

## Psychological Mechanisms and Management Strategies for Behavioral Poverty Traps: A Dual Perspective from Cognition and Motivation

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### Abstract

Drawing upon the new paradigm pioneered by behavioral economists in applying behavioral decision-making to poverty research, this study selects impoverished individuals from China's "contiguous destitute areas" as research subjects. First, it constructs a theoretical model of "behavioral poverty traps from dual perspectives of cognition and motivation"; then, it explores the causal effects between poverty-induced psychological consequences and subsequent decision-making behaviors through "the psychological and neural mechanisms by which poverty-induced cognitive consequences influence subsequent decision-making behaviors," as well as "the mechanisms by which poverty-induced cognitive and motivational consequences jointly influence subsequent decision-making behaviors"; finally, it conducts "randomized controlled experiments on how poverty-induced changes in cognitive function affect subsequent decision-making behaviors" and "field intervention studies on how poverty-induced changes in self-identity affect subsequent decision-making behaviors," aiming to achieve "teaching one to fish" through "boosting aspiration and intelligence," and to extract management strategies that can serve as references for poverty alleviation policies.

### Full Text

## Psychological Mechanisms and Management Strategies of Behavioral Poverty Traps: A Dual Perspective Based on Cognition and Motivation

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**Abstract:** Drawing upon the new research paradigm pioneered by behavioral economists who apply behavioral decision-making to poverty studies, this project selects impoverished individuals from China’s “contiguous destitute areas” as research subjects. First, we construct a theoretical model of “behavioral poverty traps from dual cognitive and motivational perspectives.” Second, we explore the causal effects between poverty-induced psychological consequences and subsequent decision-making behaviors through two pathways: (1) the psychological and neural mechanisms by which poverty’s cognitive consequences affect subsequent decisions, and (2) the joint mechanisms through which poverty’s cognitive and motivational consequences influence subsequent decisions. Finally, we conduct randomized controlled experiments on how poverty-induced changes in cognitive function affect subsequent decisions, and field intervention studies on how poverty-induced changes in self-identity affect subsequent decisions. Our aim is to achieve the goal of “teaching fishing rather than giving fish” through “boosting aspiration and intelligence,” and to distill management strategies that can inform poverty alleviation policies.

**Keywords:** poverty; behavioral poverty trap; behavioral decision-making; cognition; motivation

**Classification Code:** B849:C91

## 1. Problem Statement

The United Nations’ *Millennium Development Goals 2015 Report* indicates that 836 million people worldwide still live in extreme poverty (on less than \$1.25 per day), and 880 million people in developing countries reside in slum-like conditions. In China, there remain 11 “contiguous destitute areas,” as well as Tibet, Tibetan areas in Sichuan, and southern Xinjiang that require comprehensive poverty alleviation. Thus, whether viewed globally or domestically, the task of poverty alleviation remains urgent and formidable. Encouragingly, since the 18th National Congress of the Communist Party, the Party Central Committee has led governments at all levels in carrying out highly effective “targeted poverty alleviation” work, lifting an average of 13.7 million people out of poverty

annually. Regarding the final and most challenging task of lifting the long-term destitute population, General Secretary Xi Jinping has emphasized the need to “combine poverty alleviation with boosting aspiration and intelligence, fully mobilizing the enthusiasm and initiative of the poor, guiding them to establish a sense of agency, promoting self-reliance, stimulating their drive and determination to change their impoverished conditions, and changing their destiny through their own efforts” (Hang & Hu, 2017).

Early academic research on poverty and poverty traps primarily treated poverty as an outcome variable, examining internal and external causes from perspectives such as geographical environment, institutions and culture, and individual factors of the poor. For instance, most researchers attributed poverty to environmental and individual factors, analyzing influences from macro-level institutional, cultural, and environmental conditions of impoverished regions, and micro-level factors such as labor skills and personality traits of the poor (UNDP, 2014). However, mainstream economics historically focused on exogenous material aspects of poverty, relatively neglecting endogenous psychological factors of the poor and their interaction with material factors. In recent years, behavioral and development economics have begun treating poverty as an antecedent variable, focusing more on the interaction between poverty and individual psychological factors, examining poverty-induced psychological consequences and related factors, and innovatively employing nudges and randomized controlled trials (RCTs) to effectively help the poor escape poverty traps (Banerjee & Duflo, 2011; Karlan & Appel, 2011; Mullainathan & Shafir, 2013; Haushofer & Fehr, 2014). This has opened new avenues for poverty research and practice, achieving remarkable results (World Bank Group, 2015; Banerjee et al., 2015), with pioneers Abhijit Banerjee, Esther Duflo, and Michael Kremer receiving the 2019 Nobel Prize in Economics.

Nevertheless, the research orientation focusing on poverty-induced psychological consequences and biased behaviors has not been fully adopted in China’s poverty research and practice, and there remains a lack of genuine empirical studies in China that achieve “teaching fishing rather than giving fish” through “boosting aspiration and intelligence.” Based on this, under the guidance of General Secretary Xi’s thought on “combining poverty alleviation with boosting aspiration and intelligence,” and after summarizing the contributions and limitations of existing research on behavioral poverty traps, this project first proposes the scientific question to be explored: “How do poverty-induced psychological consequences affect subsequent decision-making behaviors?” Building upon causal mechanism research on behavioral poverty traps, we aim to help long-term impoverished individuals in China’s “contiguous destitute areas” escape poverty traps through RCTs and field intervention studies designed to “boost aspiration and intelligence,” and to distill practical solutions and policy recommendations that can inform government poverty alleviation decision-making.

## 2. Literature Review

### 2.1 From “Poverty Traps” to “Behavioral Poverty Traps”

Poverty trap research constitutes a core theme in development economics. Early researchers defined a poverty trap as “any self-reinforcing mechanism that causes poverty to persist” (Barrett, Garg & McBride, 2016). Carter and Barrett (2006) further proposed empirical methods to test for the existence of poverty traps and validated their presence using various economic data. As research progressed, poverty trap studies gradually expanded from macro to micro levels, focusing on micro-level mechanisms of poverty trap formation and how various regulatory measures can break the feedback loops that perpetuate long-term poverty (Ye, Liu & Gao, 2012; Barrett & Carter, 2013).

With the expansion of micro-level mechanism research, scholars began examining how psychological factors of impoverished individuals reinforce poverty persistence (Xu et al., 2017). Dalton, Ghosal and Mani (2014) were among the first to use the term “behavioral poverty trap,” constructing a theoretical framework where poverty leads to aspirations failure, which in turn creates behavioral poverty traps, drawing on Kahneman and Tversky’s reference point concept from prospect theory. They argued that in the formation of behavioral poverty traps, “poverty” is the cause, “low aspirations” is the result, and this result leads the poor to exert less effort, perpetuating poverty and ultimately creating a poverty trap. They simultaneously emphasized that raising aspiration levels alone can help the poor escape poverty traps. Ye, Gao and Liu (2014) constructed a positive feedback loop between asset scarcity and pessimistic psychology, highlighting the important role of pessimistic mindsets in poverty trap formation. Wuepper and Lybbert (2017) elaborated on the role of self-efficacy in poverty escape and economic development, arguing that individuals with high self-efficacy set higher goals and exert more effort to achieve them. Lybbert and Wydick (2018) simultaneously emphasized the important roles of aspirations and hope in economic development and poverty generation through model construction. It is evident that these theoretical discussions have consistently focused on motivational factors in poverty trap formation, which align closely with the core components of psychological capital (self-efficacy, optimism, hope, and resilience) constructed by management psychologists Luthans and colleagues (Luthans, Youssef & Avolio, 2015). Furthermore, Wuepper and Sauer (2016) found in surveys that self-efficacy and social capital were the main predictors of good performance among Ghanaian farmers, with self-efficacy having an even greater effect than agricultural skills. Bloem, Boughton, Htoo, Hein and Payongayong (2018) measured hope levels among Burmese farmers using a self-developed hope scale and found significant positive correlations between hope levels and welfare perception. However, these theoretical discussions on how aspirations, hope, and self-efficacy affect poverty persistence aimed to compensate for traditional poverty traps’ exclusive focus on external constraints such as material conditions and institutional factors, and the psychological factors they emphasized mostly belong to the motivational domain, without involving

other psychological factors.

### 2.2.1 Poverty-Induced Stress Responses and Negative Emotions

Haushofer and Fehr (2014) were among the first to infer the existence of a poverty persistence feedback loop in which poverty-induced psychological consequences affect subsequent economic decisions. After reviewing relevant empirical research in psychology and behavioral economics, they argued that poverty generates stress responses and negative emotions such as anxiety and depression, leading to decision biases such as short-sightedness and excessive risk aversion. They also speculated that the mechanism by which poverty leads to decision biases might be that poverty restricts individuals' attention and reinforces habitual behaviors, thereby replacing goal-directed behaviors that should have been adopted. More seriously, these poverty-induced psychological consequences affecting subsequent economic decisions constitute a feedback loop that perpetuates poverty. Thus, the poverty persistence feedback loop described by Haushofer and Fehr, like the theoretical constructions of behavioral poverty traps by the aforementioned scholars, emphasizes the important role of psychological factors in poverty trap formation (Dalton et al., 2014), although the specific psychological factors emphasized differ.

Additionally, behavioral economics research on poverty-induced stress consequences has primarily used RCTs to explore the relationship between poverty and stress responses and negative emotions (Haushofer & Shapiro, 2016). For example, studies have found that farmers receiving cash transfers showed significant reductions in frustration and depression levels (Haushofer & Fehr, 2014). Chemin, de Laat and Haushofer's (2013) field research found that Kenyan farmers experiencing sudden droughts reported higher stress levels and significantly elevated cortisol levels (stress hormones), while Kenyan poor farmers receiving free health insurance showed significant decreases in stress and cortisol levels (Haushofer, Chemin, Jang & Abraham, 2020).

### 2.2.2 Poverty-Induced Cognitive Resource Depletion

As mentioned earlier, Haushofer and Fehr (2014) speculated that the formation mechanism of the poverty persistence feedback loop might be caused by limited attention among the poor. Mullainathan and Shafir's team, through a series of experiments exploring how poverty impairs cognitive function, proposed the scarcity theory of poverty. They argued that the essential characteristic of poverty is scarcity, and that the scarcity mindset and bandwidth load (a metaphorical expression for cognitive load) of the poor are the fundamental reasons why they struggle to escape poverty (Mullainathan & Shafir, 2013). They found that poverty not only leads to excessive borrowing among the poor (Schilbach, Schofield & Mullainathan, 2016), but also directly impairs fluid intelligence and executive function (Mani, Mullainathan, Shafir & Zhao, 2013). More importantly, Shah, Mullainathan and Shafir (2012) partially validated the mechanism speculated by Haushofer and Fehr regarding attention's role in the

poverty persistence feedback loop, demonstrating that poverty causes the poor to focus attention only on immediate concerns, leading to attentional neglect of other more important matters. However, these studies primarily focused on cognitive resource depletion in individuals experiencing temporary poverty (poverty state priming), with less examination of cognitive function changes in long-term poor individuals, whereas real-world poverty often persists for extended periods, even becoming inescapable poverty traps.

Furthermore, researchers have examined poverty's depletion effects on willpower or cognitive control from a behavioral control perspective. Spear (2011) first proposed the willpower depletion hypothesis and tested it using "diet and health data" from the U.S. Census Bureau's "American Time Use Survey," finding that low-income individuals might snack more while shopping due to needing to make more trade-offs, but showed no difference from the wealthy in snacking frequency in non-shopping contexts. Spears (2011) subsequently proposed behavioral control depletion arguments through experiments. Participants were randomly assigned to two groups to select three items representing investment goods, temptation goods, and neutral items (metal lunch boxes, cooking oil, rope). "Poor" participants could choose 1 item, while "rich" participants could choose 2. Half of participants made active choices (requiring decision-making), while the other half passively accepted (no decision required). Grip strength and Stroop tests were administered afterward to measure behavioral control depletion. Results showed that both attention depletion and willpower depletion played roles, partially validating Haushofer and Fehr's (2014) speculations.

### 2.3 Limitations of Existing Research

First, the aforementioned research on behavioral poverty traps and poverty-induced psychological consequences exhibits typical fragmentation. For example, Mullainathan and Shafir's team primarily focused on poverty-induced cognitive resource depletion, specifically manipulating attention and executive function. Haushofer and Fehr's important review paper mainly addressed poverty-induced stress responses and negative emotions. Dalton et al.'s (2014) theoretical construction of behavioral poverty traps and similar arguments from other scholars mostly concentrated on motivational factors such as aspirations, hope, and self-efficacy. Thus, existing research on behavioral poverty traps mostly involves only certain psychological factors or components, and future research should pay more attention to the comprehensive psychological impacts of poverty and interactions among various psychological factors.

Second, the formation of a behavioral poverty trap or a complete poverty persistence feedback loop consists of multiple temporal stages and links, such as the link of poverty-induced psychological consequences and the link of psychological consequences affecting subsequent decision behaviors. However, existing research not only mostly focuses on specific psychological factors in a single temporal stage or link, but also often only examines relationships between factors within a single link, lacking exploration of relationships between the two links.

For example, current research has extensively explored poverty-induced stress and negative emotions and intervention strategies, but lacks examination of how poverty-induced stress responses affect subsequent decision-making (Haushofer & Fehr, 2014). Similarly, Mullainathan and Shafir's series of experiments on poverty impairing cognitive function did not address how poverty-induced cognitive consequences affect subsequent decision behaviors. Other related studies bypass psychological consequences entirely to directly investigate poverty's effects on decision behaviors, ignoring the mediating or moderating roles of psychological factors, ultimately reducing empirical research on poverty persistence feedback loops to explorations of relationships between single-link or single-stage variables. Future research should gradually overcome this limitation by focusing on causal relationships across multiple links.

Third, perhaps due to the interdisciplinary nature of behavioral poverty trap research, existing findings are difficult to integrate and generalize due to diverse research methods. For example, Dalton et al.'s (2014) discussion of behavioral poverty traps and similar explorations by other researchers employed economic theoretical modeling methods. Haushofer and Fehr's (2014) cited research on poverty persistence feedback loops mostly consisted of correlation tests between single-link variables. Meanwhile, Mullainathan and Shafir's series of studies on poverty impairing cognitive function used psychological experimental methods, making it difficult to compare and integrate existing research on behavioral poverty traps under a unified metric. Future research on behavioral poverty traps requires empirical studies with factor design and variable manipulation based on more comparable methodological foundations.

### 3. Theoretical Framework

#### 3.1 Theoretical Derivation

As mentioned above, preliminary discussions exist on how poverty-induced psychological consequences affect subsequent decision-making and ultimately lead to poverty traps, but previous research has only empirically tested specific psychological factors or single links. For example, Mullainathan and Shafir's team only focused on poverty-induced cognitive consequences. Haushofer and Fehr's (2014) proposed poverty persistence feedback loop has a weak link: whether a causal relationship exists between poverty-induced psychological consequences and subsequent decision behaviors. Furthermore, relationships among different poverty-induced psychological consequences require investigation. Based on this, we draw on Mullainathan and Shafir's scarcity theory of poverty and Luthans's psychological capital theory to construct this project's theoretical model, serving as the theoretical foundation for exploring "how poverty-induced psychological consequences affect subsequent decision behaviors."

First, existing empirical research has repeatedly demonstrated that poverty circumstances can lead to biased decision behaviors. For example, Tanaka, Camerer and Nguyen (2010) surveyed the relationship between household in-

come and risk decisions among Vietnamese farmers, finding that farmers in villages with higher average incomes showed lower levels of risk aversion and loss aversion, and that farmers in wealthy villages were more patient with lower delay discounting rates. Griskevicius, Tybur, Delton and Robertson (2011) found that individuals raised in poverty environments, compared to those raised in wealthy environments, were more prone to present bias and had higher delay discounting rates. Liu (2013) surveyed risk preferences among Chinese cotton farmers choosing genetically modified cotton seeds, finding that farmers with higher levels of risk aversion and loss aversion adopted genetically modified seeds later and benefited less. However, most of these studies on the relationship between poverty and decision behaviors are correlational tests, making causal inferences difficult and preventing understanding of whether psychological factors mediate or moderate the relationship between poverty circumstances and decision behaviors. In summary, we propose this project's scientific question: "How do poverty-induced psychological consequences affect subsequent decision-making behaviors?"

Second, Mullainathan and Shafir's team creatively proposed the scarcity theory of poverty from the essential characteristic of scarcity. They argued that the poor lack not only material resources but also cognitive resources. The scarcity mindset of the poor creates bandwidth load (overloaded cognitive processing) through restricted attention and executive function, leading to biased behaviors such as excessive borrowing and ultimately creating a vicious cycle of poverty (Mullainathan & Shafir, 2013). The scarcity theory of poverty is not only supported by a series of experiments (Shah, Zhao, Mullainathan & Shafir, 2018), but has also been used by international organizations as theoretical guidance for poverty alleviation practice (World Bank Group, 2015). However, the scarcity theory of poverty has not explored how poverty-induced cognitive consequences affect subsequent decision behaviors. We found partial support in a related study. Spears (2014) conducted a field experiment in one wealthy and one poor village, selling locally produced brand-name soap to villagers at ultra-low prices, with villagers deciding whether to purchase. Half of the villagers were randomly required to complete a grip task measuring behavioral control before purchase, while the other half completed it after purchase. A working memory test was then administered. Results showed that "poor" participants had significantly shorter grip times before purchase than after, while "rich" participants showed no significant difference in grip times before and after purchase, indicating that attention depletion caused by scarcity mindset only occurs and functions when making purchase decisions. This study not only validated the mechanism of attention depletion but also discovered its boundary condition: it only creates adverse effects when making relevant economic decisions. This study, together with Mullainathan and Shafir's series of experiments, provides empirical support for this project. Specifically, this project treats limited cognitive function (attention-working memory-cognitive control) as a mediator variable between poverty and biased decision behaviors, and accordingly proposes the project's core proposition: "Poverty-induced cognitive consequences affect subsequent

decision behaviors (risk decisions and intertemporal choices).”

Third, with increasing attention to psychological factors causing poverty traps, development economists have begun constructing theoretical models of behavioral poverty traps, coincidentally focusing on the important roles of motivational factors such as aspirations, hope, and self-efficacy in poverty persistence. However, existing research mostly belongs to theoretical discussions, with the few empirical studies only conducting correlation tests (Wuepper & Sauer, 2016; Bloem et al., 2018) without exploring causal mechanisms. Based on this, this project draws on management psychology’s psychological capital theory, integrating the aforementioned motivational factors of hope and self-efficacy as moderator variables in the mediation model of poverty-induced cognitive consequences affecting subsequent decision behaviors, and conducts a series of empirical tests on moderating effects through laboratory experiments and field intervention studies.

Psychological capital theory was created by management psychologist Luthans in 2004. He defined psychological capital as positive psychological qualities of behavioral agents, a psychological state meeting positive organizational behavior criteria, specifically including four core components: self-efficacy, optimism, hope, and resilience (Luthans & Youssef, 2004; Luthans et al., 2015). Moreover, psychological capital is a higher-order concept built upon these four core components, and its effect on behavioral performance is greater than that of individual components (Luthans & Youssef-Morgan, 2017). More importantly, psychological capital, as a state-like psychological construct, can be improved through intervention training (Luthans, Avey, Avolio, Norman & Combs, 2006; Luthans, Avey & Patera, 2008). Based on this, we draw on psychological capital theory to treat aspirations, hope, and self-efficacy affecting poverty persistence as an integrated higher-order concept, proposing the project’s second core proposition: “Psychological capital moderates the effect of poverty-induced cognitive consequences on subsequent decision behaviors.” We found that existing research provides partial empirical support for this proposition. Hall, Zhao and Shafir (2014) selected low-income individuals visiting “free kitchens” in the United States as participants. The experimental group was asked to verbally describe things they were proud of to activate “self-affirmation” (the control group only described their daily meals), finding that the experimental group not only improved cognitive function but also became more willing to participate in special assistance programs. Additionally, research in related fields shows that resilience, as a core component of psychological capital, is an effective strategy for overcoming stress-induced behavioral disorders (Kalisch et al., 2017), providing further justification for using psychological capital as a moderator variable in this project.

### 3.2 Model Construction

In summary, through in-depth study of domestic and international literature on “poverty psychology and behavioral decision-making,” this project identi-

fies limitations in existing research and determines the scientific question to be explored: the fundamental issue of behavioral poverty traps, namely “how poverty-induced psychological consequences affect subsequent decision-making behaviors.” Based on the above theoretical derivation, we construct a “behavioral poverty trap from dual cognitive and motivational perspectives” relational model (see Figure 1 [Figure 1: see original paper]) as the theoretical foundation for this project. Therefore, a series of empirical studies on the causal effects (psychological mechanisms) and intervention strategies of this scientific question and theoretical model will be the main innovations of this project.

As shown in Figure 1, chronic poverty refers to a state of poverty persisting for five years or more that is difficult to escape despite assistance (Hulme & Shepherd, 2003). Overall, chronic poverty primarily stems from environmental factors, institutional factors, and individual factors of the poor (Rodgers, 2009). This project treats chronic poverty as an antecedent variable, mainly exploring the psychological mechanisms and coping strategies of behavioral poverty trap formation from the perspective of poverty-induced psychological consequences. Of course, completely escaping poverty traps requires coordinated cooperation among institutional, environmental, and individual factors, and only comprehensive governance through multiple approaches can thoroughly break the vicious cycle of chronic poverty (Shepherd et al., 2014).

Specifically, chronic poverty first negatively affects the cognitive function and psychological capital of the poor. On one hand, poverty depletes cognitive resources such as attention, working memory, and cognitive control, creating bandwidth load (Shah et al., 2012; Mani et al., 2013; Schilbach et al., 2016). On the other hand, poverty leads to pessimism and low self-efficacy, reducing hope for escaping poverty, and decreased psychological capital affects cognitive function performance (Ye et al., 2014; Hall et al., 2014; Wuepper & Lybbert, 2017). Second, existing research on behavioral poverty traps either only explores various psychological consequences of poverty, such as impaired cognitive function, stress, and negative emotions, or only examines the relationship between poverty and decision behaviors, such as poverty affecting risk decisions or intertemporal choices, ignoring the potential mediating or moderating roles of psychological consequences in these relationships. This project infers from existing research that poverty-induced cognitive consequences are mediator variables for subsequent decision behaviors of the poor, significantly affecting their risk preference levels, delay discounting rates, and loss aversion. Additionally, psychological capital such as hope and self-efficacy of the poor may not only directly affect subsequent decision behaviors but also interact with poverty-induced cognitive consequences to jointly influence subsequent decisions. In summary, this project will conduct multi-wave, multi-variable, multi-sample empirical studies based on the theoretical model of behavioral poverty traps from dual cognitive and motivational perspectives shown in Figure 1 to test the validity and reliability of this theoretical model.

## 4. Research Design

Following the approach of “theoretical model construction →mechanism exploration →field intervention research,” this project designs five interlocking empirical studies to systematically and thoroughly explore the causal effects of poverty-induced cognitive and motivational consequences on subsequent decision-making behaviors and corresponding management strategies.

### 4.1 Study 1: Testing the Relational Model of Behavioral Poverty Traps from Dual Cognitive and Motivational Perspectives

As mentioned above, most existing research only focuses on specific links or particular psychological factors in the feedback loop of poverty-induced psychological consequences affecting subsequent decision behaviors, with few studies exploring relationships among links and factors in the poverty persistence feedback loop (Haushofer & Fehr, 2014). Based on this, Study 1 will first use structural equation modeling and path analysis techniques to test the theoretical model shown in Figure 1.

**4.1.1 Research Purpose:** To test the theoretical model of “behavioral poverty traps from dual cognitive and motivational perspectives.”

**4.1.2 Participants:** 1,000 long-term impoverished individuals from China’s 11 “contiguous destitute areas.”

**4.1.3 Methods:** (1) Questionnaire surveys and psychological measurement; (2) Structural equation modeling and path analysis.

**4.1.4 Research Instruments:** Revised or self-developed questionnaires include: (1) Behavior Rating Inventory of Executive Function–Adult Version, measuring working memory, task monitoring, and behavioral regulation components (Roth et al., 2005); (2) Consideration of Future Consequences Scale (Strathman, Gleicher, Boninger & Edwards, 1994); (3) Hope Scale (Bloem et al., 2018); (4) General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995); (5) Cognitive Reflection Test (Frederick, 2005); (6) Risk Preference Questionnaire (Hsee & Weber, 1997); (7) Delay of Gratification Scale (Carducci, 2009); (8) Self-developed Loss Aversion Questionnaire, referencing Li, Baldassi, Johnson and Weber (2013) and adapting it to the actual lives of impoverished farmers. Additionally, self-rated stress levels (PSS), positive and negative affect (PANAS), family situation, income level, and demographic characteristics will be collected.

### 4.2 Study 2: Mechanisms of Poverty-Induced Cognitive Consequences Affecting Subsequent Decision Behaviors

Existing research mainly explores poverty-induced stress and cognitive function changes, or poverty’s effects on individual risk aversion and delay discounting, with few studies examining the causal effects of poverty-induced cognitive consequences on subsequent decision behaviors. Research in poverty and related fields has repeatedly demonstrated that children and adolescents from low-income and

low socioeconomic status families not only suffer adverse effects on academic performance but also experience impacts on brain development, leading to impaired cognitive function and subsequently affecting decision quality (Brito & Noble, 2014; Hair, Hanson, Wolfe & Pollak, 2015; Noble et al., 2015). Based on this, Study 2 will systematically explore the mechanism (causal effects) of poverty-induced cognitive consequences in the formation of subsequent decision biases.

#### **4.2.1 Study 2a: Psychological Mechanisms of Poverty-Induced Cognitive Consequences Affecting Subsequent Decision Behaviors (1)**

**Research Purpose:** To explore the causal effects of poverty-induced cognitive consequences on subsequent decision biases.

**(2) Participants:** 100 long-term impoverished individuals from China's contiguous destitute areas and 100 control participants, balanced for potential confounding factors.

**(3) Hypothesis:** Impoverished individuals under high financial need show greater risk aversion and higher delay discounting rates than middle-income individuals.

**(4) Research Design:** A 2 (poverty level: long-term impoverished vs. middle-income)  $\times$  2 (financial need: high vs. low) between-subjects design. Dependent variables are risk aversion scores and delay discounting rates in subsequent monetary risk decision tasks. Participants' stress levels and positive/negative affect are measured as control variables.

**(5) Experimental Procedure and Manipulation:** All tasks are completed on computers. Participants first complete demographic characteristics including family income, then read four monetary scenarios describing different production and living contents (presented in random order). Odd-numbered participants receive high financial need scenarios, while even-numbered participants receive low financial need scenarios. For example: "Imagine a sudden emergency requiring you to immediately pay 3,000 yuan/30,000 yuan. Can you come up with this money in a very short time? How would you do it? Would this cause long-term financial shortage?..." After scenario presentation, participants' cognitive control and cognitive reflection abilities are tested, followed by self-rated stress levels and positive/negative affect. Finally, risk preference and delay discounting tasks are completed as dependent variable measures, with task order randomized.

**(6) Measurement Instruments:** (1) Abbreviated Stroop cognitive control task; (2) Cognitive Reflection Test (CRT); (3) Self-developed risk preference questionnaire, referencing Hsee and Weber (1997), including six monetary decision scenarios, each with three risk probabilities (30%/50%/70%), totaling 18 decision scenarios with both gain and loss versions; (4) Self-developed intertemporal choice questionnaire, referencing McClure, Laibson, Loewenstein

and Cohen (2004); (5) Self-rated stress (PSS); (6) Positive and Negative Affect (PANAS).

#### **4.2.2 Study 2b: Cognitive-Neural Mechanisms of Poverty-Induced Cognitive Consequences Affecting Subsequent Decision Behaviors**

**(1) Research Purpose:** To explore the neural mechanisms of poverty-induced cognitive consequences affecting subsequent decision biases, using a 64-channel Neuroscan EEG system to record event-related potentials (ERPs) during cognitive processing.

**(2) Participants:** 120 low-grade university students from impoverished families in contiguous destitute areas (half male, half female), and 120 control students from middle-income families in the same areas (half male, half female).

**(3) Research Design:** A 2 (family background: impoverished vs. middle-income)  $\times$  2 (picture priming: poverty vs. wealth) between-subjects design. Poverty or wealth feelings are primed by presenting participants with 30 poverty-related or wealth-related pictures (referencing Liu, Feng, Suo, Lee & Li, 2012).

**(4) Research Instruments:** (1) Abbreviated Stroop cognitive control task; (2) Cognitive Reflection Test (CRT); (3) Risk Preference Questionnaire (Hsee & Weber, 1997); (4) Delay of Gratification Scale (Carducci, 2009); (5) Self-rated stress (PSS); (6) Positive and Negative Affect (PANAS).

**(5) Equipment:** 64-channel Neuroscan EEG system: continuously records participants' ERPs during task completion, with focus on data collection and analysis during the poverty/wealth picture priming phase and cognitive task processing phase.

#### **4.3 Study 3: Joint Effects of Poverty-Induced Cognitive and Motivational Consequences on Subsequent Decision Behaviors**

No existing research has examined the relationship between poverty-induced cognitive and motivational consequences and their joint effects on subsequent decision behaviors. Based on relevant research showing interactive effects between cognitive and motivational factors affecting decision behaviors (Botvinick & Braver, 2015), this project proposes exploratory research in Study 3, using laboratory experiments to examine the joint effects and interactions of poverty-induced cognitive consequences (executive function) and motivational consequences (self-efficacy) on subsequent economic decisions.

**4.3.1 Research Purpose:** To examine the effects of cognitive control and self-efficacy on subsequent decision behaviors of impoverished individuals.

**4.3.2 Participants:** 160 impoverished university students (half male, half female) randomly selected from low grades.

**4.3.3 Hypothesis:** Cognitive control and self-efficacy of impoverished individuals jointly affect risk preference levels and delay discounting rates in subsequent

economic decisions, with significant interaction effects between cognitive control and self-efficacy.

**4.3.4 Research Design:** A 2 (cognitive control: high vs. low)  $\times$  2 (self-efficacy: high vs. low) between-subjects design. Dependent variables are risk preference indices and delay discounting rates in subsequent risk decision tasks.

**4.3.5 Materials and Procedure:** Cognitive control is first manipulated. Following Shah et al. (2012), poverty (low cognitive control) and wealth (high cognitive control) are manipulated through a Wheel of Fortune (WoF) game, with the number of letter guesses in anagram games determining conditions: wealthy participants can guess 15 times per round, poor participants 5 times per round, for 10 total rounds. WoF consumes cognitive control resources, with the “abbreviated Stroop cognitive control task” used to verify manipulation effectiveness. Self-efficacy is then manipulated: (1) The high self-efficacy priming group watches a short video of a similarly situated university student winning first place in a knowledge competition, while the low self-efficacy group watches a video of a similar student not placing in the same competition; (2) Participants then complete a 5-minute moderately difficult “yearbook question” quiz, with the high self-efficacy group receiving excellent performance feedback and the low self-efficacy group receiving failing feedback. The “General Self-Efficacy Scale” verifies self-efficacy priming effectiveness. Dependent variable measures are the same risk preference questionnaire and delay of gratification scale used in Study 2.

#### **4.4 Study 4: Randomized Controlled Experiments on Poverty-Induced Cognitive Function Changes Affecting Subsequent Decision Behaviors**

Existing research has found that impoverished individuals commonly exhibit decision biases such as short-sightedness, impatience, and impulsive decision-making (Haushofer & Fehr, 2014). Research in related fields such as addictive behaviors and pathological gambling has also demonstrated that working memory training and future imagination training can help individuals overcome behavioral disorders like impulsive decision-making (Peng & Feng, 2014; Wang & Zhang, 2015), with intervention effects supported by brain imaging research (Peters & Büchel, 2009). Moreover, behavioral and development economists studying poverty solutions primarily use randomized controlled experiments (with experimental and control groups randomly assigned) to test the poverty reduction effects of specific methods (Banerjee & Duflo, 2011; Karlan & Appel, 2011). Based on this, Study 4 will use cognitive training methods (working memory and future imagination training) with long-term impoverished individuals as participants, conducting multi-wave, multi-sample RCTs to test the effectiveness of working memory and future imagination training in improving decision behaviors of the poor, aiming to explore methods for correcting decision biases such as high future discounting rates among long-term impoverished individuals, and to propose management strategies for poverty alleviation that can inform

government decision-making and public policy.

#### **4.4.1 Study 4a: Randomized Controlled Experiment on Working Memory Training Improving Impoverished Individuals' Decision Behaviors**

**(1) Research Purpose:** To combine working memory training with RCTs to explore training effects on improving decision behaviors by enhancing impoverished individuals' cognitive function.

**(2) Participants:** 60 long-term impoverished individuals from China's contiguous destitute areas.

**(3) Hypothesis:** Working memory training can significantly improve decision quality among impoverished individuals.

**(4) Research Design:** Single-factor between-subjects design with random assignment: 60 participants in the experimental group and 60 in the control group. The experimental group receives working memory training, while the control group only listens to memory-related materials. The dependent variable is delay discounting rate. The working memory subscale of the Behavior Rating Inventory of Executive Function is used to verify manipulation effectiveness.

**(5) Training Materials:** (1) Forward and backward auditory recall of Arabic numerals; (2) Visual recognition and recall of Chinese pinyin letters.

#### **4.4.2 Study 4b: Randomized Controlled Experiment on Future Imagination Training Improving Impoverished Individuals' Decision Behaviors**

**(1) Research Purpose:** To combine future imagination training with RCTs to explore training effects on improving decision behaviors by enhancing impoverished individuals' cognitive function.

**(2) Participants:** 60 long-term impoverished individuals from China's contiguous destitute areas.

**(3) Hypothesis:** Future imagination training can significantly improve decision quality among impoverished individuals.

**(4) Research Design:** Single-factor between-subjects design with random assignment: 60 participants in the experimental group and 60 in the control group. The experimental group receives specialized future imagination training, while the control group receives no future event cues and only makes corresponding decision responses. The dependent variable is delay discounting rate. The Consideration of Future Consequences Scale is used to verify manipulation effectiveness.

**(5) Training Materials:** Before formal training, participants list planned future events such as purchasing new varieties of economic crops and rate their self-relevance and importance. During formal training, participants are presented with cues of planned future events such as purchasing new crop varieties and asked to vividly and concretely imagine these events.

#### 4.5 Study 5: Field Intervention Study on Poverty-Induced Self-Identity Changes Affecting Decision Behaviors

If Study 4 helps impoverished individuals improve decision quality through “boosting intelligence,” Study 5 improves decision quality through “boosting aspiration.” As mentioned earlier, Hall et al. (2014) activated “self-affirmation” among impoverished individuals, which not only improved cognitive function but also increased their willingness to participate in special assistance programs. Existing research has found that impoverished individuals are generally unwilling to participate in social support programs such as skills training (Cao, 2017). Moreover, self-efficacy and psychological capital research in psychology has a solid theoretical foundation, and self-efficacy interventions have been applied in multiple practice domains (Wuepper & Lybbert, 2017). Based on this, Study 5 will randomly select long-term impoverished individuals as participants, using pre-post quasi-experimental designs with control groups in multi-wave, multi-sample intervention studies to test whether improving self-affirmation and self-efficacy can enhance decision quality among the poor, and to propose management strategies for poverty alleviation that can inform government decision-making and public policy.

##### 4.5.1 Study 5a: Field Intervention Study on Self-Affirmation Improving Impoverished Individuals’ Decision Quality (1) Research Purpose:

To improve decision quality by enhancing self-affirmation among impoverished individuals.

(2) **Participants:** 60 long-term impoverished individuals from China’s contiguous destitute areas.

(3) **Hypothesis:** Self-affirmation can significantly improve decision quality among impoverished individuals.

(4) **Research Design:** Pre-post quasi-experimental design with control group. Sixty participants are randomly selected as the experimental group, with another 60 as the control group. Dependent variables are risk preference in economic decisions and desire for status improvement.

(5) **Intervention Materials:** Experimental group participants are asked to orally narrate stories about events that make them particularly proud in a separate room for about 5 minutes. Control group participants spend 5 minutes detailing what they do on a typical day. Considering that impoverished farmers may have low education levels and be unaccustomed to written expression, oral narration is used. Audio recordings are made of experimental group participants’ self-affirmation narratives and control group participants’ daily behavior descriptions.

(6) **Pre-Post Measurement Instruments:** (1) Behavioral regulation subscale of the Behavior Rating Inventory of Executive Function–Adult Version; (2) Cognitive Reflection Test (CRT); (3) Self-developed risk preference question-

naire; (4) Self-developed intertemporal choice questionnaire; (5) Self-developed desire to change status questionnaire; (6) Self-developed survey on active cooperation with local government and volunteer organizations' poverty alleviation plans and actions (follow-up survey after one month).

#### 4.5.2 Study 5b: Field Intervention Study on Self-Efficacy Improvement Enhancing Impoverished Individuals' Decision Quality

**(1) Research Purpose:** To improve decision quality by enhancing self-efficacy among impoverished individuals.

**(2) Participants:** 60 long-term impoverished individuals from contiguous destitute areas.

**(3) Hypothesis:** Self-efficacy enhancement can significantly improve decision quality among impoverished individuals.

**(4) Research Design:** Pre-post quasi-experimental design with control group. Sixty participants are randomly selected as the experimental group, with another 60 as the control group. Dependent variables are risk preference in economic decisions and desire to change status.

**(5) Intervention Materials:** (1) The experimental group watches a documentary compiled from research on local role models' successful experiences, while the control group watches a video introducing local geography, climate conditions, and agricultural/forestry production. (2) The experimental group receives a two-week workshop training to enhance self-efficacy (14 sessions, 2 hours each, conducted as "night school" group training), while the control group attends popular science lectures during the same period. (3) Researchers and local successful individuals encourage experimental group participants.

**(6) Pre-Post Measurement Instruments:** Same as Study 5a, plus the General Self-Efficacy Scale.

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