The Impact of Scarcity on Individual Psychology and Behavior: An Interpretation from a More Integrated Perspective

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Abstract

Scarcity is a state in which individuals' desires and needs remain unfulfilled due to actual or perceived lack of resources. As a ubiquitous phenomenon, scarcity exerts significant influence on individuals' affective, cognitive, and behavioral processes. However, do different types of scarcity—tangible resource scarcity (exemplified by food, products, and money) versus intangible resource scarcity (exemplified by time)—produce commonalities and differences in their effects on individual psychology and behavior? A review of the literature reveals that tangible resource scarcity elicits cherishing behaviors, compensatory behaviors, and approach behaviors in individuals, whereas intangible resource scarcity only elicits cherishing and compensatory behaviors. Future research should examine the boundary conditions of scarcity' s impact on individual behavior, as well as investigate the effects of time scarcity on individual psychology and behavior.

Full Text

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Abstract

Scarcity is a state in which individuals' desires and needs remain unsatisfied due to either actual or perceived lack of resources. As a ubiquitous phenomenon, scarcity exerts significant influence on individuals' emotions, cognition, and behavioral patterns. However, do different types of scarcity—tangible resource scarcity (represented by food, products, and money) versus intangible resource scarcity (represented by time)—produce commonalities and differences in their effects on individual psychology and behavior? A review of the literature reveals that tangible resource scarcity elicits cherishing behaviors, compensatory behaviors, and approach behaviors, whereas intangible resource scarcity only triggers cherishing and compensatory behaviors. Future research should investigate the boundary conditions under which scarcity influences individual behavior, as well as the psychological and behavioral impacts of time scarcity.

Keywords: scarcity; tangible resource scarcity; intangible resource scarcity; psychological perception; behavioral patterns
Classification Code: B842

Introduction

As global population continues to grow, resource scarcity has become a prominent worldwide challenge. According to the *State of Food Security and Nutrition in the World* report, over 820 million people suffered from malnutrition in 2018, demonstrating that many still face severe problems caused by food scarcity. Beyond food scarcity, the world also confronts serious threats from economic stagnation. Trade tensions have cast a shadow over global economic development, with more and more people experiencing financial scarcity resulting from economic crises. Additionally, as individuals, we frequently encounter distress caused by product scarcity and time scarcity.

How exactly do these different forms of scarcity affect individual psychology and behavior? Scholars have examined this question from various perspectives, including food scarcity, financial scarcity, product scarcity, and time scarcity. Research on food scarcity has focused on its effects on emotions and non-food consumption (Read & Leeuwen, 1998; Xu, Schwarz, & Wyer, 2015). Studies on financial scarcity have investigated its impact on cosmetics consumption and scarcity product purchasing (Hill, Rodeheffer, Griskevicius, Durante, & White, 2012; Sharma & Alter, 2012). Product scarcity research has explored its

influence on value evaluation, purchase intention, and willingness to pay (Inman, Peter, & Raghubir, 1997; Bozzolo & Brock, 1992; Eisend, 2008). Meanwhile, time scarcity studies have examined its effects on individuals' goal completion (Zhu, Bagchi, & Hock, 2018).

However, whether different types of scarcity produce commonalities and differences in their effects remains unexamined. Although domestic scholars have explored the impact of financial constraints on consumer behavior from a financial scarcity perspective (Fan & Jiang, 2017), academic discussion of scarcity in China is still in its infancy. Therefore, a systematic review of scarcity research holds both theoretical and practical significance. Theoretically, such a review can help scholars understand the historical trajectory of scarcity research, gain insights into scarcity' s effects on individuals and underlying mechanisms, and identify new research topics. Practically, it can assist governments and enterprises in comprehensively understanding the common and differential impacts of various scarcity types on citizens and consumers, thereby informing policy and business decisions. This paper aims to introduce how different types of scarcity influence individuals' cognitive, emotional, and behavioral responses. We find that scarcity of tangible resources such as food, products, and money promotes approach, cherishing, and compensatory behavioral reactions, whereas scarcity of intangible resources, particularly time, only promotes cherishing and compensatory behavioral reactions. The article concludes by proposing several promising directions for future scarcity research.

2.1 The Concept of Scarcity

What is scarcity? Scholars generally define it from the perspective of its inducing factors or causes. Some argue that scarcity is a state in which individuals possess fewer resources than they need (Mullainathan & Shafir, 2013; Fan, Li, & Jiang, 2018). Hamilton et al. (2019) offer a similar view, defining scarcity as a state where consumers' ability to satisfy their needs is threatened by the lack or unavailability of goods, services, or resources. Hamilton et al. (2019) further subdivide the causes of scarcity into two aspects: actual lack of objective resources, and perceived lack caused by restricted access to goods, services, or resources. They also propose that subjectively perceived resource scarcity is triggered by actual objective scarcity. Synthesizing these perspectives, this paper defines scarcity as a state triggered by actual or perceived lack of resources that prevents individuals' needs and desires from being satisfied.

2.2 Classification of Scarcity

Scarcity classification is not unitary; scholars have categorized scarcity (primarily perceived scarcity) from different angles. First, based on duration, scholars

distinguish between chronic scarcity perception and situational scarcity perception (Laran & Salerno, 2013; Mehta & Zhu, 2015; Griskevicius et al., 2013; Fan et al., 2018). Chronic scarcity perception typically examines the psychological and behavioral decision-making of impoverished groups or those experiencing economic crises. For instance, Mani, Mullainathan, Shafir, and Zhao (2013) studied changes in farmers' cognitive functions across planting cycles, finding that financial scarcity—that is, poverty—constrains cognitive function. Similarly, Haushofer and Fehr (2014) found that financial scarcity leads to stress and negative emotional states, resulting in myopic behavior and risk-averse decisions. Correspondingly, researchers often use experimental methods to activate situational scarcity perception. For example, Mehta and Zhu (2015) had participants recall resource scarcity experienced during childhood to evoke situational scarcity perception, while Fan et al. (2018) activated scarcity perception by showing participants images of depleted natural resources, financial crises, and food shortages.

Second, some scholars classify scarcity perception based on its source (Hamilton et al., 2019). The most common distinction is between product scarcity and resource scarcity (Hamilton et al., 2019). Product scarcity refers to the short-term or long-term lack of goods and services, whereas resource scarcity refers to the lack of capital (i.e., money, culture) or other productive inputs (i.e., time) required to obtain goods and services (Hamilton et al., 2019).

Unlike these classifications, this paper categorizes scarcity into tangible resource scarcity and intangible resource scarcity. We define tangible resource scarcity as the shortage of physical entities such as products, food, and money, while intangible resource scarcity specifically refers to the shortage of time as an intangible entity. This classification is based on two considerations: first, the effects of tangible versus intangible resource scarcity differ; second, scholarly attention to scarcity has evolved from tangible to intangible resources. The specific classification is illustrated in Figure 1 [Figure 1: see original paper].

2.3 The Evolution of Scarcity Research

Among scarcity studies, food scarcity first attracted scholars'attention. Research on food scarcity can be traced to post-WWII efforts by the University of Minnesota team investigating how to better distribute food to hungry populations (Keys, Brozek, Henschel, Mickelsen, & Taylor, 1950). At this stage, however, food scarcity research had not yet integrated with psychology but rather remained within ecology. The true integration of food scarcity and psychology emerged in the late 20th century. Read and Leeuwen' s (1998) empirical study found that food scarcity makes consumers impatient, while Xu et al. (2015) further explored the spillover effects of food scarcity, offering a novel perspective on this classic topic.

Product scarcity research followed. This line of inquiry traces back to com-

modity theory proposed by Brock (1968), which posits that scarcity enhances the value of anything that can be possessed. Lynn (1991) subsequently published a meta-analysis on commodity theory, facilitating its initial integration with marketing. In that article, Lynn interpreted the application of commodity theory in marketing. Entering the 21st century, scholars have examined product scarcity' s effects from various angles. For instance, Wu, Lu, Wu, and Fu (2012) and Liu and Li (2016) explored the psychological mechanisms underlying product scarcity' s influence on purchase intention, though from different perspectives: Wu et al. (2012) argued that product scarcity enhances purchase intention through uniqueness, while Liu and Li (2016) proposed that its effect operates through perceived competition.

Financial scarcity research emerged next. Beginning in the 1990s, Carroll, Hall, and Zeldes (1992) argued that reducing expenditure and increasing savings represent rational responses to financial scarcity. Shah, Mullainathan, and Shafir (2012) contended that impoverished populations often fall into a vicious cycle of over-borrowing and worsening economic conditions because they focus attention on money itself while neglecting long-term interests beyond immediate financial concerns. Additionally, scholars have investigated how financial scarcity influences consumers' variety-seeking behavior (Fan & Jiang, 2017).

As research on tangible resource scarcity deepened, scholars have increasingly focused in recent years on how intangible resource scarcity, particularly time scarcity, affects individual psychology and behavior (e.g., Zhu et al., 2018; Layous, Kurtz, Chancellor, & Lyubomirsky, 2018). The research trajectories for food, product, financial, and time scarcity are summarized in Table 1 .

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3. Factors Influencing Scarcity Perception

The preceding sections introduced scarcity' s concept, classification, and historical trajectory. What factors trigger individuals' perception of scarcity regarding these four resource types? This warrants further examination. Mullainathan and Shafir (2013) argue that scarcity perception is primarily induced by physical constraints and subjective feelings. They consider individual savings account balances, debts, and number of tasks to be completed as physical constraints, while the importance of shopping to us constitutes subjective feelings. Additionally, Devoe and Pfeffer (2011) propose that the economic value of time creates time pressure, thereby triggering time scarcity perception. In other words, when individuals consider their time important, they perceive time scarcity.

This review reveals that physical constraints and subjective feelings are two important antecedents of tangible resource scarcity perception. Notably, as an intangible resource, time imposes identical physical constraints on all individuals —everyone has 24 hours daily that pass at the same rate. Due to this equality, physical constraints do not constitute a factor causing time scarcity.

4. Effects of Different Scarcity Types on Individuals

As a universal phenomenon in human society, resource scarcity profoundly influences people' s cognition, emotion, and behavior. After reviewing domestic and international scarcity research, we find that both tangible and intangible resource scarcity affect individuals' emotions, cognition, and behavioral patterns. This section elaborates on the effects of each scarcity type, while the next section explains the underlying mechanisms and categorizes these effects.

4.1 Effects of Tangible Resource Scarcity on Individuals

Our review reveals that tangible resource scarcity, represented by food, product, and financial scarcity, primarily affects individuals in the following ways:

4.1.1 Effects on Cognition

Tangible resource scarcity influences psychological perception through value perception, competition perception, and security perception. First, product scarcity plays an important role in value perception. Specifically, as products become scarcer, consumers perceive higher product value. Brock (1968) argued that any commodity' s value depends on its availability. Wu et al. (2012) confirmed this conclusion in a study where participants imagined a daily shopping scenario. The scarcity condition emphasized a product' s limited-edition feature, while the control condition highlighted ample stock. Results showed that scarcity condition participants perceived significantly higher product value than control participants. However, some studies find that product scarcity does not necessarily affect value perception, depending on consumers' information processing capacity (Inman et al., 1997). Consumers with strong information processing ability rarely experience product scarcity perception, thus showing similar value perception whether products are scarce or not. Conversely, consumers with weak information processing ability experience strong product scarcity perception and consequently perceive higher value (Inman et al., 1997).

Beyond value perception, product scarcity affects competition perception. Researchers often measure competition perception through lexical decision tasks. For example, Roux, Goldsmith, and Bonezzi (2015) found that activating product scarcity perception increased perceived competition. In their experiment, participants randomly assigned to scarcity and control groups completed a lexical decision task containing 10 competition-related words, 10 neutral words, and 30 non-word letter sequences. Researchers measured competition perception through word recognition speed, finding that product scarcity group participants recognized competition-related words significantly faster than control participants, indicating that product scarcity enhances consumers' competition perception. Similarly, Kristofferson, McFerran, Morales, and Dahl (2016) found

in their study of product scarcity's effect on consumer aggression that consumers facing product scarcity situations perceive other consumers as competitors.

Finally, tangible resource scarcity affects security perception. Research shows that financial scarcity increases consumers' insecurity. Fan and Jiang (2017) randomly assigned participants to financial constraint and no-constraint conditions, then measured insecurity levels. They found that participants under financial constraints exhibited higher insecurity compared to the no-constraint group.

4.1.2 Effects on Emotion Tangible resource scarcity affects emotions primarily through two aspects: (1) patience and (2) pleasure. First, food scarcity makes individuals impatient. In Read and Leeuwen' s (1998) experiment, manipulating participants' hunger status by controlling response time, participants chose between two options: eating in one week versus eating immediately. Results showed that hungry consumers chose immediate consumption significantly more often, demonstrating impatience. Second, financial scarcity generates unpleasant emotions. For instance, Sharma and Alter (2012) found that under financial deprivation, consumers choose scarce products because they need to eliminate unpleasant feelings caused by financial deprivation through selecting scarce goods.

4.1.3 Effects on Behavior Literature review reveals that tangible resource scarcity elicits compensatory behaviors, approach behaviors, and cherishing behaviors. In psychology, "compensation" refers to the process where individuals strive to succeed in other domains to compensate for psychological inferiority in certain aspects (Adler, 1917), serving as a substitute means and tool for need satisfaction (Zheng & Peng, 2014). This paper defines compensatory behavior as actions that acquire alternative resources or discover alternative uses for other resources to compensate for resource deficiency when facing scarcity. Research indicates humans have two basic motivations: approaching pleasure and avoiding pain (Higgins, 1997). Therefore, this paper defines approach behavior as actions where individuals strive to acquire lacking resources to maintain their well-being when facing scarcity. Finally, this paper defines cherishing behavior as individuals' unwillingness to let their limited resources drain away when facing scarcity.

First, tangible resource scarcity elicits compensatory behaviors, manifesting as compensatory consumption and enhanced creativity. Tangible resource scarcity triggers compensatory consumption behavior. Griskevicius et al. (2013) used secondary data and experiments to find that consumers actually purchase more cosmetics like lipstick during economic recessions. Similarly, Xu et al. (2015) conducted five experiments and a field study, finding that under hunger (food scarcity), consumers'desire for food spills over to non-food objects—that is, desire for non-food products increases because consuming non-food goods can compensate for food scarcity' s negative effects. Additionally, Laran and Salerno (2013)

found that individuals under economic crisis threat tend to consume high-calorie foods to compensate for threats caused by money scarcity. Beyond compensatory consumption, tangible resource scarcity also enhances creativity because innovative uses of resources can compensate for psychological deficits caused by resource scarcity. Mehta and Zhu (2015) experimentally demonstrated that scarcity also produces beneficial effects on consumers by enhancing creative behavior. In their study, they first activated participants' scarcity perception through scenario imagination tasks, then asked them to design a toy suitable for 5- to 7-year-olds using building blocks, evaluating designs for novelty and appropriateness. Results showed that participants under resource scarcity demonstrated higher creativity compared to control and resource-abundant groups.

Second, tangible resource scarcity promotes approach behavior, primarily manifested as aggressive behavior. Kristofferson et al. (2016) manipulated participants' product scarcity perception, then had them participate in a shooting game where more bullets fired indicated stronger aggression. Results showed that product scarcity group participants exhibited more aggressive behavior. Notably, we categorize aggressive behavior as approach behavior because its root cause is competing with others to acquire scarce products.

Finally, tangible resource scarcity elicits cherishing behaviors, manifested as reduced spending, decreased prosocial behavior, and preference for range-priced products. First, financial scarcity prompts individuals to cherish their money more, thereby reducing expenditure (Karlsson, Garling, Dellgran, & Klinganander, 2005). Second, both financial and food scarcity reduce individuals' prosocial behavior. Prosocial behavior benefits society or others (Eisenberg, Fabes, & Spinrad, 2006). Research finds that people in lower socioeconomic status neighborhoods are less likely to spontaneously donate money to help others (Holland, Silva, & Mace, 2012; Sasson et al., 2012). Similarly, individuals experiencing hunger (food scarcity) are less likely to share financial resources with anonymous others (Aaroe & Petersen, 2013; Petersen, Aaroe, Jensen, & Curry, 2014). However, some scholars propose contrary views, arguing that financial scarcity makes individuals more generous and helpful (Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Keltner, 2012; Piff, Kraus, Cote, Cheng, & Keltner, 2010), consistent with objective data showing that poorer people donate higher proportions of their income to charity (Stern, 2013). Roux et al. (2015) reconciled these inconsistent findings, discovering that individuals may exhibit either generous or selfish behavior depending on whether they can indirectly benefit from donations. Finally, preference for range-priced products under food and money scarcity also represents cherishing behavior. Fan et al. (2018) manipulated scarcity perception through natural resource scarcity, food scarcity, and financial scarcity. They found that when feeling resource-scarce, consumers prefer range-priced products (versus single-priced products) because range pricing allows them to autonomously select preferred price ranges and save money.

4.2 Effects of Intangible Resource Scarcity on Individuals Beyond tangible resource scarcity (food, financial, product), scholars have recently begun examining intangible resource scarcity' s (primarily time scarcity) effects on individuals. Similar to tangible resource scarcity, time scarcity affects both psychological perception and behavioral patterns.

4.2.1 Effects on Cognition Intangible resource scarcity (time scarcity) affects psychological perception through value perception and well-being perception. First, when time is scarce, individuals perceive higher time value. Monga, May, and Bagchi (2017) introduced the concept of time wage rate from labor economics into consumer research. Through a series of experiments, they found that time-scarce consumers demand higher time wage rates because their time value perception is enhanced. Second, time scarcity increases well-being perception. Layous et al. (2018) found that when participants imagined having only one month left in their current city, they reported higher well-being during that period because time scarcity makes individuals focus more on positive aspects of their surroundings (Layous et al., 2018).

4.2.2 Effects on Behavior Similar to tangible resource scarcity, intangible resource scarcity (primarily time scarcity) increases compensatory and cherishing behaviors. First, time scarcity promotes cherishing behavior. Traditional views suggest time scarcity hinders goal pursuit. However, Zhu et al. (2018) found through multiple studies that time scarcity actually facilitates goal achievement because it makes individuals cherish time more and focus limited time on goal completion. Second, time scarcity elicits compensatory behavior. Monga et al. (2017) found that time-scarce individuals demand lower discounts for promotional products because they want to use money to compensate for time scarcity. Notably, unlike tangible resources, intangible time cannot be regained once passed. Therefore, individuals facing time scarcity do not exhibit approach behaviors to reacquire time.

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5. Mechanisms Through Which Scarcity Affects Individuals

In recent years, psychologists have explored various mechanisms underlying scarcity' s effects on individual psychology and behavior. However, due to limited mechanistic explanations regarding emotional cognition and its ultimate behavioral effects, this paper focuses on mechanisms affecting behavioral patterns. We introduce psychological theories related to scarcity and use them to explain scarcity research on individual behavior. We map scarcity' s effects on individual behavioral reactions and underlying mechanisms in Figure 2 [Figure 2: see original paper].

5.1 Promotion Focus Humans have two fundamental motivational principles: pursuing pleasure and avoiding pain (Higgins, 1997, 1998). Based on

these principles, regulatory focus theory proposes that individuals exhibit two regulatory orientations: promotion focus and prevention focus (Higgins, 1997, 1998). Promotion focus views goals as ideals and aspirations, focusing on positive outcomes during goal pursuit and striving to achieve them; prevention focus views goals as duties and obligations, focusing on negative outcomes and striving to avoid them (Molden, Lee, & Higgins, 2008). Based on this discussion, we propose that regulatory focus theory effectively explains compensatory behaviors (such as purchasing range-priced products) triggered by resource scarcity because promotion focus increases individuals' hope of gaining benefits from range pricing to compensate for scarcity perception.

5.2 Life History Theory How to effectively allocate limited resources across one' s lifespan is a problem everyone faces. Life-history theory concerns how resources are allocated to various survival tasks such as growth and reproduction. According to this theory, all organisms, including humans, face a fundamental trade-off in energy and resource allocation between somatic effort and reproductive effort (Griskevicius, Delton, Robertson, & Tybur, 2011; Griskevicius, Tybur, Delton, & Robertson, 2011). Somatic effort relates to slow life-history strategies where organisms delay gratification to increase future returns (Figueredo et al., 2006), whereas reproductive effort relates to fast life-history strategies where organisms sacrifice long-term interests for short-term gains. Life-history theory suggests that fast life-history strategies are primarily adaptive in harsh environments characterized by resource scarcity and intense competition because the future is highly uncertain in such environments, making reproduction-related fast strategies evolutionarily adaptive (Ellis, Figueredo, Brumbach, & Schlomer, 2009). Correspondingly, long-term interests are minimized in harsh environments as people focus on acquiring and using resources in the present. Laran and Salerno (2013) argue that reminders of harsh living conditions make people aware that world resources are scarce, leading them to seek high-calorie foods whose consumption can compensate for threats from other resource deficiencies. In summary, life-history theory explains why resource scarcity prompts high-calorie food consumption as a compensatory behavior.

5.3 Strengthened Psychological Ownership Psychological ownership, distinct from legal ownership, is a state of mind where "individuals feel that the target object or part of its ownership belongs to them" (Pierce, Kostova, & Dirks, 2003; Reb & Connolly, 2007). It is essentially a sense of possession, reflecting individuals' consciousness, thoughts, and beliefs about target objects (Pierce, Kostova, & Dirks, 2001). Liu and Li (2017) proposed that psychological ownership theory effectively explains the mechanism underlying product scarcity' s effect on purchase intention. Based on this, we argue that scarcity perception enhances consumers' psychological ownership, generating approach behaviors such as purchasing scarce products. Notably, although psychological ownership theory has been applied to product scarcity, its role in other scarcity types and overall resource scarcity' s effects on psychology and behavior remains

unexplored.

5.4 Reduced Functional Fixedness Why do individuals show enhanced creativity under resource scarcity? Functional fixedness theory may explain this. Functional fixedness is a cognitive bias that prevents individuals from seeing new uses for objects beyond their traditional functions (Mehta & Zhu, 2015; Duncker, 1945). For example, someone needing a paperweight but having only a hammer may fail to see the hammer' s alternative use. This fixed view of traditional functions constitutes functional fixedness. Generally, people prefer traditional solutions because retrieving and implementing known solutions is easier and more effective. However, Mehta and Zhu (2015) argue that scarcity activation produces a constrained cognitive orientation that makes traditional solutions unsuitable for constrained environments, requiring creative item usage to compensate for scarcity' s negative effects.

5.5 Enhanced Competition Orientation Competition orientation as a mediating mechanism effectively explains aggressive and prosocial behaviors under resource scarcity (Roux et al., 2015; Kristofferson et al., 2016). Reminders of resource scarcity activate competition orientation because a cognitive association exists between scarcity and competition, formed through two pathways. First, competition orientation becomes associated with resource scarcity through repeated personal experience (Ross & Nisbett, 2011). Throughout life, individuals compete for grades, jobs, spouses, etc. (Griskevicius et al., 2012). Second, cognitive association forms through repeated exposure to instances where resource scarcity leads to competition (Morris, Menon, & Ames, 2001). History contains countless examples of wars fought over scarce resources. Therefore, both aggressive and prosocial behaviors under resource scarcity relate to competition orientation. While competition orientation explains prosocial behavior under resource scarcity and consumer aggression under product scarcity, its role in other scarcity types remains unverified.

5.6 Other Mechanisms Scholars have proposed need satisfaction and task difficulty as mediators explaining intangible resource scarcity' s (time scarcity) effects on individual psychology and behavior. Layous et al. (2018) argued that time scarcity makes individuals focus more on psychologically satisfying activities, thereby enhancing well-being—essentially cherishing one' s time. Zhu et al. (2018) proposed that short deadlines benefit goal pursuit because they lead individuals to infer that task goals are relatively easy to accomplish.

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6. Future Research Directions

This paper systematically reviewed scarcity literature from perspectives of concept, influencing factors, effects, and mediating mechanisms. Despite progress,

many questions remain unresolved. We propose several future research directions:

First, investigate additional factors influencing individual scarcity perception. Although physical constraints and subjective feelings have been proposed as antecedents (Mullainathan & Shafir, 2013), specific factors require further exploration. We propose that social crowding and social comparison may also influence scarcity perception. Social crowding may affect scarcity perception because scarce objects have been shown to cause crowding, leading consumers to intuitively associate crowding with scarcity. According to overgeneralization theory, although this association may be inapplicable in some contexts, individuals often apply it inappropriately (Arkes & Ayton, 1999; Hsee, Yang, & Ruan, 2015). Thus, individuals may erroneously infer that "things in crowded places are scarce." Second, social comparison may generate strong scarcity perception. Suls and Wheeler (2013) argue that individuals engage in upward comparison, and when comparing their money, food, or products with those of higher-status individuals, they experience corresponding scarcity.

Second, explore additional moderators of scarcity' s effects on charitable and prosocial behavior. Why do some individuals donate generously while others give nothing under resource scarcity? Roux et al. (2015) proposed that the ability to benefit from donations moderates this effect. Beyond this, we suggest that materialism levels and empathy may also moderate these effects. Belk (1985) identified possessiveness, stinginess, and envy as characteristics of materialists. Therefore, we speculate that under financial scarcity, high materialists will cherish their money more and exhibit lower prosocial behavior. Empathy refers to understanding others' emotional states and showing similar emotional experiences and responses (Eisenberg & Strayer, 1987). We propose that under financial scarcity, individuals with stronger empathy are more likely to feel others' suffering and thus more willing to make charitable donations and engage in prosocial behavior.

Third, develop improved scarcity measurement tools. Current scarcity measurement primarily uses the scale developed by Roux et al. (2015), which represents simple item development without rigorous item generation and dimensionality reduction. Therefore, systematic scarcity measurement tools remain lacking. Future research should develop systematic scales from perspectives of food, product, financial, and time scarcity. Additionally, localized scarcity measurement tools are urgently needed, as existing measures primarily target Western consumption contexts and may not fully align with domestic situations.

Fourth, explore additional consequences of scarcity. Current research on overall resource scarcity and time scarcity' s effects remains very limited and warrants further investigation. We propose that scarcity' s effects may also include intertemporal decision-making, ritual consumption, and unethical behavior. First, scarcity may affect intertemporal decision-making. As previously discussed, resource-scarce individuals exhibit two behaviors: increased resource consumption and cherishing resources. Increased consumption represents choos-

ing immediate benefits, while cherishing resources can be viewed as protecting future interests. Intertemporal decision-making involves choosing between larger-later and smaller-sooner rewards (Li, Dou, & Nie, 2018). Thus, associations may exist between resource scarcity and intertemporal decision-making. Second, time scarcity may increase ritual consumption. Extensive research shows that increased event density within a period extends subjective time perception because individuals use event counts as temporal markers (Siddiqui, May, & Monga, 2014; Levav, 2010). Consequently, we speculate that time-scarce individuals may prefer ritual consumption that serves as temporal markers. Finally, Aaroe and Petersen (2013) confirmed that hungry individuals (food scarcity) are less likely to share financial resources with anonymous others because resource scarcity leads individuals to prioritize self-interest over others' interests. Based on this, we speculate that resource-scarce individuals may engage in unethical behavior for self-benefit.

References

Fan, Y., & Jiang, J. (2017). The impact of financial constraint on consumer variety-seeking behavior and its psychological mechanism. *Journal of Marketing Science*, 13(2), 56–70.

Li, Z., Dou, K., & Nie, Y. (2018). Staying away from "temptation" : The regulatory mechanism of precommitment on intertemporal decision-making and its neural basis. *Advances in Psychological Science*, 26(10), 1869–1877.

Liu, J., & Li, D. (2017). Parallel multiple mediation mechanisms of product scarcity appeals' impact on consumer purchase intention. *Nankai Business Review*, 20(8), 4–15.

Zheng, X., & Peng, S. (2014). Compensatory consumption behavior: Concept, types, and psychological mechanisms. *Advances in Psychological Science*, 22(9), 1513–1520.

Aaroe, L., & Petersen, M. B. (2013). Hunger games: Fluctuations in blood glucose levels influence support for social welfare. *Psychological Science*, 24(12), 2550–2556.

Adler, B. A. (1917). Study of organ inferiority and its psychical compensation: A contribution to clinical medicine. *Journal of Abnormal Psychology*, 12(5), 348–351.

Arkes, H. R., & Ayton, P. (1999). The sunk cost and concorde effects: Are humans less rational than lower animals? *Psychological Bulletin*, 125(5), 591–600.

Belk, R. W. (1985). Materialism: Trait aspects of living in the material world. *Journal of Consumer Research*, 12(3), 265–280.

Bozzolo, A. M., & Brock, T. C. (1992). Unavailability effects on message processing: A theoretical analysis and an empirical test. *Basic & Applied Social Psychology*, 13(1), 93–101.

Brock, T. C. (1968). Implications of commodity theory for value change. In *Psychological foundations of attitudes* (pp. 243–275). San Diego: Academic Press.

Carroll, C. D., Hall, R. E., & Zeldes, S. P. (1992). The buffer-stock theory of saving: Some macroeconomic evidence. *Brookings Papers on Economic Activity*, 1992(2), 61–156.

Devoe, S. E., & Pfeffer, J. (2011). Time is tight: How higher economic value of time increases feelings of time pressure. *Journal of Applied Psychology*, 96(4), 665–676.

Duncker, K. (1945). On problem solving. *Psychological Monographs*, 58(5; Whole No. 270).

Eisenberg, N., Fabes, R. A., & Spinrad, T. L. (2006). Prosocial development. In *Handbook of child psychology: Social, emotional, and personality development* (6th ed., Vol. 3, pp. 646–718). Hoboken, NJ: Wiley.

Eisenberg, N., & Strayer, J. (1987). Critical issues in the study of empathy. In N. Eisenberg & J. Strayer (Eds.), *Empathy and its development* (pp. 3–13). New York: Cambridge University Press.

Eisend, M. (2008). Explaining the impact of scarcity appeals in advertising: The mediating role of perceptions of susceptibility. *Journal of Advertising*, 37(3), 33–40.

Ellis, B. J., Figueredo, A. J., Brumbach, B. H., & Schlomer, G. L. (2009). Fundamental dimensions of environmental risk: The impact of harsh versus unpredictable environments on the evolution and development of life history strategies. *Human Nature*, 20, 204–268.

Fan, L. S., Li, X. S., & Jiang, Y. (2018). Room for opportunity: Resource scarcity increases attractiveness of range marketing offers. *Journal of Consumer Research*, 46(1), 82–98.

Figueredo, A. J., Vasquez, G., Brumbach, B. H., Schneider, S. M. R., Sefcek, J. A., Tal, I. R., ···Jacobs, W. J. (2006). Consilience and life history theory: From genes to brain to reproductive strategy. *Developmental Review*, 26, 243–275.

Griskevicius, V., Ackerman, J. M., Cantú, S. M., Delton, A. W., Robertson, T. E., Simpson, J. A., ···Tybur, J. M. (2013). When the economy falters, do people spend or save? Responses to resource scarcity depend on childhood environments. *Psychological Science*, 24(2), 197–205.

Griskevicius, V., Delton, A. W., Robertson, T. E., & Tybur, J. M. (2011). Environmental contingency in life history strategies: The influence of mortality

and socioeconomic status on reproductive timing. *Journal of Personality & Social Psychology*, 100(2), 241–254.

Griskevicius, V., Tybur, J. M., Ackerman, J. M., Delton, A. W., Robertson, T. E., & White, A. E. (2012). The financial consequences of too many men: Sex ratio effects on saving, borrowing, and spending. *Journal of Personality and Social Psychology*, 102(1), 69–80.

Griskevicius, V., Tybur, J. M., Delton, A. W., & Robertson, T. E. (2011). The influence of mortality and socioeconomic status on risk and delayed rewards: A life history theory approach. *Journal of Personality and Social Psychology*, 100(6), 1015–1026.

Hamilton, R., Thompson, D., Bone, S., Chaplin, L. N., Griskevicius, V., Goldsmith, K., ···& Piff, P. (2019). The effects of scarcity on consumer decision journeys. *Journal of the Academy of Marketing Science*, 47(3), 532–550.

Haushofer, J., & Fehr, E. (2014). On the psychology of poverty. *Science*, 344(6186), 862–867.

Hill, S. E., Rodeheffer, C. D., Griskevicius, V., Durante, K., & White, A. E. (2012). Boosting beauty in an economic decline: Mating, spending, and the lipstick effect. *Journal of Personality and Social Psychology*, 103(2), 275–291.

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, 52(12), 1280–1300.

Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. *Advances in Experimental Social Psychology*, 30(2), 1–46.

Holland, J., Silva, A. S., & Mace, R. (2012). Lost letter measure of variation in altruistic behaviour in 20 neighbourhoods. *Plos One*, 7(8), e43294.

Hsee, C. K., Yang, Y., & Ruan, B. (2015). The mere-reaction effect: Even nonpositive and noninformative reactions can reinforce actions. *Journal of Consumer Research*, 42(3), 420–434.

Inman, J. J., Peter, A. C., & Raghubir, P. (1997). Framing the deal: The role of restrictions in accentuating deal value. *Journal of Consumer Research*, 24(1), 68–79.

Karau, S. J., & Kelly, J. R. (1992). The effects of time scarcity and time abundance on group performance quality and interaction process. *Journal of Experimental Social Psychology*, 28(6), 542–571.

Karlsson, N., Gärling, T., Dellgran, P., & Klingander, B. (2005). Social comparison and consumer behavior: When feeling richer or poorer than others is more important than being so. *Journal of Applied Social Psychology*, 35(6), 1206–1222.

Keys, A., Brozek, J., Henschel, A., Mickelsen, O., & Taylor, H. L. (1950). *The biology of human starvation* (2 vols). Minneapolis, MN: University of Minnesota

Press.

Kraus, M. W., Piff, P. K., Mendoza-Denton, R., Rheinschmidt, M. L., & Keltner, D. (2012). Social class, solipsism, and contextualism: How the rich are different from the poor. *Psychological Review*, 119(3), 546–572.

Kristofferson, K., McFerran, B., Morales, A. C., & Dahl, D. W. (2016). The dark side of scarcity promotions: How exposure to limited-quantity promotions can induce aggression. *Journal of Consumer Research*, 43(5), 683–706.

Laran, J., & Salerno, A. (2013). Life-history strategy, food choice, and caloric consumption. *Psychological Science*, 24(2), 167–173.

Layous, K., Kurtz, J., Chancellor, J., & Lyubomirsky, S. (2018). Reframing the ordinary: Imagining time as scarce increases well-being. *The Journal of Positive Psychology*, 13(3), 301–308.

Levav, J. (2010). 1995 feels so close yet so far: The effect of event 'markers' on the subjective feeling of elapsed time. *Social Science Electronic Publishing*, 21(1), 133–139.

Lynn, M. (1991). Scarcity effects on value: A quantitative review of the commodity theory literature. *Psychology & Marketing*, 8(1), 43–57.

Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impedes cognitive function. *Science*, 341(6149), 976–980.

Mehta, R., & Zhu, M. (2015). Creating when you have less: The impact of resource scarcity on product use creativity. *Journal of Consumer Research*, 42(5), 767–782.

Molden, D. C., Lee, A. Y., & Higgins, E. T. (2008). Motivations for promotion and prevention. In *Handbook of Motivation Science* (pp. 169–187).

Monga, A., May, F., & Bagchi, R. (2017). Eliciting time versus money: Time scarcity underlies asymmetric wage rates. *Journal of Consumer Research*, 44(4), 833–852.

Morris, M. W., Menon, T., & Ames, D. R. (2001). Culturally conferred conceptions of agency: A key to social perception of persons, groups, and other actors. *Personality and Social Psychology Review*, 5(2), 169–182.

Mullainathan, S., & Shafir, E. (2013). *Scarcity: Why having too little means so much*. New York: Penguin Books.

Petersen, M. B., Aarøe, L., Jensen, N. H., & Curry, O. (2014). Social welfare and the psychology of food sharing: Short term hunger increases support for social welfare. *Political Psychology*, 35(6), 757–773.

Pierce, J. L., Kostova, T., & Dirks, K. T. (2001). Toward a theory of psychological ownership in organizations. *Academy of Management Review*, 26(2), 298–310.

Pierce, J. L., Kostova, T., & Dirks, K. T. (2003). The state of psychological ownership: Integrating and extending a century of research. *Review of General Psychology*, 7(1), 84–107.

Piff, P. K., Kraus, M. W., Côté, S., Cheng, B. H., & Keltner, D. (2010). Having less, giving more: The influence of social class on prosocial behavior. *Journal of Personality and Social Psychology*, 99(5), 771–784.

Read, D., & Leeuwen, B. V. (1998). Predicting hunger: The effects of appetite and delay on choice. *Organizational Behavior and Human Decision Processes*, 76(2), 189–205.

Reb, J., & Connolly, T. (2007). Possession, feelings of ownership, and the endowment effect. *Judgment and Decision Making*, 2(2), 107–114.

Ross, L., & Nisbett, R. E. (2011). *The person and the situation: Perspectives of social psychology*. London: Pinter & Martin Publishers.

Roux, C., Goldsmith, K., & Bonezzi, A. (2015). On the psychology of scarcity: When reminders of resource scarcity promote selfish (and generous) behavior. *Journal of Consumer Research*, 42(4), 615–631.

Sasson, C., Magid, D. J., Chan, P., Root, E. D., McNally, B. F., Kellermann, A. L., & Haukoos, J. S. (2012). Association of neighborhood characteristics with bystander-initiated CPR. *New England Journal of Medicine*, 367(17), 1607–1615.

Shah, A. K., Mullainathan, S., & Shafir, E. (2012). Some consequences of having too little. *Science*, 338(6107), 682–685.

Sharma, E., & Alter, A. L. (2012). Financial deprivation prompts consumers to seek scarce goods. *Journal of Consumer Research*, 39(3), 545–560.

Siddiqui, R. A., May, F., & Monga, A. (2014). Reversals of task duration estimates: Thinking how rather than why shrinks duration estimates for simple tasks, but elongates estimates for complex tasks. *Journal of Experimental Social Psychology*, 50(1), 184–189.

Stern, K. (2013). *With charity for all: Why charities are failing and a better way to give*. New York: Anchor Books.

Suls, J., & Wheeler, L. (Eds.). (2013). *Handbook of social comparison: Theory and research*. Berlin: Springer Science & Business Media.

Wu, W. Y., Lu, H. Y., Wu, Y. Y., & Fu, C. S. (2012). The effects of product scarcity and consumers'need for uniqueness on purchase intention. *International Journal of Consumer Studies*, 36(3), 263–274.

Xu, A. J., Schwarz, N., & Wyer, R. S. (2015). Hunger promotes acquisition of nonfood objects. *Proceedings of the National Academy of Sciences*, 112(9), 2688–2692.

Zhu, M., Bagchi, R., & Hock, S. J. (2018). The mere deadline effect: Why more time might sabotage goal pursuit. *Journal of Consumer Research*, 45(5), 1068-1084.

Note: Figure translations are in progress. See original paper for figures.