors can mediate the effect by affecting social behaviours after being influenced by scarcity. Enduring contextual and individual factors can moderate the effects of scarcity on social behaviour.

optimal decision-making by leading individuals to neglect other potentially useful information in the environment: for example, financial scarcity may lead people to focus exclusively on the price of items, ignoring information on discounts [25]. Whilst this effect makes people more efficient in dealing with the immediate effect of the scarce resource [6], it also impairs exploration and information detection [26]. Cognitive load increases reliance on decision-making heuristics such as present bias [3], as well as on emotions and social expectations, as reviewed below. These effects are also observed for scarcity of non-material resources such as time [4] or social connections [27].

### Scarcity mindset and social behaviour

Scarcity cues shift attention towards the scarce resource and increase reliance on decision heuristics, thus influencing behavioural outcomes, including social behaviours. Whether these behaviours will appear to be prosocial or antisocial will depend on multiple factors, including whether they allow individuals to regain the missing resource [5,18]. If prosociality can aid in alleviating the resource discrepancy, then scarcity may increase prosociality; conversely, if the resource can be obtained

through selfish or antisocial actions, then scarcity may encourage such behaviours [20]. For example, during the COVID-19 pandemic lockdown, people experiencing predominantly scarcity of freedom were *less* likely to cooperate in a public goods game and to sacrifice their time outside to help shorten the lockdown for everyone, as cooperation would not lead to regain the missing resource, i.e., freedom. In contrast, people experiencing primarily scarcity of social connections were *more* likely to cooperate and sacrifice their time outside: here, cooperation was useful to regain the missing resource, i.e., socialisation [28]. Similarly, cognitive load may trigger heuristic thinking by undermining deliberation, but heuristics can lead to either prosocial or selfish actions, depending on internalised previous experiences [29]. For example, stress elicited by COVID-19-related scarcity depleted cognitive resources and triggered either selfish (hoarding) or prosocial (donations) behavioural coping strategies, depending on individual and cultural differences [30–32].

An interesting case comes from a large-scale cross-cultural study reporting that subjective chronic experiences of scarcity, indexed by low subjective

socioeconomic status, are associated with higher scores in several morality measures (moral identity, morality-as-cooperation, prosocial intentions) suggesting that these chronic experiences may lead people to increase reliance on one's social environment, hence enhancing the willingness to cooperate and behave prosocially [33].

Therefore, social behaviours resulting from perceived scarcity, such as cooperation and generosity, or the lack thereof, depend not only on changes to cognitive processes, but also on individual and contextual factors.

### Individual factors: personality traits and social emotions

The effect of scarcity on social behaviour can be moderated by personality traits like empathy. Cognitive empathy mitigates the negative effect of scarcity on generosity (sharing behaviour), both behaviourally, in that people under scarcity are more willing to share resources if they report a higher cognitive empathy, and neurally, by reducing the negative effect of scarcity on the activation of the medial prefrontal cortex, an affective area [34], as well as on the functional connectivity between the medial prefrontal cortex and the temporoparietal junction, associated with theory of mind [35]. Furthermore, financial threats caused by economic crises increase helping behaviour, but crucially, this correlation is positively moderated by empathic concerns [36].

Notably, when empathy is measured as a pain intensity rating of others' pain, as opposed to a personality trait, scarcity reduces the strength of this response, suggesting that an empathic response to others' suffering is a transient state that works as a mediator of the scarcity effect on social behaviour [37]. Similarly, research has shown that scarcity affects other social emotions, including compassion, envy, anticipated guilt, and pride [32,38,39] which are likely to mediate the effect of scarcity on behaviour. For example, scarcity reduces anticipated guilt of waste and lead people to use more resources, behaving less cooperatively [39]. Similarly, perceived vaccine scarcity lowers the sense of priority and, in turn, vaccine intentions, likely due to perceived scarcity triggering compassion and altruistic attitudes towards the more needy [40].

### Contextual factors: social environment and social expectations

Enduring contextual factors such as social environment (e.g., inequality between agents or tight (strong norms) vs loose (weak norms) societies [41]) can moderate the relationship between scarcity and social behaviours.

A theoretical study [42] explored farmers' water usage during the rainy and dry seasons, focusing on the resilience of cooperation (i.e., willingness to restrain water

consumption and willingness to punish defectors) against resource scarcity, agent heterogeneity, and resource inequality. The model showed that scarcity can hinder cooperation, particularly when inequality among agents leads poorer landowners to adopt the selfish behaviours of richer ones, who are relatively less affected by sanctions. Additionally, cooperation is weakened when there is agent heterogeneity, as the absence of small, cohesive groups of farmers undermines the cooperative network. Supporting this latter intuition, a lab-in-the-field study [43] found that Afghan farmers were less likely to punish unfair dictators during the lean season (scarcity) compared to the post-harvest season (abundance). These farmers live in a tight society (village) and know the potential future need for leniency; during scarcity, cooperation is crucial and more likely in tight societies where mutual trust and reciprocity are expected.

The relationship between scarcity and social behaviours can also be mediated by transient contextual factors such as social expectations, defined as perceptions of what others ought to do or actually do in a given situation [44,45]. A lab-based study showed that people donated more money when they witnessed someone experiencing material scarcity (a lower-class person) donating money, a scarce resource for them; conversely, they donated more time as volunteers when observing a higher-class person volunteering, on the assumption that higher-class people experience a greater scarcity of time (vs. money) [46].

### The case of parochialism

Parochialism, defined as the tendency to prioritise one's group interests above those of other groups, represents one of the most extensively studied phenomena in behavioural science, particularly for its implications in intergroup conflicts. In this section, we narrow our focus to review the literature on the effect of scarcity on parochialism.

Most studies suggest that scarcity increases parochialism. When people perceive financial scarcity, they tend to donate more to local charities than to international ones [47]. A recent fMRI study found that the anterior cingulate cortex, associated with decision-making and value attribution, shows a higher activation and a higher connectivity with theory of mind areas for the ingroup (vs outgroup) in the scarcity condition [48]. A recent meta-analysis suggests that cheating increases when people are reminded of the scarcity of certain resources, but only if these anti-social behaviours benefit the ingroup [49]. In other works, white Americans experiencing scarcity were found to encode dark faces differently, as demonstrated by a delayed EEG component associated with face processing, and a lower activation in the right fusiform gyrus, an area involved in face

recognition. This different encoding was also associated with a lower sharing of resources with black people, indicating increased discrimination towards an outgroup [50,51]. Taken together, these findings support the notion that people differentiate more sharply between ingroup and outgroup, when scarcity is present.

There are also cases in which scarcity decreases parochialism. For instance, lab-in-the-field studies have demonstrated that parochialism increased among Thai rice farmers post-harvest (abundance) compared to pre-harvest (scarcity) [52], and a similar rise in parochialism was observed among Guatemalan coffee farmers during the harvest compared to before [53]. This highlights that the effect of scarcity on parochialism might depend on context.

These seemingly contrasting results can be explained by the moderating effect of the social environment. Acting prosocially with both ingroups and outgroups may be beneficial during scarcity in homogeneous societies like those of the farmers, where ingroups and outgroups share the same reality. When social expectations are universally shared, scarcity may boost prosocial behaviour rooted in the principle of reciprocity: sharing resources and showing leniency toward defectors during tough times benefits everyone in the long term. Conversely, when social expectations are more uncertain, as in heterogeneous societies or when social distance is greater (e.g., local vs international charities), scarcity may lead to selfishness and resource-protective behaviours.

Overall, findings show that people favour reciprocity and resource redistribution when resources are abundant, or when the group involved is homogeneous [54] and trustworthy [55]; in such cases, redistribution of resources may also occur during scarcity. As with other social behaviours, scarcity may either increase or decrease parochialism depending on long-term gains.

### Conclusions: scarcity as a tool for social behavioural change, with warnings

Given its strong and heterogeneous effects, scarcity perception could be used as a potent *nudge* to alter social behaviours such as those described above. However, its effect can vary considerably across contexts. For example, attaching a scarcity nudge to non-financial resources, such as water, and highlighting their uniqueness and irreplaceability, can increase moral obligation towards their conservation [56]. Conversely, individuals who experience financial scarcity tend to avoid sustainable choices as they are more expensive [57–59]. Therefore, context-specific investigations are crucial when devising interventions. For example, an intervention to reduce meat consumption may fail if it focuses on increasing the desirability of typically more expensive meat alternatives through scarcity salience

nudges in regular supermarkets (e.g., “only five items left”) [60], as these can cause feelings of financial scarcity, but may succeed if it emphasizes the scarcity of farmland. Additionally, it is pivotal to consider any potential unforeseen effects of scarcity: for example, communications that stress vaccines shortage may unintentionally contrast government efforts in vaccine promotion, as they may lead some people to de-prioritise their own wellbeing, thereby reducing vaccine uptake intentions [40].

Our key takeaway is that considering the scarcity mindset to promote prosocial behaviours and discourage anti-social behaviours is essential, especially in situations characterized by severe resource scarcity, like pandemics, conflicts, or economic crises. Overlooking the behavioural effects of perceived scarcity can lead to a significant waste of resources on ineffective or potentially damaging behavioural interventions. The impact of scarcity on these behaviours is complex and multidimensional, and still relatively underexplored considering the heterogeneity of influencing factors. Therefore, tailored, context-specific investigations on scarcity’s influence on prosocial behaviours are crucial to avoid incorrect predictions and unwanted effects.

### Credit author statement

**Claudia Civai:** Conceptualization, Methodology, Investigation, Writing - Original Draft, Writing - Review & Editing, Visualization.

**Christian T. Elbaek:** Investigation, Writing - Review & Editing.

**Valerio Capraro:** Conceptualization, Methodology, Investigation, Writing - Original Draft, Writing - Review & Editing, Visualization.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Data availability

No data was used for the research described in the article.

### References

References of particular interest have been highlighted as:

- of special interest
- of outstanding interest

1. Mullainathan S, Shafir E: *Scarcity: why having too little Means so much*. New York, NY: Times Books; 2013.
2. Shah AK, Mullainathan S, Shafir E: **An exercise in self-replication: replicating Shah, Mullainathan, and Shafir (2012)**. *J Econ Psychol* 2019, **75**, 102127.



3. Shafir E: **Decisions in poverty contexts.** *Curr Opin Psychol* 2017, **18**:131–136.
4. Zhao J, Tomm BM: **Psychological responses to scarcity.** In *Oxford research encyclopedia of psychology.* New York: Oxford University Press; 2018.
5. Cannon C, Goldsmith K, Roux C: **A self-regulatory model of resource scarcity.** *J Consum Psychol* 2019, **29**:104–127.
6. De Bruijn EJ, Antonides G: **Poverty and economic decision making: a review of scarcity theory.** *Theor Decis* 2022, **92**:5–37.
7. Sheehy-Skeffington J: **The effects of low socioeconomic status on decision-making processes.** *Curr Opin Psychol* 2020, **33**: 183–188.
8. Hahmann T, Hamilton-Wright S, Ziegler C, Matheson FI: **Problem gambling within the context of poverty: a scoping review.** *Int Gamb Stud* 2021, **21**:183–219.
9. Hamilton RW, Mittal C, Shah A, Thompson DV, Griskevicius V: **How financial constraints influence consumer behavior: an integrative framework.** *J Consum Psychol* 2019, **29**:285–305.
10. Huijsmans I, Ma I, Micheli L, Civai C, Stallen M, Sanfey AG: **A scarcity mindset alters neural processing underlying consumer decision making.** *Proc Natl Acad Sci USA* 2019, **116**: 11699–11704.
11. Mani A, Mullainathan S, Shafir E, Zhao J: **Scarcity and cognitive function around payday: a conceptual and empirical analysis.** *J Assoc Consum Res* 2020, **5**:365–376.
12. John M, Melis AP, Read D, Rossano F, Tomasello M: **The preference for scarcity: a developmental and comparative perspective.** *Psychol Market* 2018, **35**:603–615.
13. Banerjee AV, Duflo E: **The economic lives of the poor.** *J Econ Perspect* 2007, **21**:141–167.
14. Schilbach F, Schofield H, Mullainathan S: **The psychological lives of the poor.** *Am Econ Rev* 2016, **106**:435–440.
15. van der Veer A, Madern T, van Lenthe FJ: **Tunneling, cognitive load and time orientation and their relations with dietary behavior of people experiencing financial scarcity—an AI-assisted scoping review elaborating on scarcity theory.** *Int J Behav Nutr Phys Activ* 2024, **21**:1–15.
16. Sircar NR, Friedman EA: **Financial security and public health: how basic income & cash transfers can promote health.** *Global Publ Health* 2018, **13**:1878–1888.
17. de Bruijn EJ, Antonides G, Madern T: **A behaviorally informed financial education program for the financially vulnerable: design and effectiveness.** *Front Psychol* 2022, **13**, 1090024.
18. Roux C, Goldsmith K, Bonezzi A: **On the psychology of scarcity: when reminders of resource scarcity promote selfish (and generous) behavior.** *J Consum Res* 2015, **42**: 615–631.
19. Piff PK, Kraus MW, Côté S, Cheng BH, Keltner D: **Having less, giving more: the influence of social class on prosocial behavior.** *J Pers Soc Psychol* 2010, **99**:771.
20. Prediger S, Vollan B, Herrmann B: **Resource scarcity and antisocial behavior.** *J Publ Econ* 2014, **119**:1–9.
21. De Bruijn EJ, Antonides G: **Determinants of financial worry and rumination.** *J Econ Psychol* 2020, **76**, 102233.
22. Børsting CK, Elbæk CT, Mitkidis P, Hochman G: **Resource constraints lead to biased attention but decrease unethical behavior.** *J Behav Decis Making* 2024, **37**, e2402.
23. Folta SC, Anyanwu O, Pustz J, Oslund J, Penkert LP, Wilson N: **Food choice with economic scarcity and time abundance: a qualitative study.** *Health Educ Behav* 2022, **49**:150–158.
24. Denti L, Sturén E, Johansson L: **Scarcity mindset among schoolteachers: how resource scarcity negatively impacts teachers' cognition and behaviors.** *Front Psychol* 2024, **14**, 1333735.
25. Zhao J, Tomm BM: **Attentional trade-offs under resource scarcity.** In *Augmented cognition. Enhancing cognition and behavior in complex human environments: 11th international conference, AC 2017, held as part of HCI international 2017, vancouver, BC, Canada, july 9-14, 2017, proceedings, Part II 11.* Springer International Publishing; 2017:78–97.
26. Chang SAA, Jara-Ettinger J, Baskin-Sommers A: **Resource scarcity compromises explore-exploit decision-making.** *J Exp Soc Psychol* 2022, **98**, 104254.
27. Kalil A, Mayer S, Shah R: **Scarcity and inattention.** University of Chicago, Becker Friedman Institute for Economics Working Paper; 2022-76, June 26, 2023, <https://doi.org/10.2139/ssrn.4138637>.
28. Civai C, Caserotti M, Carrus E, Huijsmans I, Rubaltelli E: **How perceived scarcity predicted cooperation during early pandemic lockdown.** *Front Psychol* 2022, **1**, 951757.
29. Capraro V: **The dual-process approach to human sociality: meta-analytic evidence for a theory of internalized heuristics for self-preservation.** *J Pers Soc Psychol* 2024, **126**:719–757.
30. Krishnan L: **The scarcity–prosociality link: ambiguous, yet thought-provoking.** *Psychol Develop Soc* 2022, **34**:79–103.
31. Tse DC, Lau VW, Hong YY, Bligh MC, Kakarika M: **Prosociality and hoarding amid the COVID-19 pandemic: a tale of four countries.** *J Community Appl Soc Psychol* 2022, **32**:507–520.
32. Faber NS, Häusser JA: **Why stress and hunger both increase and decrease prosocial behaviour.** *Curr Opin Psychol* 2022, **44**:49–57.
33. Elbæk CT, Mitkidis P, Aarøe L, Otterbring T: **Subjective socioeconomic status and income inequality are associated with self-reported morality across 67 countries.** *Nat Commun* 2023, **14**:5453.
34. Cui F, Huang X, Jing Y, Luo YJ, Liu J, Gu R: **How resource sharing resists scarcity: the role of cognitive empathy and its neurobiological mechanisms.** *Cerebr Cortex* 2022, **32**:5330–5342.
35. Liu Z, Zhao H, Xu Y, Liu J, Cui F: **Prosocial decision-making under time pressure: behavioral and neural mechanisms.** *Hum Brain Mapp* 2023, **44**:6090–6104.
36. Alonso-Ferres M, Navarro-Carrillo G, Garrido-Macías M, Moreno-Bella E, Valor-Segura I: **Connecting perceived economic threat and prosocial tendencies: the explanatory role of empathic concern.** *PLoS One* 2020, **15**, e0232608.
37. Li W, Meng J, Cui F: **Scarcity mindset reduces empathic responses to others' pain: the behavioral and neural evidence.** *Soc Cognit Affect Neurosci* 2023, **18**, nsad012.
38. Tang H, Li L, Su S: **Experiencing less leads to the use of more: the effect of a scarcity mindset on product usage.** *J Bus Res* 2022, **149**:139–148.
39. Salerno A, Escoe B: **Resource scarcity increases the value of pride.** *J Assoc Consum Res* 2020, **5**:458–469.
40. Pereira B, Fehl AG, Finkelstein SR, Jiga-Boy GM, Caserotti M: **Scarcity in COVID-19 vaccine supplies reduces perceived vaccination priority and increases vaccine hesitancy.** *Psychol Market* 2022, **39**:921–936.
41. Gelfand MJ, Raver JL, Nishii L, Leslie LM, Lun J, Lim BC, ... Yamaguchi S: **Differences between tight and loose cultures: a 33-nation study.** *Science* 2011, **332**:1100–1104.
42. Nhim T, Richter A, Zhu X: **The resilience of social norms of cooperation under resource scarcity and inequality—an agent-based model on sharing water over two harvesting seasons.** *Ecol Complex* 2019, **40**:100709.
43. Bartoš V: **Seasonal scarcity and sharing norms.** *J Econ Behav Organ* 2021, **185**:303–316.
44. Bicchieri C: *The grammar of society: the nature and dynamics of social norms.* Cambridge University Press; 2005.
45. Bicchieri C: *Norms in the wild: how to diagnose, measure, and change social norms.* Oxford University Press; 2016.
46. Han EJ, Choi JS, Na J: **Are they giving scarce resources away?: types of prosocial behavior modulate the prosocial effects of target social class on others.** *J Exp Soc Psychol* 2023, **108**:104477.

47. Herzstein M, Posavac SS: **When charity begins at home: how personal financial scarcity drives preference for donating locally at the expense of global concerns.** *J Econ Psychol* 2019, **73**:123–135.
48. Cui F, Deng K, Liu J, Huang X, Yang J, Luo YJ... : **Gu R: resource scarcity aggravates ingroup bias: neural mechanisms and cross-scenario validation.** *Br J Psychol* 2023, **114**: 778–796.
49. Elbaek C, Mitkidis P, Aarøe L, Otterbring T: **Material scarcity and unethical economic behavior: a systematic review and meta-analysis.** PREPRINT, <https://doi.org/10.21203/rs.3.rs-800481/v2>.
50. Krosch AR, Amodio DM: **Scarcity disrupts the neural encoding of Black faces: a socioperceptual pathway to discrimination.** *J Pers Soc Psychol* 2019, **117**:859.
51. Berkebile-Weinberg MM, Krosch AR, Amodio DM: **Economic scarcity increases racial stereotyping in beliefs and face representation.** *J Exp Soc Psychol* 2022, **102**:104354.
52. Boonmanunt S, Meier S: **The effect of financial constraints on in-group bias: evidence from rice farmers in Thailand.** *J Econ Behav Organ* 2023, **207**:96–109.
53. Aksoy B, Palma MA: **The effects of scarcity on cheating and in-group favoritism.** *J Econ Behav Organ* 2019, **165**:100–117.
54. Nettle D, Saxe R: **Preferences for redistribution are sensitive to perceived luck, social homogeneity, war and scarcity.** *Cognition* 2020, **198**:104234.
55. Tan LK, Li NP, Tan K: **Cash, crowds, and cooperation: the effects of population density and resource scarcity on cooperation in the dictator game.** *Evol Hum Behav* 2024, **45**:106581.
56. Cauberghe V, Vazquez-Casaubon E, Van de Sompel D: **Perceptions of water as commodity or uniqueness? The role of water value, scarcity concern and moral obligation on conservation behavior.** *J Environ Manag* 2021, **292**:112677.
57. Zhang R, Ma Q, Guan D: **The impact of financial scarcity on green consumption: sequential mediating effects of anxiety and self-efficacy.** *Psychol Market* 2023, **40**:1162–1178.
58. Sachdeva S, Zhao J: **Distinct impacts of financial scarcity and natural resource scarcity on sustainable choices and motivations.** *J Consum Behav* 2021, **20**:203–217.
59. Sachdeva S, Wu JST, Zhao J: **The impact of scarcity on pro-environmental behavior in the COVID-19 pandemic.** *Front Sustain Cities* 2021, **3**:767501.
60. Chapman LE, Sadeghzadeh C, Koutlas M, Zimmer C, De Marco M: **Evaluation of three behavioural economics ‘nudges’ on grocery and convenience store sales of promoted nutritious foods.** *Publ Health Nutr* 2019, **22**:3250–3260.
- reviewed, finding that it mostly aligns with the scarcity theory, although some results are mixed, especially for the third proposition.
26. This paper combines an experimental approach with real-world data by investigating the behaviour of people coming from higher or lower percentiles of neighbourhood disadvantage in a game of resource foraging in resource-rich and resource-depleted environments. Results show that people living in more disadvantaged neighbourhoods, i.e., in real-world relative scarcity condition, are less likely to engage in resource-maximising, exploratory behaviour in the game. However, there is no difference when it comes to social norm compliance: everyone is more likely to violate social norms in resource-depleted (vs resource-rich) environments.
29. This paper provides an extensive meta-analytical review of empirical work on the role of intuition and deliberation in shaping social behaviour and a theoretical framework to coherently synthesise the results. The findings suggest that intuition leads to the use of decision heuristics related to self-preservation. Although the paper does not focus specifically on scarcity, it is relevant for the current review in that many of the measures that may trigger intuitive reasoning are, in fact, either causing (time constraint) or caused by (cognitive load) the scarcity mindset.
32. In this paper, the authors discuss literature on the influence of acute hunger and acute stress on social behaviour. The evidence is mixed, in that both these acute conditions may either enhance or diminish prosociality, depending on the incentive structure and the specific situation. This work is of particular relevance for the current review, since it comes to the same conclusions with regards to the importance of evaluating context to understand the complexity of the psychological and physiological influences on social behaviour.
33. This large-scale cross-cultural study (N = 50,396 across 67 countries) aimed to investigate the association between morality and subjective experience of economic scarcity, both at the individual (subjective socio-economic status) and at the national (economic inequality – GINI index) levels. The main results show that people who experience high economic scarcity at both levels show higher moral identity, in that they see themselves as highly moral individuals, but also higher morality-as-cooperation, prosocial intentions and moral circle, suggesting that they also project these morality beliefs towards their peers.
40. In two experimental studies, the authors investigate the effect of COVID-19 vaccine scarcity on people’s willingness to receive the vaccine. Contrary to their expectations, which were based on extensive literature showing that perceived scarcity increases willingness to acquire scarce goods, these results showed that people’s willingness to receive the vaccine decreased with increased vaccine scarcity, by reducing the perceived priority. Therefore, highlighting vaccine scarcity to increase vaccine uptake would, in fact, have the opposite effect. These counterintuitive findings well exemplify the importance of investigating potential behavioural interventions within a specific context.
49. This is a systematic review and meta-analysis (N = 6921 across 44 studies) on the effect of scarcity on moral economic behaviour. Previous research mostly showed that scarcity may increase the tendency towards unethical economic behaviour, despite the existence of contrasting evidence; this meta-analysis finds that acute scarcity may indeed increase the propensity to engage in unethical behaviour, whilst more chronic scarcity, such as that experienced by lower social class individuals, does not. In general, individuals are more inclined to engage in unethical behaviour when they are reminded of scarcity.

### Further information on references of particular interest

6. This paper provides a comprehensive critical review of the effects of poverty on economic decision making through the lenses of the scarcity mindset framework. Evidence for the three theoretical propositions (i.e., poverty triggers attentional tunnelling; poverty induces trade-off thinking; poverty reduces mental bandwidth) is