

Effort-Reward Imbalance and Adolescent Problem Behaviors: The Chain Mediating Roles of Core Self-Evaluation and Self-Esteem

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ABSTRACT: This study explored the chain mediating mechanism of core self-evaluation and self-esteem between effort-reward imbalance and adolescent problem behaviors. A total of 301 junior high students completed questionnaires. Results indicated effort-reward imbalance positively predicted problem behaviors; core self-evaluation and self-esteem played independent and chain mediating roles. The study provides intervention suggestions for adolescent mental health.

KEYWORDS : *adolescent problem behavior, core self-evaluation, effort-reward imbalance, self-esteem*

I. INTRODUCTION

The healthy development and education of adolescents have long been a critical focus in China. In the post-pandemic era, adolescent mental health has received heightened attention. Simultaneously, adolescence represents a significant transitional period, fraught with challenges and pressures. Research consistently indicates that this is a high-risk period for the emergence of various problem behaviors (Cai & Zhou, 2006). These behaviors have been linked to numerous adverse health consequences (Diclemente et al., 1996), not only negatively impacting individuals but also precipitating broader societal issues like social safety concerns and public health crises. Therefore, investigating the influencing factors and mechanisms underlying adolescent problem behaviors is imperative for developing appropriate early intervention strategies (Peng, Zhu, & Wang, 2018).

Effort-reward imbalance, a common negative stimulus during adolescence, may exert direct or indirect effects on adolescent problem behaviors. By introducing core self-evaluation and self-esteem as mediating variables, this study delves into the positive predictive role of effort-reward imbalance and its internal mechanisms. This research aims to provide a reference for subsequent studies seeking to refine models of adolescent problem behaviors and to identify intervention targets, offering a basis for effective prevention strategies in applied settings.

II. LITERATURE REVIEW AND HYPOTHESES

2.1 Effort-Reward Imbalance Model

The Effort-Reward Imbalance (ERI) model, initially grounded in social exchange theory, was first applied in the occupational domain by Siegrist to explain health problems stemming from an imbalance between work-related efforts and rewards. Through ongoing investigation, the ERI model has been adapted to various other social domains while retaining its core logic. In the educational context, effort is defined as the time and energy students invest, and reward as positive external feedback like praise. Studies indicate that ERI among students is linked to fatigue, poor sleep quality (Fukuda & Yamano, 2010), and academic burnout (Wang et al., 2023). Following its introduction to China, the Learning Effort-Reward Imbalance Scale (LERIS) was adapted for local use (Chu et al., 2015). Current domestic research demonstrates that ERI positively predicts academic burnout and negatively predicts psychological capital (Zhu & Tao, 2022).

2.2 Adolescent Problem Behaviors

Previous research on the etiology of adolescent problem behaviors has predominantly focused on four areas: genetic/physiological factors, family environment factors, peer group factors, and social factors. Regarding the family environment, parental monitoring (Wang & Chen, 2007), parent-child relationship quality (Wu & Chen, 2016), parental conflict (Gao et al., 2019), and family socioeconomic status (Liu et al., 2020) have all been associated with these behaviors. Regarding peer and social factors, association with deviant peers (Sieverding et al.,

2005), neighborhood environment (Bronfenbrenner & Morris, 1998), and school climate (Eccles & Roeser, 2012) have also been shown to play a significant role.

2.3 Conceptual Definitions and Hypothesis Formulation

Problem behaviors are defined as atypical behavioral issues that impede an individual's social adaptation (Lin et al., 2003), typically classified into internalizing (e.g., depression, anxiety) and externalizing (e.g., rule-breaking, aggression) problems (Achenbach, 1991). Studies indicate that perceived ERI has significant adverse effects on adolescent health, including depressive symptoms (Guo et al., 2014). Therefore, Hypothesis 1 is proposed: Effort-reward imbalance positively predicts adolescent problem behaviors.

Core self-evaluation refers to a fundamental evaluation individuals hold regarding their own worth (Judge, 1997). The high self-esteem theory of aggression suggests that aggressive responses partly stem from self-crisis (Liu & Zhang, 2003). Previous research also indicates that low core self-evaluation is associated with internalizing problems (Leung et al., 2018). Hence, Hypothesis 2 is proposed: Core self-evaluation negatively predicts adolescent problem behaviors. It is also hypothesized that core self-evaluation mediates the relationship between effort-reward imbalance and adolescent problem behaviors.

Self-esteem is a crucial indicator of mental health (Zhou et al., 2021). The vulnerability model of depression emphasizes its negative predictive role on depression (Beck, 1976). Studies confirm that lower self-esteem is associated with higher depression and aggression (Ji et al., 2017; Li, 2002). Therefore, Hypothesis 3 is proposed: Self-esteem negatively predicts adolescent problem behaviors. It is also hypothesized that self-esteem mediates the relationship between effort-reward imbalance and adolescent problem behaviors.

In summary, this study posits that individuals experiencing high effort-reward imbalance are more likely to exhibit lower core self-evaluation and decreased self-esteem, leading to increased problem behaviors. Consequently, Hypothesis 4 is proposed: Core self-evaluation and self-esteem serve as chain mediators in the relationship between effort-reward imbalance and adolescent problem behaviors.

III. RESEARCH METHODS

3.1 Participants

Adolescent participants were recruited from two randomly selected junior high schools in Guangdong provinces. A total of 329 questionnaires were distributed. After excluding invalid responses, 301 valid responses were retained (91.49% effective rate). The sample comprised 170 males (56.5%) and 131 females (43.5%), with 153 students in grade 7 (50.8%), 79 in grade 8 (26.2%), and 69 in grade 9 (22.9%).

3.2 Measures

3.2.1 Effort-Reward Imbalance.

The LERIS, revised by Chu et al. (2015), was used. As this study focused on the level of imbalance, only the effort and reward dimensions were used. Higher scores on the effort subscale and lower scores on the reward subscale indicate higher imbalance.

3.2.2 Core Self-Evaluation.

The Core Self-Evaluations Scale (CSES), translated into Chinese by Du et al. (2012), consists of 10 items rated on a 5-point Likert scale. Higher scores indicate higher core self-evaluation. In this study, Cronbach's α was 0.88.

3.2.3 Self-Esteem.

The Self-Esteem Scale (SES) by Rosenberg comprises 10 items rated on a 4-point scale. Higher scores indicate higher self-esteem. In this study, Cronbach's α was 0.92.

3.2.4 Adolescent Problem Behaviors.

The Strengths and Difficulties Questionnaire (SDQ), self-report version, revised by Kou et al., was used. The total problem behavior score was calculated by summing the scores from the first four dimensions (emotional symptoms, conduct problems, hyperactivity, peer problems). In this study, Cronbach's α was 0.73.

3.3 Data Analysis

SPSS 26.0 was used for common method bias testing, descriptive statistical analysis, correlation analysis, and mediation model testing using PROCESS Macro Model 6 (Hayes, 2013).

IV. RESULTS

4.1 Common Method Bias Test

Harman's single-factor test revealed 14 factors with eigenvalues greater than 1. The first factor accounted for 26.61% of the total variance, below the 40% threshold, suggesting common method bias is not a serious concern.

4.2 Descriptive Statistics

Independent samples *t*-tests and one-way ANOVA were conducted. Results indicated that males reported significantly higher core self-evaluation than females. Seventh-grade students reported significantly more problem behaviors than eighth-grade students. No other significant gender or grade-level differences were found.

Table 1 Grade-Level Differences in Study Variables (*M*±*SD*)

Grade	ERI	CSE	SE	Adolescent Problem Behaviors
①Grade 7 (<i>n</i> =153)	0.92±0.24	32.35±7.09	28.64±5.63	19.93±6.05
②Grade 8 (<i>n</i> =79)	0.86±0.18	34.22±8.41	30.38±6.46	17.30±5.35
③Grade 9 (<i>n</i> =69)	0.90±0.26	34.00±8.37	29.36±6.15	18.17±5.45
F	1.919	1.971	2.221	6.046*
Post-hoc comparisons				②<①

Note: $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. ERI=Effort-Reward Imbalance; CSE=Core Self-Evaluation; SE=Self-Esteem. The same below.

4.3 Correlation Analysis

Correlation analyses revealed that effort-reward imbalance was significantly negatively correlated with core self-evaluation ($r = -0.327$, $p < 0.01$) and self-esteem ($r = -0.339$, $p < 0.01$), and significantly positively correlated with adolescent problem behaviors ($r = 0.425$, $p < 0.01$). Core self-evaluation and self-esteem were significantly negatively correlated with adolescent problem behaviors ($r = -0.643$ and -0.613 , respectively, $p < 0.01$).

Table 2 Correlations Among Study Variables

Variable	1	2	3	4
1.ERI	1			
2.CSE	-0.327**	1		
3. SE	-0.339**	0.843**	1	
4. Adolescent Problem Behaviors	0.425**	-0.643**	-0.613**	1

4.4 Mediating Roles of Core Self-Evaluation and Self-Esteem

The mediation analysis results are presented in Table 3 and Figure 1. Bias-corrected bootstrap methods (5000 resamples) confirmed the significance of all three mediating paths, as the 95% confidence intervals did not include zero.

Table 3 Mediation Effect Analysis

Mediation Path	Effect	SE	95% Bootstrap CI		Effect Size
			LLCI	ULCI	
Total Mediation	0.198	0.033	0.135	0.263	46.68%
ERI→CSE→Problem Behaviors	0.132	0.032	0.074	0.199	31.07%
ERI→SE→Problem Behaviors	0.014	0.009	0.000	0.035	3.30%
ERI→CSE→SE→Problem Behaviors	0.052	0.023	0.009	0.097	12.31%

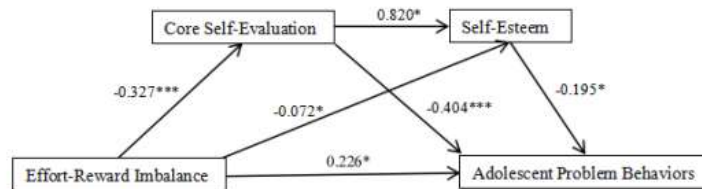


Figure 1 The Chain Mediation Model

V. DISCUSSION

5.1 Relationship Between Effort-Reward Imbalance and Adolescent Problem Behaviors

This study found that effort-reward imbalance was significantly positively correlated with adolescent problem behaviors, supporting Hypothesis 1. The finding that seventh-grade students reported more problem behaviors than eighth-grade students diverges from some prior research (e.g., Steinberg et al., 2006), a discrepancy that may be attributable to cultural differences or varying research focuses.

5.2 Independent Mediating Roles of Core Self-Evaluation and Self-Esteem

The results demonstrate that effort-reward imbalance affects adolescent problem behaviors through the independent mediating roles of core self-evaluation and self-esteem, supporting Hypotheses 2 and 3. This aligns with the high self-esteem theory of aggression (Liu & Zhang, 2003), which suggests that aggressive responses can stem from external negation of self-worth. The finding that males reported higher core self-evaluation than females is consistent with previous research (Yang & Wu, 2021), potentially due to culturally shaped role expectations.

5.3 Chain Mediating Role of Core Self-Evaluation and Self-Esteem

The results indicate that core self-evaluation positively predicts self-esteem, and they serve as a chain mediator, supporting Hypothesis 4. Adolescence is a period of transition in self-concept; individuals construct core self-evaluations based on external feedback, which, in turn, influence self-esteem levels over time. This suggests that beyond academic assessments (e.g., grades), increasing the diversity of external feedback could help adolescents develop appropriate self-evaluations and self-esteem, ultimately preventing or reducing problem behaviors.

VI. Conclusion and Future Directions

6.1 Conclusion

This study confirms that effort-reward imbalance significantly positively predicts adolescent problem behaviors. Core self-evaluation and self-esteem play significant mediating roles in this relationship, including independent and chain mediating pathways.

6.2 Limitations and Future Directions

This study has several limitations. First, its cross-sectional design cannot establish causality. Future research could employ longitudinal designs. Second, all data were derived from adolescent self-reports, introducing potential cognitive biases. Incorporating reports from multiple informants, such as teachers and parents, would enhance rigor. Finally, the sample was drawn from only two junior high schools, limiting generalizability. Future research could expand the sample to include participants from different regions and educational levels. Based on these findings, future interventions could focus on modifying cognitions (e.g., core self-evaluation) and enhancing feelings of worth (e.g., self-esteem). Broadening students' understanding of "rewards" to include diverse forms of recognition could reduce perceived effort-reward imbalance and consequently decrease problem behaviors. Ultimately, preventing and intervening in adolescent problem behaviors requires the collective effort of families, schools, and society.

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