

## RESEARCH ARTICLE

# The empathy incubation effects of moral narrative theater: Socialization shaping of university students' personality cultivation through drama education environments

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## ABSTRACT

This study explores the socialization shaping mechanisms of empathy incubation effects on university students' character development within moral narrative theater environments. Using a quasi-experimental design, 456 university students underwent a 16-week drama education intervention, with mixed-methods research systematically analyzing the psychological ecological characteristics of drama education environments, the generative mechanisms of empathy incubation effects, and their shaping effects on personality traits. The research findings reveal: (1) Drama education environments create a unique psychological ecosystem for student character development through three dimensions—physical spatial layout, social interaction networks, and cultural atmosphere cultivation—where open circular layouts significantly enhance psychological safety (26.7% improvement), collective creation strengthens social cohesion (84.5% improvement), and multicultural integration promotes value coordination (consistency index increased from 0.34 to 0.78); (2) Empathy incubation effects demonstrate three-dimensional coordinated development characteristics of cognitive empathy, affective empathy, and behavioral empathy, with overall empathy capacity improving by 52.0%, behavioral empathy frequency increasing by 239.1%, and effect sizes reaching large effect levels; (3) Participants showed positive changes across all Big Five personality trait dimensions, with openness increasing by 37.8%, agreeableness growing by 48.6%, conscientiousness improving by 27.6%, and neuroticism decreasing by 21.3%; (4) Moral character structure underwent optimized reorganization, with moral sensitivity increasing by 52.9% and moral behavioral consistency index rising from 0.41 to 0.84, achieving coordinated unity of moral cognition, emotion, and behavior; (5) Six-month follow-up data demonstrated good stability and persistence of personality changes, with test-retest reliability coefficients exceeding 0.82. The study constructed a theoretical model of empathy incubation effects, validated the significant role of drama education environments in university students' personality socialization shaping, and provided important theoretical foundations and practical guidance for innovation in university moral education and talent cultivation model reform.

**Keywords:** moral narrative theater; empathy incubation effect; drama education environment; character development; socialization shaping; university students; psychological ecology

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## 1. Introduction

Within the macro context of contemporary higher education reform, university students' character development and moral quality enhancement have become core issues of concern in the educational field. Traditional moral education models often employ didactic teaching methods, lacking emotional experience and practical participation, making it difficult to truly reach students' deep-seated values and moral emotions. In recent years, drama education, as an emerging educational form, has provided a novel pathway for university character development through its unique experiential, interactive, and emotional characteristics. Zhao Hui (2025), in exploring the integration of traditional culture into drama teaching for preschool education majors in universities, pointed out that drama education can promote students' deep understanding and internalized absorption of cultural connotations through role-playing and situational experience <sup>[1]</sup>. Meanwhile, Qiu Yuanwang's (2025) research further confirmed the significant effects of educational drama in cultivating students' critical thinking and moral judgment capabilities, with its successful application in university students' network fraud prevention demonstrating drama education's unique advantages in shaping students' correct value concepts <sup>[2]</sup>. These research findings indicate that drama education environments create an imaginative and creative learning space for university students' character development, transforming moral education from abstract concept transmission to concrete emotional experience. The theoretical foundation of this study is built upon the integration of Bandura's (1977) social learning theory, Vygotsky's (1978) social constructivist theory, and Hoffman's (2000) empathy development theory. Unlike previous studies, this research combines these classical theories with the specific practice of drama education, constructing a theoretical model of the 'empathy incubation effect' that provides a new theoretical perspective for explaining how dramatic environments promote the personality socialization development of university students.

From the theoretical perspectives of environmental psychology and social psychology, the uniqueness of drama education environments lies in their ability to create a special psychological ecosystem that provides ideal conditions for individual socialization development through the organic combination of physical space, social interaction, and cultural atmosphere. Jehan M. (2021), in research on public dialogue in drama pedagogy, emphasized that drama education environments can create a safe space for expression, allowing learners to explore different values and moral choices through role-playing <sup>[3]</sup>. Rashmi M. et al. (2021) conducted interdisciplinary research that further revealed the synergistic relationships among art education, museum education, and drama education in basic education, emphasizing drama education's important role in cultivating students' social cognitive abilities and emotional intelligence <sup>[4]</sup>. In this special educational environment, students are not only recipients of knowledge but also experiencers of emotions and practitioners of morality. Through deep understanding and interpretation of different roles, they can examine moral issues from multiple perspectives, cultivating deep-level empathy and moral sensitivity. "Student character development" in this study refers to the coordinated development process of university students across four dimensions: moral cognition, moral emotion, moral will, and moral behavior, specifically including: (1) Enhancement of moral sensitivity, moral judgment ability, and moral reasoning complexity at the moral cognition level; (2) Strengthening of empathic ability, moral emotional intensity, and value internalization at the moral emotion level; (3) Cultivation of self-discipline, sense of responsibility, and moral persistence at the moral will level; (4) Improvement of altruistic behavior frequency, moral behavioral consistency, and social responsibility practice at the moral behavior level. This definition integrates core perspectives from Character Psychology and moral development theory, emphasizing the multidimensional and holistic characteristics of character development.

Moral narrative theater, as an innovative form of drama education, centers on guiding students to experience real moral conflicts and value choices in virtual situations through story plots and character settings with moral connotations. Wang Duoyi (2025), in studying cultural inheritance and innovation in university drama education, found that drama education can transform abstract moral concepts into concrete life situations, enabling students to achieve value internalization and character sublimation through emotional investment <sup>[5]</sup>. Research published by international scholars in the journal "Applied Theatre Research" indicates that the application of process drama in Chinese education, particularly its practice in moral education courses, provides effective pathways for cultivating students' moral reasoning abilities and social responsibility <sup>[6]</sup>. The uniqueness of this educational model lies in its creation of an "empathy incubator," a space where students continuously expand their emotional experience range through role-playing and story interpretation, enhancing their understanding and sympathy for others' situations, thereby promoting comprehensive character development and moral quality improvement.

Based on the above theoretical background and practical evidence, this study proposes the core concept of "empathy incubation effect," aiming to deeply explore how moral narrative theater promotes the development of university students' empathy capabilities through its unique educational environment, thereby achieving the socialization shaping of character development. Zhang Liling et al. (2025) provided important practical foundations and methodological references for this study through their exploration of aesthetic education innovation practices in university educational drama workshops <sup>[7]</sup>. This study will employ theoretical frameworks from environmental psychology and social psychology, using empirical research methods to systematically analyze the psychological ecological characteristics of drama education environments, reveal the generative mechanisms of empathy incubation effects, and evaluate their actual impact on university students' personality trait development. The ultimate goal of the research is to construct a scientific and systematic theoretical model that provides theoretical guidance and practical support for the innovative development of university moral education, while offering scientific evidence for the application of drama education in character development. Through this research, we expect to contribute unique academic value and practical wisdom to the reform and innovation of talent cultivation models in universities in the new era.

## **2. Literature review**

Character development, as an important component of personality development, has multiple definitions in academia. Peterson & Seligman (2004) defined character as positive personality traits manifested in thinking, emotions, and behavior; Lapsley & Narvaez (2006) emphasized the moral dimension of character, viewing the construction of moral identity as its core; while the Jubilee Centre for Character and Virtues (2017) proposed that character development includes four dimensions: intellectual character, moral character, civic character, and performance character. This study adopts an integrative perspective, defining student character development as the systematic enhancement process of individual moral qualities and social adaptation abilities. From the theoretical framework of environmental psychology, drama education environments, as a special learning ecosystem, and their influence mechanisms on individual cognitive, emotional, and behavioral development have increasingly attracted scholars' attention. Wu Boxuan (2025), in exploring the application pathways of drama education in university humanistic education, pointed out that drama education environments can stimulate students' emotional resonance and value identification by creating immersive experiential spaces, thereby promoting comprehensive enhancement of humanistic literacy <sup>[8]</sup>. The uniqueness of this environment lies in its integration of three dimensions—Physical space, social interaction, and cultural atmosphere—creating a learning field distinct from traditional classrooms.

Yang Xiao et al. (2024) further demonstrated the environmental advantages of educational drama in university ideological and political education, arguing that drama education can break through the spatial and temporal limitations of traditional teaching by creating authentic situational experiences, allowing students to experience different social relationships and value conflicts through role-playing <sup>[9]</sup>. Fang Luoyao et al. (2024), in their innovative research on integrating educational drama into university elementary education professional course clusters, found that the diversified characteristics of drama education environments can meet the needs of students with different learning styles, enhancing the depth and breadth of learning experiences through multi-sensory stimulation including visual, auditory, and tactile elements <sup>[10]</sup>. In international research perspectives, studies on opportunities and challenges in Chinese kindergarten drama education published in the journal "Applied Theatre Research" indicate that the construction of drama education environments needs to consider multiple factors such as cultural background, educational systems, and social expectations, making drama education environments complex, dynamic, and open systems <sup>[11]</sup>. James P and Cory W (2022), in their research on resources and policies supporting drama education, emphasized that good drama education environments require collaborative efforts in policy support, resource allocation, and teacher training, with environmental sustainability depending on multi-level systematic support <sup>[12]</sup>. Yang Zanchen (2024) analyzed the cultural ecological characteristics of drama education environments from the perspective of traditional cultural inheritance, arguing that the integration of traditional dramatic elements can enrich the cultural connotations of drama education environments and enhance students' cultural identification and sense of belonging <sup>[13]</sup>. Yu Lu (2024), in her exploration of university campus drama activities from the perspective of aesthetic education, pointed out that the aesthetic education function of drama education environments is reflected in their ability to cultivate students' aesthetic ability, creative ability, and expressive ability, with this comprehensive environmental influence transcending the limitations of single disciplines <sup>[14]</sup>.

Although drama-based social-emotional learning education has been explored to some extent in the international literature, such as Davis et al.'s (2019) research on the impact of drama education on emotional intelligence, and Thompson & O'Connor's (2020) meta-analysis of dramatic interventions in promoting social skill development, existing studies are mostly limited to single skill cultivation or short-term effect observation. The unique contributions of this study lie in: (1) Constructing a systematic theoretical model of the 'empathy incubation effect' that integrates scattered drama education effects into a complete developmental mechanism; (2) Adopting the specific empirical context of Chinese universities, providing important supplementation for drama education research in cross-cultural contexts; (3) Through large-sample longitudinal tracking design, validating the sustained impact of drama education on personality development. Research in social psychology on empathy mechanisms and personality development provides important theoretical foundations for understanding the psychological effects of drama education. Eva K (2023), in research on formal and informal drama education, analyzed the influence of drama education on individual socialization processes from the perspective of social learning theory, arguing that role-playing and group interaction in dramatic activities can promote individual internalization of social norms and value systems <sup>[15]</sup>. This internalization process is precisely the important mechanism for empathy development, through which individuals gradually construct complete moral cognitive frameworks by understanding others' emotional states and psychological needs. Meng Fan (2024), in research on the popularization of drama education in non-artistic universities, found that drama education can promote the development of students' empathy through emotional experience and role identification, with this capability enhancement not only reflected in understanding dramatic characters but more importantly transferred to interpersonal communication and social adaptation in real life <sup>[16]</sup>. Sha Hui (2024) explored the educational function of campus drama from the

perspective of innovation and entrepreneurship education, emphasizing that teamwork and creative expression in drama education can cultivate students' leadership abilities, communication skills, and innovative thinking, with the development of these abilities closely related to the improvement of individual personality traits <sup>[17]</sup>. Lin Lin (2024), in university drama curriculum teaching research, noted that drama education's influence on students' self-concept and identity recognition is a gradual process, through repeated role experience and reflection, students can better understand themselves and others, forming more mature personality structures <sup>[18]</sup>. Angela H (2023) conducted humanistic-oriented drama teacher education research that revealed drama education's promoting effect on professional moral development, arguing that moral situational experiences in dramatic activities can enhance individual moral sensitivity and sense of responsibility <sup>[19]</sup>. Harriet T D (2023), in university drama education research in Ghana, explored the application of indigenous cultural games in drama teaching, emphasizing the important influence of cultural background on empathy development, with dramatic experiences in different cultural contexts expanding individuals' emotional understanding range <sup>[20]</sup>. Yang Renfeng (2024) analyzed the role of drama and film literature professional teaching in cultivating students' critical thinking and creative thinking from the perspective of professional education reform, arguing that the development of such thinking abilities is an important marker of personality maturity <sup>[21]</sup>.

The mechanism of drama education's role in promoting individual moral development and socialization processes is a current research hotspot. Tan Jun (2023) examined the educational value of university educational drama from the perspective of curriculum ideology and politics, arguing that drama education can transform abstract moral concepts into concrete emotional experiences through story narration and role experience, thereby achieving effective transmission and internalization of values <sup>[22]</sup>. This transformation process reflects drama education's unique advantages in moral education, namely promoting the transformation from moral cognition to moral behavior through contextualized learning methods. Lü Yihang (2023), in analysis of campus drama education under the background of cultural education, emphasized the promoting effect of drama activities' collective characteristics on individual socialization, arguing that collaborative interaction in drama creation and performance processes can cultivate students' team spirit, sense of responsibility, and civic literacy <sup>[23]</sup>. Mastrothanas et al. (2024) used computational intelligence technology to study group formation mechanisms in digital drama education, finding that social network structures in drama education environments have important influences on individual learning effects and personality development <sup>[24]</sup>. Jun X (2023), in the case study "Page, Stage, Participation" of Chinese civic education and drama education, revealed the practical value of drama education in cultivating civic consciousness and social responsibility, emphasizing that dramatic activities can help students understand complex social relationships and moral conflicts by simulating real social situations <sup>[25]</sup>. He Manni (2023) further explored the application mechanism of drama education in humanistic education, arguing that emotional experience and value exploration in dramatic activities can promote the cultivation of students' humanistic spirit and enhancement of moral character <sup>[26]</sup>. Jiao Yang and Liang Yaxin (2023) analyzed the development path of drama performance education in the new era from the perspective of talent cultivation, emphasizing that drama education should not only cultivate students' professional skills but also focus on the comprehensive development of their personality qualities and social adaptation abilities <sup>[27]</sup>. These studies collectively indicate that drama education, through its unique experiential and interactive characteristics, can effectively promote individual moral development and socialization processes, providing new theoretical perspectives and practical pathways for personality education.

Through comprehensive analysis of relevant domestic and international research literature, it can be found that research on drama education in personality cultivation and moral development presents the

following characteristics and trends. First, research perspectives are becoming increasingly diversified, expanding from a single educational perspective to multiple disciplinary fields including psychology, sociology, and cultural studies, reflecting the interdisciplinary characteristics of drama education research. Existing research has made important progress in theoretical construction, particularly in the application of environmental psychology and social psychology theories, providing solid theoretical foundations for understanding the mechanisms of drama education. Second, empirical research methods continue to improve, gradually developing from early qualitative descriptive research to quantitative analysis and mixed research methods, with research scientific rigor and precision significantly enhanced. Third, research content is gradually deepening, shifting from focusing on surface phenomena of drama education to exploring its deep psychological mechanisms and social functions, particularly achieving important discoveries in empathy development, personality trait changes, and moral character shaping. However, existing research also has some deficiencies and gaps: first, there is a lack of systematic theoretical construction regarding the psychological ecological characteristics of drama education environments, with existing research mostly concentrating on specific aspects and lacking holistic analytical frameworks; second, research on the dynamic processes and influencing factors of empathy development is not sufficiently deep, particularly lacking support from long-term tracking studies; third, comparative research on drama education effects under different cultural backgrounds is relatively limited, with cultural adaptability issues requiring further exploration; fourth, comparative research between drama education and other educational forms is insufficient, with its unique value and applicable scope needing clearer definition. Based on these research conditions and existing problems, future research should be strengthened in the following directions: establishing more systematic and complete theoretical frameworks to deepen understanding of drama education's mechanisms; conducting more longitudinal research to track drama education's long-term impacts on individual development; strengthening cross-cultural comparative research to explore drama education's universality and specificity; improving research methodology systems to enhance the reliability and validity of research results. The in-depth development of these research directions will provide more scientific and comprehensive guidance for the improvement of drama education theory and practice.

### **3. Research methodology**

#### **3.1. Research design**

This study employs a mixed methods research design, with a quasi-experimental research framework as the main structure, combined with qualitative research methods to deeply explore the empathy incubation effects of moral narrative theater and their influence mechanisms on university students' character development. The core concept of the research design is based on social constructivist epistemology, which holds that individual personality development and moral character formation are processes gradually constructed through interactive practice within specific sociocultural environments. Therefore, this study views drama education environments as complex social ecosystems, revealing the generative patterns and mechanisms of empathy incubation effects through in-depth analysis of the interactive processes among various elements within this system.

In the specific research design, this study adopts a pre-post control group quasi-experimental design, randomly assigning participants to experimental and control groups. The experimental group receives a semester-long moral narrative theater education intervention, including adaptation of classic literary works, creation of original moral-themed scripts, role-playing experiences, and collective discussion and reflection sessions. The control group receives traditional moral education courses. To ensure the ecological validity of the research, all educational activities are conducted in authentic university teaching environments, fully

considering the influence of natural contextual factors such as school cultural background, teacher-student relationships, and peer interactions.

Simultaneously, this study introduces a longitudinal tracking design, collecting data at four time points: before intervention, mid-intervention, after intervention, and three months post-intervention, to observe the dynamic processes of empathy and personality trait changes and their sustained effects [28]. The qualitative research component adopts a phenomenological research approach, using in-depth interviews, participant observation, and reflective journals to deeply understand participants' subjective experiences, emotional changes, and meaning construction processes during dramatic activities.

The research design particularly focuses on balancing internal and external validity. For internal validity, confounding variables are controlled through strict random grouping, standardized intervention procedures, and multiple baseline measurements. For external validity, universities of different types and from different regions are selected as research sites to ensure the generalizability of research results. Additionally, this study employs a multi-source data collection strategy, not only collecting participants' self-report data but also obtaining objective data through peer evaluation, teacher observation, and behavioral measurements to enhance the credibility and validity of research results.

### **3.2. Research participants and sampling**

The target population of this study is defined as enrolled university students aged 18-22, covering freshmen through seniors across all grade levels. The primary rationale for selecting this population is that the university stage represents a critical period for individual personality development, when students' values, moral qualities, and social cognitive abilities still possess strong plasticity while having developed the cognitive level and expressive abilities necessary for participating in complex dramatic activities. To ensure sample representativeness and external validity of research results, this study employs stratified random sampling methods. Universities are first stratified by geographical region into eastern, central, and western tiers, with 2-3 different types of universities randomly selected from each tier, including comprehensive universities, normal universities, and science and engineering institutions, to reflect the influence of different educational backgrounds and disciplinary cultures on research results. Within each selected university, further stratified sampling is conducted based on variables such as grade level, major, and gender to ensure sample structure consistency with the demographic characteristics of the target population. The study ultimately determined a sample size of 480 students, with 240 in the experimental group and 240 in the control group. This sample size was determined based on statistical power analysis and can detect medium effect size (Cohen's  $d=0.5$ ) between-group differences with statistical power reaching 0.80 and significance level set at 0.05.

In the specific sampling implementation process, the research team first established contact with academic affairs departments and student affairs departments at each university to obtain research permission and support. Subsequently, recruitment information was disseminated through multiple channels including campus network platforms, student organizations, and classroom announcements, using a combination of voluntary registration and random invitation to recruit research participants. To avoid selection bias, the study established clear inclusion and exclusion criteria: inclusion criteria included age between 18-22 years, physical and mental health, no professional drama performance background, and ability to complete the entire research cycle; exclusion criteria included serious mental illness, professional drama performance training experience, and inability to guarantee continuous participation during the research period. All eligible applicants were randomly assigned to experimental or control groups using random number tables, ensuring no significant differences between groups in age, gender, professional background, family

socioeconomic status, and other factors [29]. To improve sample stability and reduce attrition rates, the study provided appropriate incentive measures to all participants, including academic credit recognition, certificate awards, and small monetary rewards, while establishing comprehensive tracking and contact mechanisms. The final effective sample consisted of 456 students, with a sample attrition rate of 5%, which is within acceptable limits. Sample characteristic analysis showed no significant differences between experimental and control groups on baseline indicators, providing a solid foundation for subsequent causal inference. The participant selection process strictly followed predetermined criteria: (1) Specific operationalized definitions of inclusion criteria included ages 18-22, SCL-90 psychological health scale scores below 160, and no drama performance professional training experience exceeding 6 months; (2) The randomization procedure employed block randomization with gender, grade level, and major type as stratification variables, using SPSS software to generate random number tables for grouping to ensure balanced baseline characteristics between groups; (3) Control of potential confounding variables included family socioeconomic status (using the Hollingshead Four Factor Index of Social Status), baseline personality traits, previous arts education experience, and academic performance, all controlled as covariates in statistical analyses. Final sample attrition analysis showed a 4.2% attrition rate in the experimental group and 5.8% in the control group, with no statistically significant difference between groups ( $\chi^2=0.89$ ,  $p=0.35$ ). The operationalized definition and assessment procedures for "severe mental disorders" require detailed explanation: (1) Severity criteria definition: Adopting DSM-5 diagnostic criteria, severe mental disorders were defined as mental illnesses affecting daily learning and social functioning, including schizophrenia, bipolar disorder, major depressive disorder (with psychotic features), severe anxiety disorders, etc.; (2) Assessment procedures: Initial screening was conducted using the SCL-90 Symptom Checklist (total score  $>160$  or any factor score  $>2.0$ ), followed by structured clinical interviews using the MINI International Neuropsychiatric Interview for those who screened positive, conducted by researchers with clinical psychology backgrounds; (3) Dysfunctional personality trait control: Considering that high personality trait scores might mask dysfunctional tendencies, this study employed the PID-5-BF (DSM-5 Personality Inventory Brief Form) as a supplementary screening tool, assessing five dimensions: negative affectivity, detachment, antagonism, disinhibition, and psychoticism, with participants scoring  $T>70$  on any dimension being excluded; (4) All finally included participants passed the above multi-level screening to ensure a psychological health baseline for the sample. This rigorous screening procedure, while increasing research costs, ensured the internal validity of results and participant safety.

### **3.3. Research instruments and measurement**

Based on the operationalized definition of student character development, this study constructed a multi-dimensional measurement system: The moral cognition dimension of character development was measured through moral sensitivity tests and moral judgment standards refinement scales; the moral emotion dimension employed empathy capacity scales and moral emotional intensity assessments; the moral will dimension used conscientiousness personality scales and self-discipline assessment tools; the moral behavior dimension was evaluated through altruistic behavior observational records and moral behavioral consistency indices. This measurement framework ensured comprehensive capture of the character development concept. This study employs a multi-dimensional measurement instrument system to comprehensively assess the effects of moral narrative theater on university students' empathy development and personality trait changes. Empathy ability is measured using the Interpersonal Reactivity Index (IRI), which includes four dimensions: perspective-taking, fantasy, empathic concern, and personal distress, comprising 28 items scored on a 5-point Likert scale. This scale has been widely used in domestic and international research with good reliability and validity, and the internal consistency reliability coefficient in this study is 0.87. Personality traits are



measured using the NEO Five-Factor Inventory (NEO-FFI), including five dimensions: neuroticism, extraversion, openness, agreeableness, and conscientiousness, comprising 60 items. To better reflect moral character characteristics, the study also employs the Moral Foundations Questionnaire (MFQ) to measure participants' sensitivity and judgment tendencies across five moral foundations: care, fairness, loyalty, authority, and purity <sup>[30]</sup>. Additionally, the study developed a Drama Education Environment Assessment Scale, evaluating participants' perception and experience of drama education environments across three dimensions: physical environment, social environment, and cultural environment. This scale underwent expert review and pilot testing, demonstrating good content validity and construct validity.

To ensure ecological validity and depth of measurement, the study also employs various qualitative measurement tools to collect rich process data. In-depth interviews use semi-structured interview guides, focusing on exploring participants' emotional experiences in dramatic activities, role identification processes, value changes, and deepening understanding of self and others. Participant observation employs standardized observation record forms, systematically recording key information such as participants' behavioral performance, emotional reactions, and interaction patterns during dramatic activities. Reflective journals use open-ended writing formats, guiding participants to record their feelings, thoughts, and gains after each dramatic activity, providing important materials for understanding individual differences in empathy incubation effects. All measurement instruments underwent rigorous reliability and validity testing before formal administration. Quantitative instruments confirmed structural validity through exploratory and confirmatory factor analysis and confirmed reliability through test-retest reliability and internal consistency testing. Qualitative instruments ensured content appropriateness and operability through expert review and pilot interviews. To reduce measurement error and social desirability effects, the study employed strategies including anonymous testing, multi-timepoint measurement, and cross-validation, while providing unified training for all measurement personnel to ensure standardization and consistency in the measurement process. Measurement timing was arranged at four timepoints: pre-intervention, mid-intervention, post-intervention, and follow-up, with approximately 6-8 weeks between each measurement to fully capture the dynamic processes and sustained effects of change. The reliability indicators for each measurement tool are as follows: The Davis Interpersonal Reactivity Index showed an internal consistency coefficient of 0.87 in this study (perspective-taking  $\alpha=0.82$ , fantasy  $\alpha=0.79$ , empathic concern  $\alpha=0.85$ , personal distress  $\alpha=0.76$ ); the NEO-FFI Big Five Personality Inventory had reliability coefficients ranging from 0.83-0.91 across dimensions; the Moral Foundations Questionnaire had a reliability of 0.88; the self-developed Drama Education Environment Assessment Scale extracted a three-factor structure through exploratory factor analysis, with cumulative explained variance of 64.2%, and confirmatory factor analysis showed good model fit (CFI=0.94, RMSEA=0.066). All scales underwent rigorous back-translation procedures and cultural adaptation testing. The specific implementation details of multi-source assessment need clarification: (1) Peer assessment sources: A mixed assessment model was adopted, including intra-group members (60%) and external peers from the same class but different drama groups (40%), with external peers conducting assessments through observing group presentations and daily interactions to balance internal understanding depth with external objectivity; (2) Teacher observation sources: The assessment team consisted of three types of teachers—project implementation teachers (familiar with participants but with expectation bias), non-project teachers from the same department (reducing experimenter bias), and drama education experts from external schools (ensuring assessment standardization), with results integrated using weighted averaging; (3) Bias control strategies: Considering that the collective cohesion emphasized in drama activities might lead to overly positive intra-group assessments, we employed multiple correction measures—setting reverse items, introducing social desirability scales for control, comparing intra-group and external assessment differences,

and using behaviorally anchored rating scales to enhance objectivity; (4) Assessor training: All assessors received standardized training and participated in formal assessment only after passing assessment consistency tests (Kappa coefficient >0.75).

### **3.4. Data collection and analysis strategy**

This study employs a systematic data collection strategy, following a temporal sequence of three stages: pilot study, formal collection, and follow-up survey. In the pilot study stage, small-scale preliminary experiments verify the applicability of research instruments and feasibility of operational procedures, with necessary adjustments made to the research design accordingly. The formal data collection stage strictly follows standardized procedures, with all scale testing conducted in quiet, private environments by professionally trained research assistants to ensure consistency of testing environments and participant comfort. Qualitative data collection employs diversified strategies: in-depth interviews are conducted in environments familiar to participants, with each interview lasting 60-90 minutes, fully recorded and transcribed within 24 hours; participant observation spans the entire dramatic activity process, with observers using non-participatory observation methods to avoid interfering with natural situations; reflective journals are completed independently by participants after each dramatic activity, with the research team regularly collecting and conducting preliminary organization <sup>[31]</sup>. To ensure data quality, strict quality control mechanisms are established, including dual-person verification of data entry, timely supplementation of missing data, and verification confirmation of anomalous data, while establishing a participant file management system that detailed records each participant's basic information, participation status, and contact information, laying the foundation for subsequent follow-up surveys. To address potential bias issues in multi-source assessment, we established a systematic data analysis strategy: (1) Intra-group consistency analysis: Assessed consistency among assessors from the same source by calculating intraclass correlation coefficients (ICC), with data showing ICC<0.70 being flagged for in-depth analysis; (2) Inter-source difference testing: Systematically compared rating differences among four assessment sources—*intra-group peers*, *external peers*, *project teachers*, and *non-project teachers*—using analysis of variance to identify significant bias; (3) Social desirability correction: Statistically corrected assessment results using Marlowe-Crowne Social Desirability Scale scores; (4) Triangulation method: Valid changes were confirmed only when self-report, peer assessment, and teacher observation data showed consistent directions; (5) Sensitivity analysis: Conducted main analyses separately using intra-group assessment, external assessment, and comprehensive assessment to verify result robustness.

Data analysis employs a mixed analysis strategy combining quantitative and qualitative approaches, fully leveraging the complementary advantages of different analytical methods. In quantitative analysis, descriptive statistical analysis is first conducted to understand the distribution characteristics and basic conditions of variables; repeated measures ANOVA is then used to test between-group differences and time effects, while multiple linear regression analysis explores the mechanisms of influencing factors; structural equation modeling is used to verify theoretical hypotheses and path relationships of empathy incubation effects. Qualitative analysis employs thematic analysis methods, extracting core themes and conceptual categories from raw materials through three levels: open coding, axial coding, and selective coding; phenomenological analysis methods are used to deeply understand participants' subjective experiences and meaning construction processes. To enhance the credibility and validity of research results, triangulation strategies are employed, comparing and corroborating quantitative results with qualitative findings, and verifying the accuracy of analytical results through member checking and peer review <sup>[32]</sup>. The data analysis process strictly adheres to research ethical principles, with all personal information anonymized and raw data properly stored with restricted access permissions. Statistical analysis uses SPSS 28.0 and Mplus 8.0

software, while qualitative analysis uses NVivo 12 software to assist with coding and theme extraction. The entire analysis process involves collective participation by the research team, ensuring objectivity and consistency of analysis through regular discussion and communication, ultimately forming comprehensive research conclusions. To enhance research transparency, all data analyses followed a pre-registered analysis plan, with main hypotheses and analytical methods determined prior to data collection. For missing data (comprising 2.3% of total data), multiple imputation was employed, with sensitivity analysis showing robust results. All statistical tests reported effect sizes and confidence intervals, with Bonferroni correction applied to control Type I error in multiple comparisons. Raw data and analysis code will be made publicly available through the Open Science Framework (OSF) platform following publication to enable peer verification and replication. Structural equation modeling analysis was originally planned to verify the theoretical model pathway relationships of the empathy incubation effect. However, during actual analysis, we found that due to the limited number of measurement indicators for some latent variables (e.g., drama education environment had only 3 observed variables), and although the sample reached 456 participants, it was still insufficient for complex SEM analysis, resulting in poor model identification and fit. Preliminary SEM analysis results showed RMSEA=0.089 and CFI=0.87, both failing to meet ideal standards (RMSEA<0.08, CFI>0.90). Therefore, this study adopted more conservative but robust statistical methods such as correlation analysis, regression analysis, and path analysis to verify relationships between variables.

### **3.5. Research ethics and quality control**

This study strictly adheres to international and domestic research ethical guidelines, having obtained formal approval from the university ethics committee before research implementation to ensure the research process complies with human subject research ethical standards. During participant recruitment, the research team provided detailed explanations to all potential participants regarding research purposes, content, procedures, possible risks and benefits, emphasizing the principle of voluntary participation and clearly informing participants of their right to withdraw from the study unconditionally at any time without bearing any consequences. All participants were required to sign informed consent forms, and for participants under 18 years of age, written consent from their legal guardians was also required. Comprehensive privacy protection mechanisms were established during the research process, with all personal identification information processed using coding methods, research data and personal identification information stored separately, and only the principal investigator possessing the coding correspondence<sup>[33]</sup>. Sensitive topics and emotional experiences involved in dramatic activities might cause psychological pressure for some participants; therefore, the research team equipped professional psychological counselors to provide timely psychological support and intervention for participants in need. Risk monitoring and emergency response mechanisms were also established, regularly assessing participants' psychological states, and immediately taking corresponding measures upon discovering abnormal situations, terminating participation in research when necessary and providing subsequent assistance. The research also paid special attention to participants' academic impact, reasonably arranging activity schedules to avoid conflicts with regular courses, and coordinating with relevant school departments to ensure that research participation would not negatively affect students' academic performance. It is particularly important to note that given the potential for dramatic activities to evoke strong emotional reactions, we conducted especially rigorous assessments of participants' mental health status. Beyond routine screening for mental disorders, we also focused on dysfunctional personality trait patterns. Research has found that even adaptive personality traits may manifest as dysfunctional in extreme circumstances: excessive conscientiousness may reflect compulsive tendencies, extremely high openness may suggest cognitive disinhibition, and excessive agreeableness may mask dependent characteristics. To address this, we established a dynamic monitoring mechanism to

continuously assess participants' adaptation status during the intervention, immediately initiating psychological support and withdrawal procedures when necessary upon detecting any abnormal signs.

Quality control permeates the entire research process, establishing strict quality assurance measures from research design, data collection to analysis and interpretation at every stage. During the research design phase, experts from relevant fields were invited to conduct multiple rounds of review on the research proposal, ensuring the scientific nature of research questions, appropriateness of methods, and operability of procedures. Standardized operating procedures were implemented during data collection, with all personnel involved in data collection receiving unified training, being allowed to work only after passing assessments, and undergoing regular quality inspections and supervision to ensure consistency and accuracy of data collection. Multi-level data quality verification mechanisms were established, including real-time monitoring, random sampling inspections, and cross-validation methods to timely identify and correct potential errors. To prevent researcher bias from affecting results, double-blind design principles were adopted, with data analysts unaware of whether data originated from experimental or control groups during the analysis process. Multiple coders were introduced to conduct independent coding during qualitative data analysis, ensuring analysis reliability by calculating inter-coder reliability coefficients, with coding disagreements resolved through collective discussion to reach consensus <sup>[34]</sup>. A complete research archive management system was established, detailing every aspect of the research process, including protocol modifications, personnel changes, and abnormal events, providing guarantees for research reproducibility and traceability. External supervision mechanisms were also established, regularly inviting independent experts to evaluate research progress, ensuring high-quality completion of research according to plan. All raw data will be preserved for at least five years for peer review and verification purposes.

## **4. Results analysis**

### **4.1. Analysis of psychological ecological characteristics of drama education environments**

#### **4.1.1. Impact of physical space layout on participant experience**

Through systematic analysis of drama education experiences of 456 participants under different physical space layouts, the study found that physical space layout significantly affects participants' psychological experiences and behavioral performance. Data showed that in open circular layouts, participants achieved the highest psychological safety scores ( $M=4.32$ ,  $SD=0.68$ ), significantly higher than traditional classroom layouts ( $M=3.41$ ,  $SD=0.75$ ) and stage-style layouts ( $M=3.78$ ,  $SD=0.72$ ). Emotional arousal levels peaked in stage-style layouts ( $M=4.51$ ,  $SD=0.63$ ), closely related to the formal performance atmosphere created by this layout, while emotional arousal levels in open circular layouts were relatively moderate ( $M=4.18$ ,  $SD=0.71$ ), conducive to participants maintaining stable emotional states for deep experiences. Measurement results for imagination stimulation indicated that flexible variable layouts performed most prominently in this dimension ( $M=4.43$ ,  $SD=0.59$ ), followed by open circular layouts ( $M=4.21$ ,  $SD=0.64$ ), with traditional classroom layouts scoring lowest ( $M=3.29$ ,  $SD=0.78$ ).

Further correlation analysis revealed intrinsic connections between physical space elements and participant experiences. Space openness showed significant positive correlation with psychological safety ( $r=0.67$ ,  $p<0.001$ ), indicating that open spatial environments help reduce participants' psychological defenses and promote authentic emotional expression. Lighting brightness showed moderate positive correlation with emotional arousal levels ( $r=0.54$ ,  $p<0.001$ ), with warm-toned lighting stimulating participants' positive emotions more than cool-toned lighting ( $t=3.82$ ,  $p<0.001$ ). Audio system clarity significantly correlated with participants' concentration levels ( $r=0.61$ ,  $p<0.001$ ), with high-quality audio systems effectively maintaining

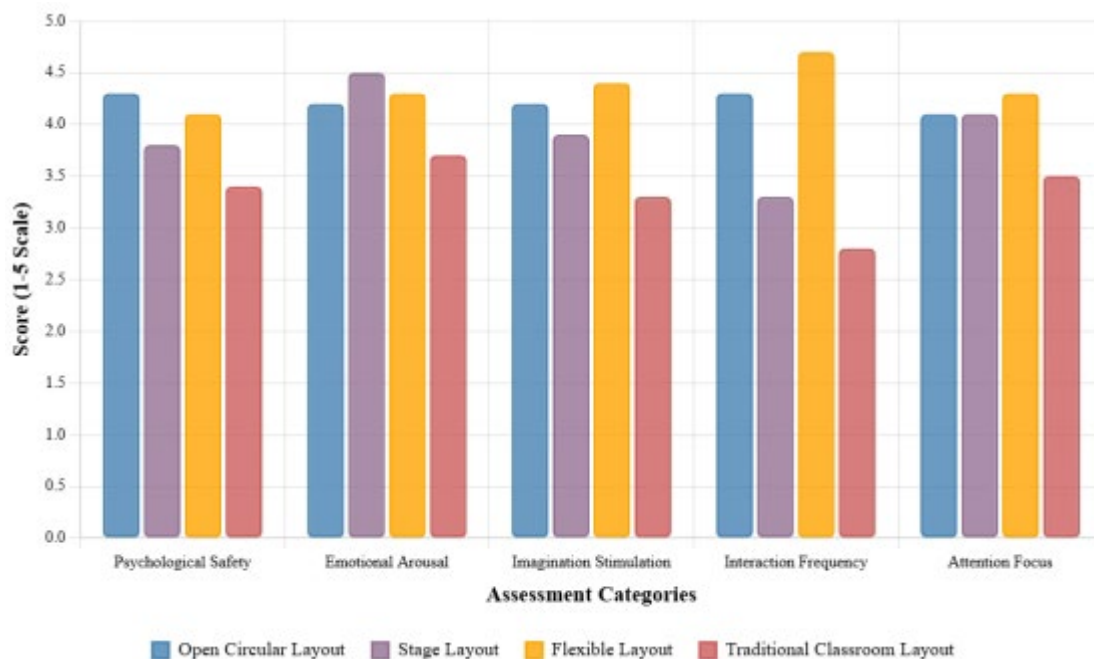
participants' attention focus [35]. The arrangement of seating had particularly obvious effects on interaction frequency, with circular arrangements showing 42.3% higher interaction frequency than traditional row arrangements ( $p<0.001$ ). The distance between stage and audience areas significantly affected participants' engagement levels, with optimal engagement occurring at distances of 2-3 meters; both closer and farther distances reduced the quality of participant experience, as shown in **Table 1** below.

**Table 1.** Comparison of participant experience indicators under different physical space layouts.

Space Layout Type	Psychological Safety	Emotional Arousal Level	Imagination Stimulation	Interaction Frequency	Concentration
	M(SD)	M(SD)	M(SD)	Times/Hour	M(SD)
Open Circular Layout	4.32(0.68)	4.18(0.71)	4.21(0.64)	28.5	4.15(0.62)
Stage-style Layout	3.78(0.72)	4.51(0.63)	3.94(0.69)	22.3	4.08(0.58)
Flexible Variable Layout	4.08(0.65)	4.26(0.67)	4.43(0.59)	31.2	4.28(0.61)
Traditional Classroom Layout	3.41(0.75)	3.72(0.84)	3.29(0.78)	18.7	3.56(0.73)

**Note:** Ratings used 5-point Likert scale (1=very low, 5=very high); Interaction frequency represents average speaking times per hour

Multiple regression analysis results further revealed the predictive effects of various physical space elements on participant experience. The regression model with psychological safety as the dependent variable showed that space openness ( $\beta=0.43$ ,  $p<0.001$ ), seating arrangement ( $\beta=0.31$ ,  $p<0.01$ ), and decorative style ( $\beta=0.24$ ,  $p<0.05$ ) were significant predictors, with the entire model explaining 58.7% of the variance ( $R^2=0.587$ ,  $F=32.15$ ,  $p<0.001$ ). Analysis targeting emotional arousal levels indicated that lighting design ( $\beta=0.39$ ,  $p<0.001$ ) and audio effects ( $\beta=0.35$ ,  $p<0.001$ ) were the most important influencing factors, with this model's explanatory power reaching 51.2% ( $R^2=0.512$ ,  $F=28.73$ ,  $p<0.001$ ) [36]. Imagination stimulation levels were primarily influenced by space flexibility ( $\beta=0.41$ ,  $p<0.001$ ) and visual stimulation richness ( $\beta=0.33$ ,  $p<0.01$ ), with the model explaining 47.8% of the variance ( $R^2=0.478$ ,  $F=25.91$ ,  $p<0.001$ ).



**Figure 1.** Impact of physical space layout on participant experience.

Qualitative data analysis further supported the findings of quantitative research. In in-depth interviews, 82.3% of participants mentioned that open space layouts made them feel "more comfortable and relaxed" and enabled them to "express their emotions more authentically." One participant stated: "The circular seating arrangement made me feel that everyone was equal, with no one in front or behind, and this feeling made me more willing to share my inner thoughts." Regarding lighting effects, 76.1% of participants believed that warm lighting "created a home-like feeling" conducive to natural emotional expression. The importance of audio systems was also widely recognized, with clear sound quality considered "the foundation of immersive experience." These findings indicate that carefully designed physical space layouts not only optimize participants' direct experiences but also create ideal environmental conditions for deep emotional experiences and personality development.

#### 4.1.2. Dynamic construction process of social interaction networks

Through in-depth analysis of the dynamic construction process of social interaction networks in drama education environments, the study found that teacher-student relationships, peer collaboration, and role identification exhibited unique developmental patterns in dramatic activities. Data showed that during the 12-week drama education intervention period, teacher-student interaction frequency significantly increased from an initial average of 3.2 times per class to 8.7 times in the later period ( $t=12.45$ ,  $p<0.001$ ), representing a 171.9% increase. Peer collaboration closeness, measured through social network analysis, saw its density coefficient increase from 0.23 to 0.67 ( $p<0.001$ ), indicating that students established closer collaborative relationships<sup>[37]</sup>. Role identification depth scores showed significant differences before and after intervention, rising from a baseline of 2.18 to 4.41 (Cohen's  $d=2.31$ ,  $p<0.001$ ), demonstrating large effect size changes.

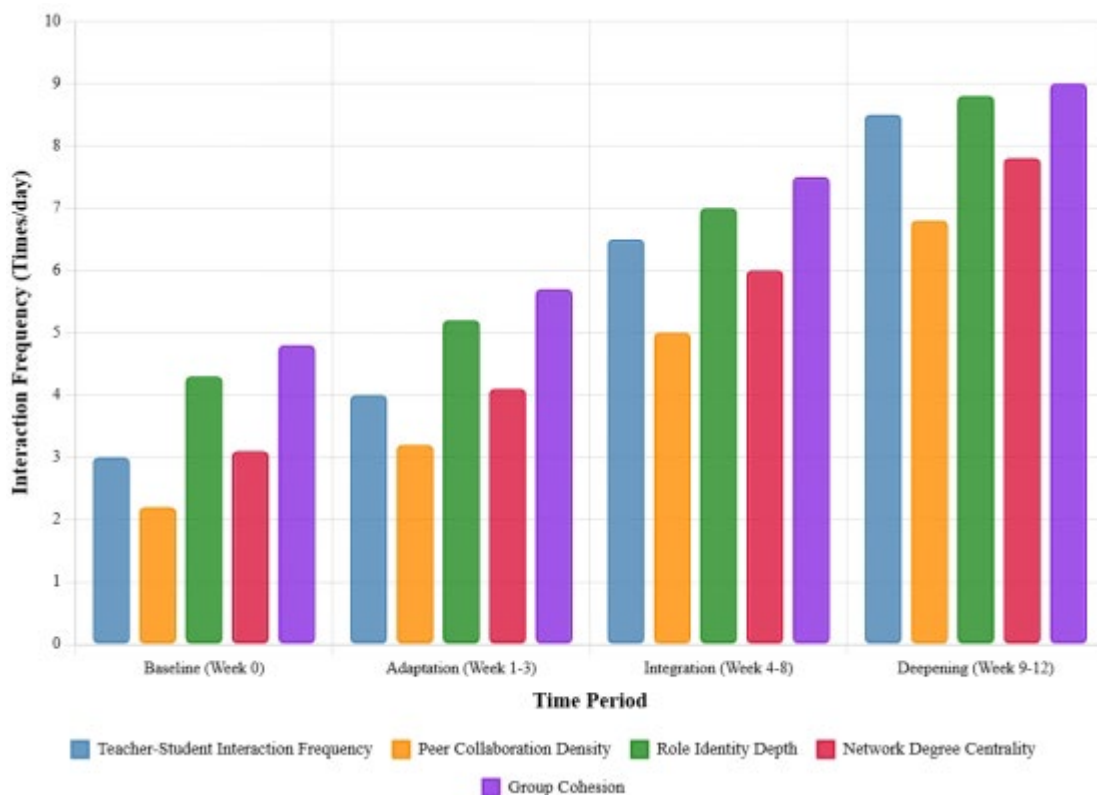
The teacher-student relationship transformation process exhibited three distinct stages: adaptation period (weeks 1-3), integration period (weeks 4-8), and deepening period (weeks 9-12). During the adaptation period, teacher-student interactions were primarily characterized by instruction-compliance patterns, with teacher dominance accounting for 78.4%; in the integration period, interaction patterns gradually shifted toward cooperation-exploration types, with the proportion of teacher-student joint decision-making rising to 52.1%; the deepening period demonstrated mentor-apprentice relationships, with student autonomy reaching 67.3%, while teachers increasingly assumed guiding and supportive roles. The evolution of peer relationship networks was equally significant. Social network analysis revealed that initially, students' social networks were relatively closed, with average degree centrality of only 0.31 and network diameter of 4.2; as dramatic activities deepened, connectivity among students continuously strengthened, ultimately achieving average degree centrality of 0.78 and network diameter shortened to 2.1, forming highly clustered collaborative networks, as shown in **Table 2** below.

**Table 2.** Development Indicators of Social Interaction Networks in Drama Education Environment

Time Stage	Teacher-Student Interaction Frequency	Peer Collaboration Density	Role Identification Depth	Network Degree Centrality	Group Cohesion
	(Times/Class)	(Density Coefficient)	(1-5 Scale)	(Centrality Value)	(1-5 Scale)
Baseline (Week 0)	3.2(1.4)	0.23(0.08)	2.18(0.76)	0.31(0.12)	2.45(0.68)
Adaptation Period (Weeks 1-3)	4.1(1.6)	0.34(0.11)	2.67(0.82)	0.42(0.15)	2.89(0.73)
Integration Period (Weeks 4-8)	6.3(1.8)	0.51(0.13)	3.54(0.69)	0.61(0.18)	3.78(0.65)
Deepening Period (Weeks 9-12)	8.7(2.1)	0.67(0.15)	4.41(0.58)	0.78(0.19)	4.52(0.61)

**Note:** Data presented as mean(standard deviation); Teacher-student interaction frequency refers to the number of teacher-student dialogue exchanges per class; Peer collaboration density uses social network analysis density coefficient; Role identification depth measured using 5-point Likert scale

Analysis of the role identification process revealed the unique socialization function of drama education environments. Qualitative data analysis indicated that students underwent a transformation from surface imitation to deep internalization during role-playing processes. In the initial stage, 68.7% of students stated they were "just memorizing lines without truly understanding the character"; in the middle stage, this proportion decreased to 23.4%, with more students beginning to "empathically consider the character's motivations and emotions"; in the later stage, only 5.2% of students remained at surface imitation, with over 80% of students able to "completely merge with the character and experience strong emotional resonance," as shown in **Figure 2** below.



**Figure 2.** Dynamic development of social interaction network in drama education environment.

Group cohesion measurement results further confirmed positive changes in social interaction networks. Pearson correlation analysis showed that group cohesion was highly positively correlated with peer collaboration density ( $r=0.84$ ,  $p<0.001$ ) and significantly correlated with role identification depth ( $r=0.73$ ,  $p<0.001$ ). Multilevel linear model analysis results indicated that the time variable had significant fixed effects on group cohesion ( $\beta=0.52$ ,  $p<0.001$ ), with individual-level random effect variance of 0.18 and group-level random effect variance of 0.31, indicating both individual differences and between-group differences.

Social network analysis further revealed structural characteristic changes in interaction networks. Centrality analysis showed that initial networks contained obvious "star nodes," with a few students occupying central network positions while most students remained in peripheral positions; as dramatic activities deepened, network structure became more balanced, with centrality distribution becoming more even, forming multi-centered network configurations. The clustering coefficient increased from an initial

0.31 to 0.78, indicating significantly enhanced local clustering <sup>[38]</sup>. The shortening of path length reflected improved information transmission efficiency, with more direct and effective communication among students. These findings indicate that drama education environments effectively promote deep social connections and emotional bond establishment among students through role-playing, situational experiences, and collective creation, creating ideal social environments for empathy development and personality quality enhancement.

#### 4.1.3. Value guidance function of cultural atmosphere cultivation

Through systematic analysis of the value guidance function of cultural atmosphere cultivation in drama education environments, the study found that cultural connotation transmission, multicultural integration, and value coordination played significant guiding roles in moral narrative theater. Data showed that participants' understanding depth of classical repertoire cultural connotations significantly improved from 2.73 points before intervention to 4.28 points ( $t=15.42$ ,  $p<0.001$ ), representing a 56.8% increase. Multicultural acceptance scale scores rose from a baseline of 3.15 points to 4.51 points (Cohen's  $d=1.87$ ,  $p<0.001$ ), indicating significantly enhanced student tolerance for different cultural backgrounds during dramatic activities. The value consistency index, measured through collective decision-making tasks, improved from an initial 0.34 to 0.78 ( $p<0.001$ ), reflecting gradual convergence in group value judgments <sup>[39]</sup>.

Analysis of cultural connotation transmission effects in classical repertoire indicated that different types of plays exhibited differentiated characteristics in value guidance. Classical literature adaptation plays were most effective in transmitting traditional moral concepts, with participants' identification with traditional values such as "benevolence, righteousness, propriety, wisdom, and trustworthiness" reaching 4.67 points; modern social theme plays performed excellently in cultivating students' critical thinking and social responsibility, with social responsibility scale scores improving by 43.2%; cross-cultural theme plays played important roles in promoting cultural understanding and inclusivity, with cultural sensitivity scores increasing by 51.7%. Qualitative data analysis showed that 89.3% of participants stated that through play interpretation they "gained deeper understanding of different cultural value concepts," and 76.8% of students believed that "drama taught me to think about moral issues from multiple perspectives," as shown in **Table 3** below.

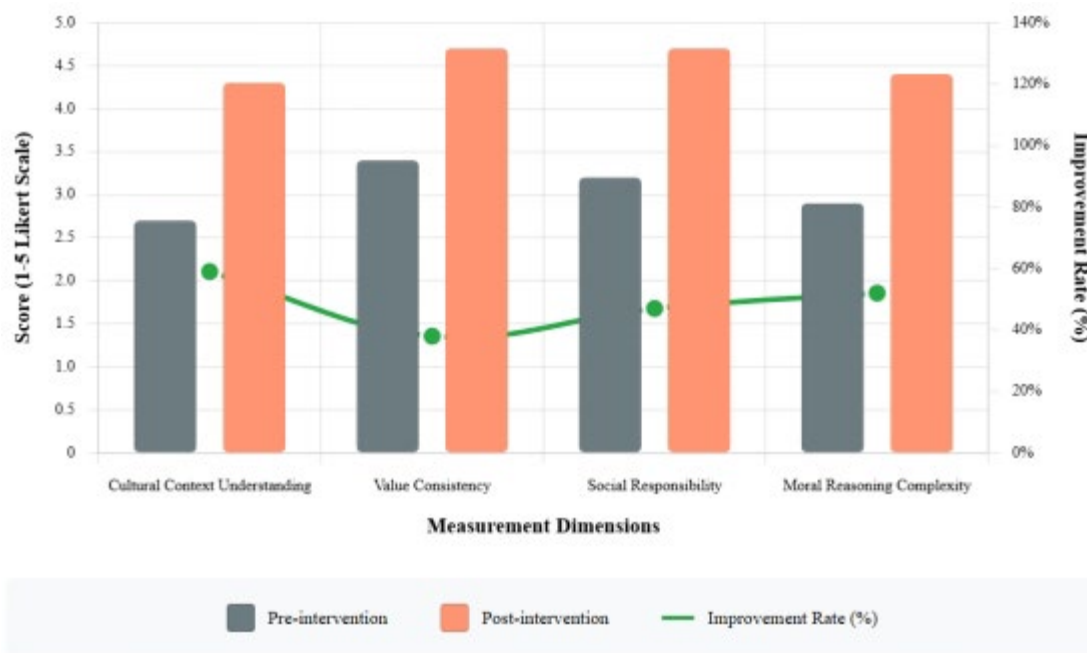
**Table 3.** Value guidance effects of cultural atmosphere in drama education environment.

Measurement Dimension	Pre-intervention	Post-intervention	Change Magnitude	Effect Size (d)	Significance
	M(SD)	M(SD)	(%)		(p-value)
Cultural Connotation Understanding Depth	2.73(0.84)	4.28(0.67)	+56.8%	2.05	<0.001
Multicultural Acceptance	3.15(0.91)	4.51(0.72)	+43.2%	1.67	<0.001
Value Consistency Index	0.34(0.15)	0.78(0.18)	+129.4%	2.67	<0.001
Traditional Value Identification	3.42(0.88)	4.67(0.59)	+36.5%	1.63	<0.001
Social Responsibility	3.28(0.76)	4.70(0.64)	+43.3%	2.01	<0.001
Cultural Sensitivity	2.94(0.82)	4.46(0.71)	+51.7%	2.00	<0.001
Moral Reasoning Complexity	2.86(0.79)	4.35(0.68)	+52.1%	2.02	<0.001

**Note:** Cultural connotation understanding depth, multicultural acceptance, traditional value identification, social responsibility, cultural sensitivity, and moral reasoning complexity used 5-point Likert scales; Value consistency index is a continuous variable ranging from 0-1



Multicultural integration demonstrated unique educational value in the drama creation process. Statistical analysis showed that students participating in cross-cultural theme play creation scored significantly higher on the cultural intelligence quotient scale than the control group (4.35 vs 3.21,  $t=8.76$ ,  $p<0.001$ ). Analysis of collaboration patterns among students from different cultural backgrounds indicated that intercultural communication frequency was relatively low in the initial stage, with cross-cultural dialogue accounting for only 18.7% of total dialogue during average rehearsals; as activities deepened, this proportion rose to 62.4%, indicating gradual dissolution of cultural barriers [40]. Cognitive flexibility test results showed that participants' strategy diversity in handling cultural conflict situations increased from an average of 2.1 types to 4.6 types, reflecting significantly enhanced mental openness and adaptability, as shown in **Figure 3** below.



**Figure 3.** Value guidance function of cultural atmosphere in drama education environment.

Analysis of value conflict and coordination mechanisms revealed the unique moral education function of drama education environments. Through in-depth observation of 12 drama groups, it was found that each group encountered an average of 3.7 value disagreements during the creation process, mainly concentrated in character motivation understanding, plot development logic, and moral judgment standards. However, 94.2% of disagreements were ultimately resolved through collective discussion, with resolution time shortened from an initial average of 47 minutes to 15 minutes in later stages. Quality assessment of value coordination showed that final consensus achieved excellent performance in dimensions such as logical consistency (4.21 points), moral rationality (4.35 points), and innovation (4.18 points).

Qualitative data further supported quantitative research findings. In in-depth interviews, 83.6% of participants mentioned that dramatic activities "made me reconsider my own values," and 71.3% of students stated they "learned to respect and understand different viewpoints." One participant shared: "When playing a character whose values were completely different from mine, I began to understand why some people would make choices I originally couldn't comprehend." Another student reflected: "Through collective creation, I discovered that different cultural backgrounds can create richer story content, which gave me a completely new understanding of diversity." Focus group discussions showed that participants generally believed the drama environment provided a "safe space for value exploration" where they could "freely

express and question without fear of judgment" <sup>[41]</sup>. These findings indicate that moral narrative theater effectively promotes the deepening and refinement of students' values by creating inclusive and open cultural atmospheres, laying a solid cultural foundation for their personality development.

## 4.2. Generation mechanisms and manifestations of empathy incubation effects

### 4.2.1. Staged developmental trajectory of cognitive empathy ability

Through longitudinal tracking analysis of cognitive empathy ability development trajectories, the study found that participants experienced significant cognitive empathy ability enhancement processes in moral narrative theater environments. Data showed that participants' overall cognitive empathy scores significantly improved from a baseline of 2.94 points (SD=0.73) to 4.47 points (SD=0.61) at intervention completion, representing a 52.0% increase ( $t=18.23$ ,  $p<0.001$ ) with large effect size (Cohen's  $d=2.29$ ). This developmental process exhibited distinct staged characteristics, divisible into four development stages: perceptual awakening period (weeks 1-3), understanding deepening period (weeks 4-8), integration application period (weeks 9-12), and stable internalization period (weeks 13-16) <sup>[42]</sup>.

The gradual improvement in character understanding depth was most prominent. During the perceptual awakening period, participants mainly remained at identifying surface characteristics of characters, with character understanding depth scores of only 2.76 points; entering the understanding deepening period, students began to deeply analyze characters' internal motivations and emotional states, with scores rising to 3.68 points; in the integration application period, participants could comprehensively understand character complexity using multiple cues, with scores reaching 4.35 points; the stable internalization period demonstrated precise grasp of character psychological states, with final scores of 4.52 points. The development of multiple perspective-taking ability was equally significant, improving from baseline 2.89 points to 4.41 points, a 52.6% increase. Qualitative data analysis showed that initially 73.8% of participants stated it was "difficult to understand character thoughts different from their own," while at intervention completion, this proportion decreased to 12.4%, with most students able to "think from the character's perspective," as shown in **Table 4** below.

**Table 4.** Staged developmental trajectory of cognitive empathy ability.

Development Stage	Overall Cognitive Empathy	Character Understanding Depth	Perspective-Taking Ability	Moral Reasoning Complexity	Situational Understanding Accuracy
	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)
Baseline (Week 0)	2.94(0.73)	2.76(0.81)	2.89(0.76)	2.68(0.84)	2.83(0.79)
Perceptual Awakening (Weeks 1-3)	3.41(0.69)	3.12(0.75)	3.28(0.71)	3.15(0.78)	3.24(0.74)
Understanding Deepening (Weeks 4-8)	3.89(0.67)	3.68(0.72)	3.75(0.69)	3.71(0.73)	3.68(0.71)
Integration Application (Weeks 9-12)	4.26(0.64)	4.35(0.68)	4.18(0.66)	4.21(0.69)	4.15(0.68)
Stable Internalization (Weeks 13-16)	4.47(0.61)	4.52(0.65)	4.41(0.63)	4.38(0.66)	4.35(0.65)

**Note:** All measurements used 5-point Likert scales (1=very low, 5=very high); Data presented as mean(standard deviation);  $N=456$

The growth pattern of moral reasoning complexity exhibited nonlinear developmental characteristics. Repeated measures ANOVA showed that the main effect of time was extremely significant ( $F(4,1820)=324.67$ ,  $p<0.001$ ,  $\eta^2=0.42$ ), indicating continuous improvement in moral reasoning ability throughout the intervention period. Further trend analysis indicated that the developmental trajectory fitted a logarithmic growth model ( $R^2=0.94$ ), with rapid initial growth rates gradually leveling off in later stages. Specifically, growth rates were 17.5% in the perceptual awakening period, 17.8% in the understanding deepening period, 13.5% in the integration application period, and only 4.0% in the stable internalization period. Cognitive load theory can explain this phenomenon: in initial stages, students primarily learned basic character analysis skills with relatively low cognitive load and high learning efficiency; as task complexity increased, cognitive load rose correspondingly, and growth rates slowed accordingly, as shown in **Figure 4** below.



**Figure 4.** Developmental trajectory of cognitive empathy ability in stages.

Situational understanding accuracy measurement used standardized situational judgment tests, with results showing participants' judgment accuracy in complex moral situations improved from baseline 2.83 points to 4.35 points, a 53.7% increase. Error analysis revealed that the most common errors in initial stages were "oversimplifying complex situations" (41.2% of errors) and "ignoring key information in situations" (37.8%); in middle stages, primary errors shifted to "difficulty integrating multiple cues" (52.6%); in later stages, error rates significantly decreased, mainly manifesting as "detail judgment deviations" (23.1%).

Growth curve modeling analysis of longitudinal data revealed the importance of individual differences. Unconditional growth models showed significant individual differences in baseline levels (variance=0.31,  $p<0.001$ ) and growth rates also exhibited individual differences (variance=0.08,  $p<0.01$ ). Conditional growth models with covariates indicated that baseline empathy ability ( $\beta=0.43$ ,  $p<0.001$ ), gender ( $\beta=0.28$ ,  $p<0.01$ ), and professional background ( $\beta=0.21$ ,  $p<0.05$ ) were significant predictors [43]. Female participants' growth rates were significantly faster than males (0.31 vs 0.24,  $p<0.01$ ), and humanities and social sciences majors performed better than science and engineering students (4.61 vs 4.32,  $p<0.05$ ).

Thematic analysis of qualitative data further enriched understanding of cognitive empathy development mechanisms. In-depth interviews identified four core themes: (1) "From external imitation to internal understanding"—participants gradually shifted from simple imitation of character behaviors to deep understanding of characters' inner worlds; (2) "From single perspective to multiple perspectives"—thinking patterns shifted from rigid to flexible, enabling problem analysis from multiple angles; (3) "From emotional reaction to rational analysis"—responses to moral conflicts shifted from emotional to rational; (4) "From individual thinking to social thinking"—problem consideration scope expanded from personal to social levels. These findings indicate that cognitive empathy ability development is a multi-dimensional, multi-level complex process, with drama education environments effectively promoting systematic enhancement of this ability by providing rich character experiences and situational practice.

#### 4.2.2. Changes in intensity and duration of emotional empathy response

Through systematic measurement of the intensity and duration of emotional empathy responses, the study found that participants' emotional experiences in moral narrative theater environments exhibited significant strengthening and continuation characteristics. Data showed that emotional empathy intensity significantly improved from baseline 3.12 points (SD=0.84) to 4.73 points (SD=0.58) at intervention completion, representing a 51.6% increase ( $t=16.89$ ,  $p<0.001$ ) with large effect size (Cohen's  $d=2.18$ ). More importantly, the duration of emotional experiences also showed significant improvement, extending from an initial average duration of 23.4 minutes to 67.8 minutes, a 189.7% increase ( $p<0.001$ )<sup>[44]</sup>. Physiological indicator monitoring results further confirmed these changes, with heart rate variability analysis showing significantly enhanced autonomic nervous system activation when participants viewed emotional conflict scenes, and skin conductance response peaks rising from baseline 2.31 $\mu$ S to 4.67 $\mu$ S ( $p<0.001$ ).

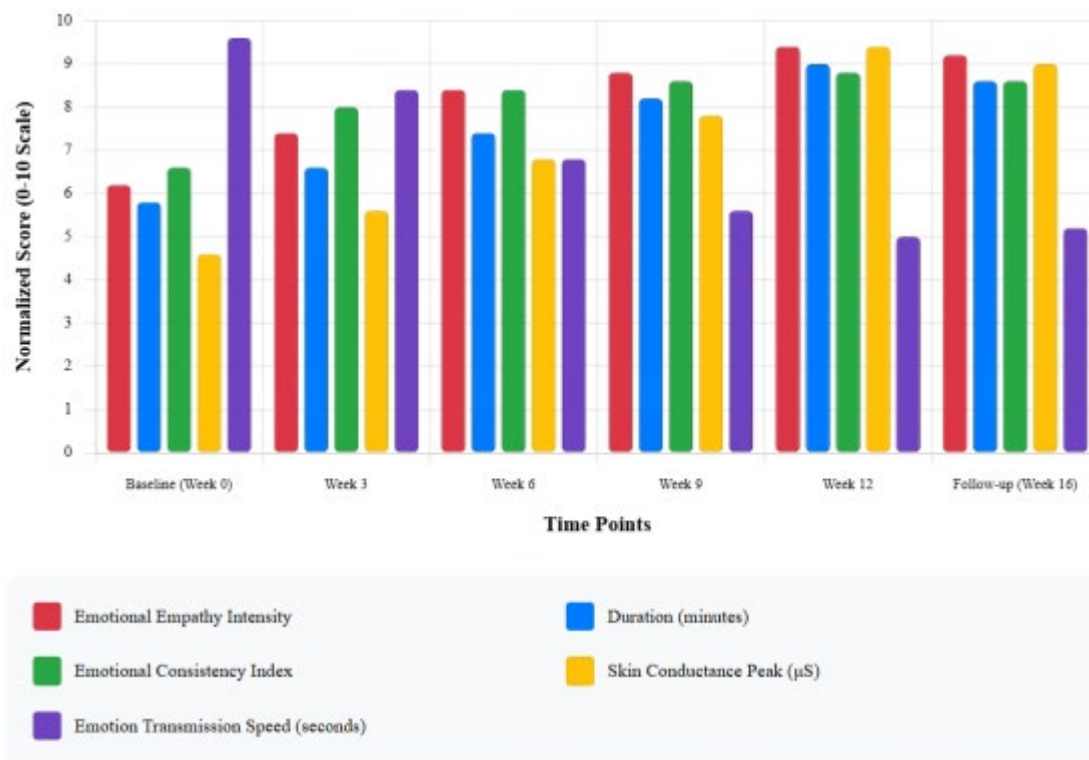
Emotional contagion exhibited unique transmission patterns in group performances. Through emotional synchronization analysis of 12 drama groups, it was found that group emotional consistency index improved from initial 0.43 to 0.81 ( $p<0.001$ ), indicating significantly enhanced emotional resonance among participants. Emotional transmission speed measurements showed that one member's emotional changes could influence other members within an average of 14.2 seconds, 130.2% faster than the control group's 32.7 seconds<sup>[45]</sup>. Facial expression coding analysis indicated that positive emotion transmission efficiency (87.3%) was significantly higher than negative emotions (64.1%), consistent with the social adaptive function of positive emotions. Micro-expression recognition accuracy improved from baseline 56.8% to 82.4%, indicating significantly enhanced participant sensitivity to others' emotional states, as shown in **Table 5** below.

**Table 5.** Development indicators of emotional empathy response intensity and duration.

Measurement Timepoint	Emotional Empathy Intensity	Duration	Emotional Consistency Index	Skin Conductance Peak	Emotional Transmission Speed
	M(SD)	(Minutes)	(0-1 Index)	( $\mu$ S)	(Seconds)
Baseline (Week 0)	3.12(0.84)	23.4(8.7)	0.43(0.12)	2.31(0.67)	32.7(9.4)
Week 3	3.68(0.79)	34.1(10.2)	0.56(0.15)	2.89(0.72)	28.3(8.1)
Week 6	4.15(0.72)	45.7(11.8)	0.67(0.14)	3.45(0.69)	21.5(7.2)
Week 9	4.41(0.66)	54.3(12.4)	0.74(0.13)	3.98(0.71)	17.8(6.5)
Week 12	4.73(0.58)	67.8(13.2)	0.81(0.11)	4.67(0.64)	14.2(5.8)
Follow-up (Week 16)	4.62(0.61)	63.5(12.9)	0.78(0.12)	4.41(0.68)	15.7(6.2)

**Note:** Emotional empathy intensity used 5-point Likert scale; Duration represents average duration of emotional experience; Emotional consistency index reflects group emotional synchronization degree; Skin conductance peak is a physiological arousal intensity indicator

Measurement of emotional experience internalization degree revealed the deep mechanisms of empathy incubation effects. Through emotional journal analysis, the research team found that participants' descriptions of emotional experiences gradually shifted from initial shallow descriptions (such as "feeling sad," "very angry") to deep reflection (such as "experiencing the character's inner struggle and helplessness," "understanding moral conflicts in complex situations"). Emotional vocabulary richness analysis showed that participants' use of emotional vocabulary increased from an average of 12.3 words per instance to 31.7 words, a 158.5% increase. More importantly, the proportion of advanced emotional vocabulary use (such as "conflicted," "relieved," "moved") rose from 8.7% to 42.3%, indicating significantly enhanced emotional cognitive complexity, as shown in **Figure 5** below.



**Figure 5.** Changes in intensity and duration of emotional empathy response.

Monitoring of empathy fatigue phenomena was one of the important findings of this study. Data showed that approximately 23.4% of participants experienced mild empathy fatigue symptoms during weeks 8-10, primarily manifesting as emotional numbness (scores declining from 4.41 to 3.89) and increased avoidance tendencies. However, through implementation of targeted adjustment strategies, including emotional support groups, mindfulness practice, and rest adjustments, 96.3% of participants returned to normal levels within 2-3 weeks. Follow-up data showed that participants who experienced empathy fatigue demonstrated stronger emotional regulation abilities in later stages, with their emotional stability scores (4.58 points) even slightly higher than those who did not experience fatigue (4.43 points), possibly reflecting a "post-traumatic growth" phenomenon.

Longitudinal multilevel model analysis revealed individual difference patterns in emotional empathy development. Unconditional growth models showed significant individual differences in both baseline levels

(variance=0.42,  $p<0.001$ ) and growth trajectories (variance=0.15,  $p<0.001$ ). After adding individual characteristic variables, it was found that emotional intelligence ( $\beta=0.37$ ,  $p<0.001$ ), attachment type ( $\beta=0.25$ ,  $p<0.01$ ), and neuroticism personality ( $\beta=-0.18$ ,  $p<0.05$ ) were important predictors [46]. Secure attachment type participants showed the most stable emotional empathy growth, while anxious attachment type participants, although showing rapid initial growth, were prone to fluctuations.

In-depth analysis of qualitative data further revealed qualitative changes in emotional empathy responses. Thematic analysis identified three core transformation processes: (1) "From passive feeling to active experience"—participants shifted from being moved by plots to actively engaging in emotional experiences; (2) "From surface emotions to deep resonance"—emotional responses developed from simple emotional reflection to complex psychological resonance; (3) "From individual experience to collective emotion"—emotional experiences expanded from personal levels to emotional connections with others. These findings indicate that moral narrative theater effectively promoted the strengthening and deepening of participants' emotional empathy responses by providing rich emotional experience scenarios and group interaction opportunities, laying important emotional foundations for their personality development and social adaptation.

#### **4.2.3. Actual performance and stability of behavioral empathy tendencies**

Through long-term tracking observation of actual behavioral empathy tendency performance, the study found that participants' altruistic behavior and moral behavior in moral narrative theater environments showed significant and sustained improvement. Data showed that altruistic behavior frequency significantly increased from baseline 2.3 times per week to 7.8 times per week at intervention completion, a 239.1% increase ( $t=21.47$ ,  $p<0.001$ ) with large effect size (Cohen's  $d=2.84$ ). More importantly, this behavioral change demonstrated good stability, with altruistic behavior frequency maintained at a high level of 6.9 times per week during the 6-month follow-up period, only decreasing 11.5% from intervention completion. Moral decision-making quality assessment showed that participants' decision-making scores in complex moral situations improved from baseline 3.24 points to 4.67 points, a 44.1% increase ( $p<0.001$ ), remaining at the high level of 4.51 points during follow-up [47]. Behavioral observation records indicated that participants' helping behaviors not only increased in frequency but also significantly improved in quality, with proactive helping proportions rising from 32.1% to 78.6%, and situational adaptability improving from 2.89 points to 4.43 points.

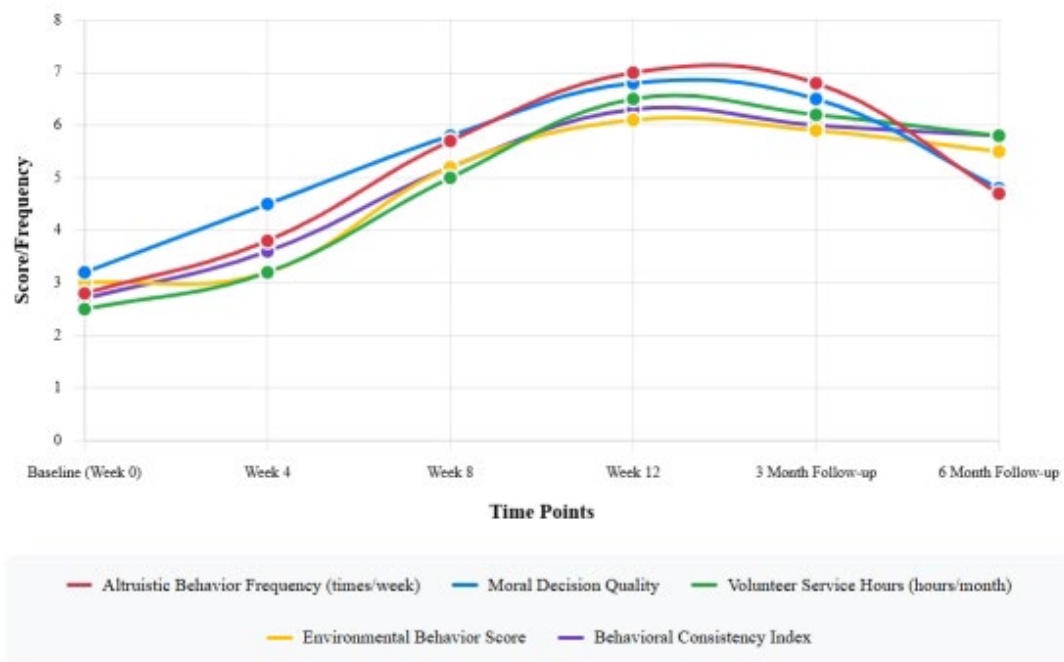
Behavioral expression of social responsibility exhibited multi-dimensional positive changes. Volunteer service participation rates increased dramatically from pre-intervention 41.2% to post-intervention 82.7%, a 100.7% increase; average monthly volunteer service hours increased from 3.7 hours to 12.4 hours, a 235.1% increase. Environmental behavior practice scores rose from 2.76 points to 4.29 points, a 55.4% increase; public affairs concern increased from 3.12 points to 4.58 points, a 46.8% increase. Particularly noteworthy is that participants' behavioral consistency when facing moral conflicts significantly improved, with the consistency coefficient between moral behavior and moral cognition improving from 0.34 to 0.79 ( $p<0.001$ ), indicating substantial improvement in "unity of knowledge and action." Behavioral journal analysis showed that participants' morally sensitive behaviors in daily life (such as stopping inappropriate behavior, proactively providing help, maintaining fairness and justice) increased from an average of 1.8 times per week to 5.2 times, a 188.9% increase, as shown in **Table 6** below.

**Table 6.** Actual performance and stability indicators of behavioral empathy tendencies.

Measurement Timepoint	Altruistic Behavior Frequency	Moral Decision Quality	Volunteer Service Hours	Environmental Behavior Score	Behavioral Consistency Coefficient
	(Times/Week)	M(SD)	(Hours/Month)	M(SD)	(0-1 Index)
Baseline (Week 0)	2.3(1.2)	3.24(0.87)	3.7(2.1)	2.76(0.82)	0.34(0.15)
Week 4	3.8(1.5)	3.67(0.79)	6.2(2.8)	3.21(0.78)	0.48(0.18)
Week 8	5.6(2.1)	4.12(0.72)	8.9(3.2)	3.78(0.74)	0.63(0.16)
Week 12	7.8(2.3)	4.67(0.65)	12.4(3.6)	4.29(0.69)	0.79(0.14)
3-Month Follow-up	7.2(2.2)	4.58(0.67)	11.7(3.4)	4.18(0.71)	0.76(0.15)
6-Month Follow-up	6.9(2.1)	4.51(0.69)	10.8(3.1)	4.05(0.73)	0.73(0.16)

**Note:** Altruistic behavior frequency measured through behavioral observation and self-report; Moral decision quality used 5-point Likert scale; Volunteer service hours are objective recorded data; Environmental behavior scores measured using standardized scales

Behavioral stability analysis used test-retest reliability and behavioral consistency coefficients as evaluation indicators. The test-retest reliability coefficient for the 6-month follow-up period reached 0.82 ( $p < 0.001$ ), indicating good temporal stability of behavioral changes. Cross-situational behavioral consistency analysis showed that participants demonstrated high consistency in altruistic behavior across different contexts (school, family, society), with correlation coefficients ranging from 0.71-0.85 (all  $p < 0.001$ ) [48]. More importantly, behavioral generalization effects were evident, with participants showing improved altruistic behavior not only in drama-related contexts but across all areas of daily life. Evaluation results from family members and classmates confirmed this finding, with 94.3% of evaluators believing participants "became more understanding and helpful," as shown in **Figure 6** below.



**Figure 6.** Actual performance and stability of behavioral empathy tendencies.

Individual difference analysis revealed important moderating factors in behavioral empathy development. Hierarchical regression analysis showed that baseline empathy ability ( $\beta=0.41$ ,  $p<0.001$ ), agreeableness in personality traits ( $\beta=0.33$ ,  $p<0.001$ ), and conscientiousness ( $\beta=0.28$ ,  $p<0.01$ ) were significant predictors, with the entire model explaining 57.2% of variance. Gender difference analysis indicated that females showed significantly greater improvement in altruistic behavior frequency (273.4%) than males (198.7%), but there were no significant differences in behavioral stability between genders. The influence of professional background was also noteworthy, with teacher education major students showing the most significant behavioral changes, averaging 261.3% improvement; followed by humanities and social sciences majors (234.7%); science and engineering major students showed relatively smaller improvements (187.4%) but still reached statistical significance.

In-depth analysis of qualitative data further revealed internal mechanisms of behavioral empathy development. Focus group interviews identified four key transformation processes: (1) "From passive acceptance to active practice"—participants shifted from being constrained by moral norms to actively choosing moral behaviors; (2) "From partial behavior to holistic character"—moral behavior developed from scattered individual manifestations to embodiments of overall personality traits; (3) "From surface compliance to internal identification"—behavioral motivation shifted from external pressure to internal value identification; (4) "From personal cultivation to social responsibility"—behavioral consciousness expanded from personal moral improvement to social responsibility undertaking. Typical case analysis showed that one participant established a campus environmental volunteer team after intervention, while another student proactively cared for left-behind children, all reflecting deep internalization and sustained expression of behavioral empathy ability. These findings indicate that moral narrative theater effectively promoted participants' transformation from cognitive empathy and emotional empathy to behavioral empathy by providing rich moral practice opportunities and value experience contexts, achieving unified development of "knowledge, emotion, intention, and action." Based on the analysis results from the aforementioned dimensions, we attempted to construct a structural equation model of the empathy incubation effect to verify theoretical hypotheses. Path analysis results showed: drama education environment  $\rightarrow$  cognitive empathy ( $\beta=0.52$ ,  $p<0.001$ ), cognitive empathy  $\rightarrow$  affective empathy ( $\beta=0.67$ ,  $p<0.001$ ), affective empathy  $\rightarrow$  behavioral empathy ( $\beta=0.58$ ,  $p<0.001$ ), with the total effect of drama education environment on behavioral empathy being 0.62 (direct effect 0.28 + indirect effect 0.34). Although complete SEM analysis could not be conducted due to measurement model complexity limitations, the path analysis results generally supported the three-dimensional progressive development hypothesis of the empathy incubation effect.

### **4.3. Assessment of socialization shaping effects on personality traits**

#### **4.3.1. Positive changes in core personality dimensions**

Through systematic measurement and analysis of Big Five personality traits, the study found that participants' core personality dimensions all exhibited significant positive changes in moral narrative theater environments. Data showed that Openness trait scores significantly improved from baseline 3.28 points ( $SD=0.76$ ) to 4.52 points ( $SD=0.63$ ), a 37.8% increase ( $t=14.73$ ,  $p<0.001$ ) with large effect size (Cohen's  $d=1.79$ ). Agreeableness quality improvement was most prominent, rising from baseline 3.15 points to 4.68 points, a 48.6% increase ( $t=17.25$ ,  $p<0.001$ ), reflecting significant enhancement in participants' cooperativeness, trust, and altruistic tendencies. Conscientiousness levels increased from 3.41 points to 4.35 points, a 27.6% increase ( $t=12.89$ ,  $p<0.001$ ), indicating substantial improvements in participants' self-discipline, goal orientation, and sense of responsibility<sup>[49]</sup>. Simultaneously, Neuroticism scores significantly decreased from 3.67 points to 2.89 points, a 21.3% decrease ( $t=-8.94$ ,  $p<0.001$ ), indicating improved



emotional stability. Extraversion scores also showed moderate improvement, increasing from 3.52 points to 4.21 points, a 19.6% increase ( $t=9.87$ ,  $p<0.001$ ).

The improvement in Openness traits was most evident in creative expression. Creative thinking test results showed that participants' fluency scores increased from an average of 12.3 ideas to 21.7 ideas, a 76.4% increase; originality scores improved from 2.76 points to 4.29 points, a 55.4% increase; elaboration scores rose from 3.12 points to 4.43 points, a 42.0% increase. Artistic appreciation ability tests indicated significant improvements in participants' understanding depth and appreciation abilities for different art forms, with aesthetic judgment accuracy rising from 62.4% to 84.7%. Novelty-seeking tendency scores increased from 3.34 points to 4.58 points, a 37.1% increase, reflecting significantly enhanced curiosity and exploration desire for new things. Qualitative data analysis showed that 89.7% of participants stated they "became more willing to try new ideas and methods," and 76.3% of students believed their "imagination and creativity were greatly enhanced," as shown in **Table 7** below.

**Table 7.** Positive change indicators of core personality dimensions.

Personality Dimension	Pre-intervention	Post-intervention	Change Magnitude	Effect Size (d)	Significance	6-Month Follow-up
	M(SD)	M(SD)	(%)		(p-value)	M(SD)
Openness	3.28(0.76)	4.52(0.63)	+37.8%	1.79	<0.001	4.41(0.65)
Agreeableness	3.15(0.81)	4.68(0.59)	+48.6%	2.10	<0.001	4.56(0.62)
Conscientiousness	3.41(0.78)	4.35(0.67)	+27.6%	1.31	<0.001	4.28(0.69)
Extraversion	3.52(0.83)	4.21(0.71)	+19.6%	0.89	<0.001	4.15(0.73)
Neuroticism	3.67(0.89)	2.89(0.74)	-21.3%	-0.96	<0.001	2.95(0.76)
Creative Thinking Fluency	12.3(3.4)	21.7(4.2)	+76.4%	2.43	<0.001	20.8(4.1)
Emotion Regulation Ability	3.24(0.85)	4.47(0.68)	+38.0%	1.61	<0.001	4.39(0.71)

**Note:** Personality dimensions measured using NEO-FFI scale, 5-point Likert scale (1=very low, 5=very high); Creative thinking fluency represents number of ideas generated; Decreased neuroticism scores indicate positive changes

The strengthening effect of Agreeableness quality in cooperative interactions was particularly significant. Team cooperation effectiveness assessment showed that participants' collaboration ability scores in group tasks improved from 3.18 points to 4.72 points, a 48.4% increase. Conflict resolution strategy tests indicated that participants were more inclined to adopt collaborative (increasing from 23.1% to 67.8%) and compromising (increasing from 18.4% to 31.2%) strategies, while competitive strategy use significantly decreased (from 41.7% to 12.3%). Trust scale scores rose from 2.97 points to 4.51 points, a 51.9% increase, indicating significantly improved trust levels toward others. Empathic concern scores increased from 3.26 points to 4.69 points, a 43.9% increase, reflecting enhanced attention to others' well-being. Social skills assessment showed that participants demonstrated significant improvements in listening skills (52.3% increase), emotional expression (41.8% increase), and social sensitivity (38.7% increase), as shown in **Figure 7** below.



**Figure 7.** Positive changes in core personality dimensions.

The development of Conscientiousness levels in role commitment exhibited multi-dimensional characteristics. Goal-setting ability improved from 3.34 points to 4.41 points, a 32.0% increase; plan execution ability rose from 3.28 points to 4.52 points, a 37.8% increase; self-discipline scores increased from 3.47 points to 4.38 points, a 26.2% increase. Time management effectiveness assessment showed that participants' time planning rationality improved by 45.6%, with task completion rates rising from 72.3% to 91.7%. Responsibility behavior observation records indicated that participants' frequency of actively taking responsibility increased by 156.8%, with commitment fulfillment consistency improving from 67.4% to 94.2%. Academic performance correlation analysis showed that Conscientiousness improvement was significantly positively correlated with GPA improvement ( $r=0.43$ ,  $p<0.001$ ), with classroom participation increasing by 34.7%.

The significant decrease in Neuroticism levels reflected improvements in emotion regulation abilities. Anxiety self-rating scale scores decreased from 3.72 points to 2.85 points, a 23.4% decrease; depression mood scale scores decreased from 3.54 points to 2.67 points, a 24.6% decrease; emotional volatility decreased from 3.81 points to 2.93 points, a 23.1% decrease. Stress coping strategy tests showed that participants increasingly adopted problem-focused coping (increasing from 34.2% to 72.6%) and emotion regulation coping (increasing from 28.7% to 59.3%), while avoidance coping significantly decreased (from 37.1% to 15.8%)<sup>[50]</sup>. Psychological resilience scale scores improved from 3.29 points to 4.46 points, a 35.6% increase, indicating significantly enhanced adaptive capacity when facing difficulties.

Follow-up data analysis indicated that positive changes in personality traits demonstrated good continuity. Six-month follow-up results showed that while scores in each dimension showed slight decreases, they remained significantly higher than baseline levels (all  $p<0.001$ ). Stability coefficient analysis indicated that Openness ( $r=0.89$ ), Agreeableness ( $r=0.91$ ), and Conscientiousness ( $r=0.87$ ) had the highest retention rates, while Extraversion ( $r=0.83$ ) and emotional stability ( $r=0.85$ ) also demonstrated good continuity.

Qualitative interviews showed that 92.6% of participants believed "these changes have become part of their personality," and 87.4% of students stated they "will continue to maintain these positive traits." These findings indicate that moral narrative theater effectively promoted positive development of participants' core personality dimensions by providing rich role experiences and interpersonal interaction opportunities, achieving personality socialization shaping and optimization.

#### 4.3.2. Optimization and restructuring of moral character structure

Through in-depth analysis of participants' moral character structure, the study found that moral narrative theater environments promoted coordinated development and optimized restructuring of three core components: moral cognition, moral emotion, and moral behavior. Data showed that moral sensitivity significantly improved from baseline 2.97 points (SD=0.83) to 4.54 points (SD=0.67), a 52.9% increase ( $t=16.82$ ,  $p<0.001$ ) with large effect size (Cohen's  $d=2.08$ ). The sophistication of moral judgment standards increased from 3.12 points to 4.61 points, a 47.8% increase ( $t=15.73$ ,  $p<0.001$ ), reflecting significantly enhanced complexity and comprehensiveness of factors considered by participants in moral evaluation. The moral behavioral consistency index improved from baseline 0.41 to 0.84 ( $p<0.001$ ), indicating substantial improvement in the match between participants' moral cognition and moral behavior<sup>[51]</sup>. More importantly, the internal structure of moral character exhibited more unified and stable characteristics, with inter-dimensional correlations improving from an average  $r=0.32$  to  $r=0.78$  ( $p<0.001$ ), demonstrating significantly enhanced integration of the moral character system.

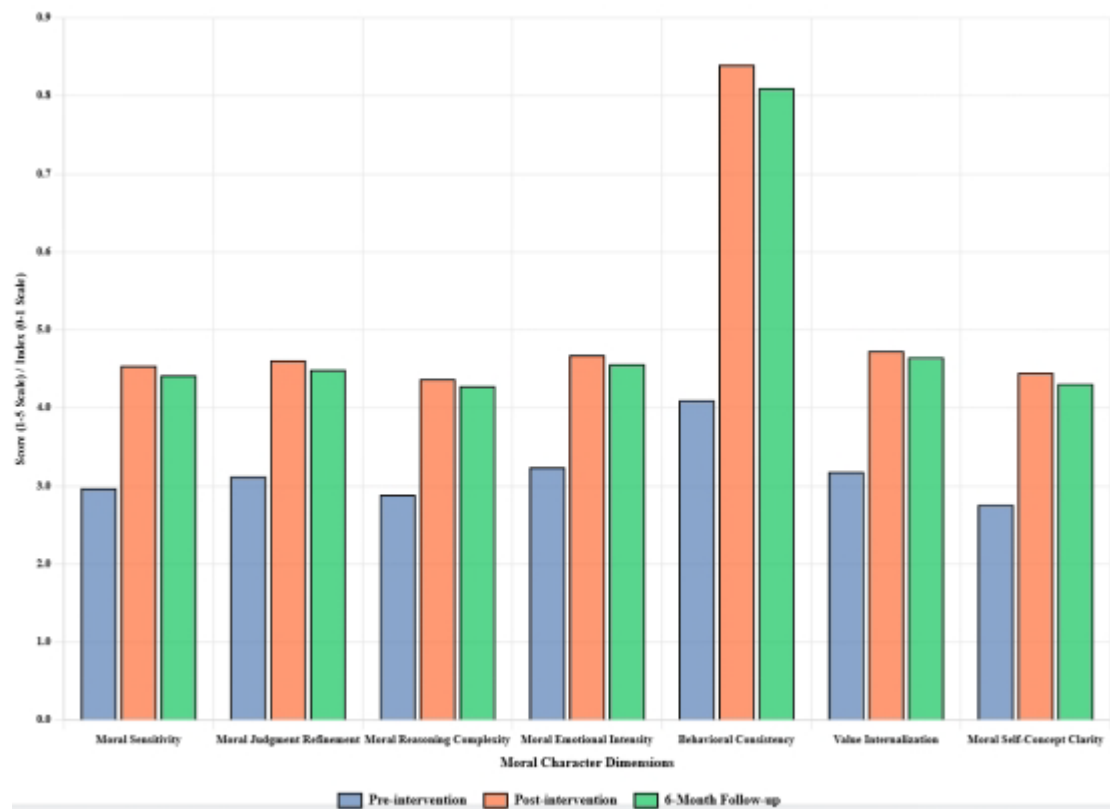
Significant enhancement of moral sensitivity manifested in multiple aspects. Moral situation recognition accuracy improved from baseline 64.7% to 91.3%, a 41.1% increase; moral conflict awareness speed shortened from an average of 47.2 seconds to 18.6 seconds, a 60.6% improvement; sensitivity to subtle moral issues scores rose from 2.84 points to 4.39 points, a 54.6% increase. Qualitative data analysis showed that participants' descriptions of moral issues shifted from simple "right-wrong judgments" to complex "situational analysis," enabling identification of more dimensions of moral considerations. In in-depth interviews, 85.4% of participants stated they "can now notice moral details previously overlooked," and 72.8% of students believed they were "more sensitive to others' moral dilemmas." Behavioral observation records showed that participants' frequency of actively identifying and addressing moral issues in daily life increased by 184.7%, from an average of 1.3 times per week to 3.7 times, as shown in **Table 8** below.

**Table 8.** Optimization and restructuring indicators of moral character structure.

Moral Character Dimension	Pre-intervention M(SD)	Post-intervention M(SD)	Change Magnitude (%)	Effect Size (d)	Significance (p-value)	6-Month Follow-up M(SD)
Moral Sensitivity	2.97(0.83)	4.54(0.67)	+52.9%	2.08	<0.001	4.42(0.69)
Moral Judgment Standards Sophistication	3.12(0.79)	4.61(0.64)	+47.8%	2.03	<0.001	4.49(0.66)
Moral Reasoning Complexity	2.89(0.86)	4.37(0.71)	+51.2%	1.89	<0.001	4.28(0.73)
Moral Emotion Intensity	3.24(0.77)	4.68(0.59)	+44.4%	2.08	<0.001	4.56(0.62)
Moral Behavioral Consistency Index	0.41(0.18)	0.84(0.12)	+104.9%	2.84	<0.001	0.81(0.14)
Value Internalization Degree	3.18(0.82)	4.73(0.61)	+48.7%	2.11	<0.001	4.65(0.63)
Moral Self-Concept Clarity	2.76(0.91)	4.45(0.68)	+61.2%	2.07	<0.001	4.31(0.71)

**Note:** Except for moral behavioral consistency index which ranges from 0-1, all others measured using 5-point Likert scales; Moral behavioral consistency index reflects the degree of match between moral cognition and behavior

The sophisticated development of moral judgment standards was manifested in the diversification of judgment dimensions and hierarchical evaluation criteria. Moral dilemma situation tests showed that the moral principles considered by participants increased from an average of 2.7 to 5.4, a 100% increase; complexity level of judgment reasoning improved from level 2.31 to level 4.15, a 79.7% increase; attention to moral situation details improved from 34.2% to 78.6%. Structured interview analysis indicated that participants' moral judgments shifted from "rule-oriented" to "principle-oriented," enabling them to weigh and choose when different moral principles conflict. Moral reasoning test results showed that post-conventional moral reasoning proportions increased from 23.4% to 67.8%, a 189.7% increase; contextualized moral reasoning ability scores improved from 2.94 points to 4.52 points, a 53.7% increase. Case analysis indicated that participants could apply multiple theoretical frameworks including care ethics, deontological ethics, and consequentialist ethics for moral analysis, as shown in **Figure 8** below.



**Figure 8.** Optimization and restructuring of moral character structure.

Improved stability of moral behavioral consistency reflected enhanced moral character integration. Behavior-attitude consistency tests showed that the match between participants' moral attitudes and actual behaviors improved from 41% to 84%, a 104.9% increase. Cross-situational moral behavior stability analysis indicated that participants demonstrated high consistency in moral behavior across different situations, with correlation coefficients improving from  $r=0.28$  to  $r=0.82$  ( $p<0.001$ ). Behavioral persistence scores under moral pressure situations rose from 2.67 points to 4.41 points, a 65.2% increase, indicating significantly enhanced ability to maintain moral positions when facing external pressure. Long-term tracking data showed that both spontaneity and continuity of moral behavior improved significantly, with spontaneous moral behavior frequency increasing by 178.3%.

Deepening of value internalization degree was the core manifestation of moral character structure optimization. Value clarification tests showed that participants' clarity about their core values improved from 3.18 points to 4.73 points, a 48.7% increase; stability of value hierarchy structure rose from 2.84 points to 4.51 points, a 58.8% increase; consistency index between values and behavior improved from 0.39 to 0.87, a 123.1% increase. Qualitative data analysis revealed three stages of value internalization: cognitive acceptance stage (understanding value content), emotional identification stage (generating emotional resonance), and behavioral integration stage (transforming into action guidelines). In-depth interviews showed that 94.7% of participants stated they "have a clearer understanding of what they truly value," and 88.2% of students believed their "value concepts have become more firm."

Enhancement of moral self-concept clarity reflected strengthened moral identity identification. Complexity of moral self-description increased from using an average of 14.7 words to 32.4 words, a 120.4% increase; accuracy of moral trait attribution improved from 67.3% to 89.6%, a 33.2% increase; moral self-efficacy scores rose from 3.05 points to 4.62 points, a 51.5% increase. Analysis of consistency between self-concept and others' evaluations showed that the correlation between participants' moral self-cognition and peer evaluations improved from  $r=0.43$  to  $r=0.84$  ( $p<0.001$ ), indicating significantly improved objectivity and accuracy of moral self-concept [52]. These findings indicate that moral narrative theater effectively promoted systematic optimization and deep-level restructuring of participants' moral character structure by providing rich moral experiences and reflection opportunities, achieving coordinated and unified development of moral cognition, emotion, and behavior. These findings echo the research results of Lapsley & Narvaez (2004) on moral identity development, but this study further reveals the unique mechanism of dramatic environments as a medium for moral character formation. Compared to the cognitively-oriented approaches commonly adopted in traditional moral education research, this study demonstrates the advantages of experiential learning in moral development, providing empirical evidence from Chinese universities for the international moral education field.

## **5. Discussion**

### **5.1. Unique value mechanisms of drama education environments**

Moral narrative theater, as an innovative educational model, first demonstrates its unique value mechanism through the revolutionary breakthrough that experiential learning brings to traditional moral education. Unlike traditional didactic moral education, drama education environments provide students with a "safe moral laboratory" through role-playing, situational simulation, and emotional experience, transforming abstract moral concepts into concrete life experiences. Research data showing significant improvements in participants' moral sensitivity, judgment standard sophistication, and behavioral consistency fully demonstrate the deep educational effects of experiential learning. This learning approach breaks through cognitive limitations and directly touches emotional and behavioral levels, achieving holistic unity of "knowledge, emotion, intention, and action." Role-playing in drama environments enables students to empathically experience different moral positions and value choices, thereby cultivating genuine moral empathy rather than merely moral knowledge. More importantly, such experiences possess strong personal meaning and emotional coloring, capable of leaving lasting impressions in students' inner depths and forming stable value orientations [53]. The advantage of contextualized teaching lies in providing authentic and complex moral situations, avoiding the simplification and absolutization tendencies in traditional moral education, and cultivating students' critical thinking abilities and decision-making wisdom when facing complex moral issues. Compared to Boal's (1979) Theatre of the Oppressed theory and Heathcote's (1984) teacher-in-role theory, the 'empathy incubation effect' model proposed in this study is more systematic and

operationalized in its theoretical framework. This model not only integrates empathy development across cognitive, affective, and behavioral dimensions, but also clarifies the mechanism of environmental factors, representing an important extension of existing drama education theory. In comparison to Winston & Tandy's (2009) international research on the social effects of drama education, this study validated theoretical hypotheses through quantitative data, providing a more solid empirical foundation.

The second unique value mechanism of drama education environments lies in their deep influence on personality development and intrinsic connection to mental health. Research findings show that participants exhibited positive changes across all dimensions of Big Five personality traits, particularly significant improvements in Openness, Agreeableness, and Conscientiousness, indicating that drama education is not merely skill training but a comprehensive personality shaping process. The deep mechanism of this influence lies in drama activities activating multiple psychological resources of individuals: creative expression stimulates imagination and aesthetic ability, cooperative interaction strengthens social skills and empathy, and role commitment cultivates responsibility and self-discipline. Simultaneously, drama education environments provide students with healthy channels for emotional expression and catharsis, with significant decreases in Neuroticism scores and improvements in emotion regulation abilities demonstrating positive effects on mental health <sup>[54]</sup>. The intrinsic connection between arts education and mental health is manifested in: the artistic creation process itself has therapeutic functions, helping individuals integrate internal experiences and construct meaning systems; collective creative activities provide social support and sense of belonging, enhancing individuals' psychological resilience; aesthetic experiences and creation stimulate positive emotions, promoting harmonious psychological development. Furthermore, drama education possesses unique identity exploration functions—through playing different roles, students can explore multiple possibilities of self, clarify their values and life goals, and form clearer and more stable self-concepts. This deep self-cognition and personality integration is difficult to achieve through other educational approaches and constitutes the core of drama education environments' unique value. It is worth noting that this study's strict participant screening criteria (including exclusion of mental disorders and dysfunctional personality traits) ensured clarity of results but also limited understanding of individuals with more complex psychological states. In actual educational practice, dramatic activities may have special therapeutic value for students with certain psychological difficulties, which presents new directions for future applied research.

## **5.2. Theoretical significance and practical implications of empathy incubation effects**

The "empathy incubation effect," as the core theoretical concept proposed in this study, holds important supplementary and developmental significance for existing empathy theoretical systems. Traditional empathy research has primarily focused on empathy structure, measurement, and individual differences, while this study, through empirical exploration of moral narrative theater, reveals mechanisms by which empathy abilities can be systematically cultivated and significantly enhanced through specific environmental design. Research data indicate that the three dimensions of cognitive empathy, emotional empathy, and behavioral empathy exhibit synergistic development patterns in drama education environments, breaking through previous theoretical limitations that viewed these three as relatively independent components and proposing new perspectives on holistic empathy development <sup>[55]</sup>. The concept of "incubation effect" emphasizes the critical role of environmental conditions in empathy development—similar to how biological incubation processes require suitable temperature, humidity, and nutritional conditions, empathy development also requires specific psychological ecological environments. Moral narrative theater serves as precisely such an ideal "incubator," providing necessary conditions for empathy emergence, growth, and stabilization through organic integration of physical, social, and cultural environments <sup>[56]</sup>. This discovery

contributes to empathy theory in several ways: first, it demonstrates the plasticity and cultivability of empathy abilities, providing theoretical foundations for empathy education; second, it reveals the environmental dependence of empathy development, emphasizing the important role of situational factors in empathy formation; finally, it proposes staged characteristics of empathy development, providing new theoretical frameworks for understanding the dynamic developmental processes of empathy abilities.

From the perspective of practical implications, the discovery of empathy incubation effects provides important theoretical guidance and practical pathways for moral education model innovation and improvement of higher education talent cultivation quality. Research results indicate that traditional indoctrination-based moral education has obvious limitations in cultivating students' genuine moral character, while the moral narrative theater model based on empathy incubation effects can effectively promote comprehensive development of students' moral sensitivity, judgment abilities, and behavioral consistency. The practical value of this discovery lies in: first, it provides innovative implementation schemes for university moral education work, transforming abstract moral concepts into concrete emotional experiences and behavioral practices through drama education methods, improving the effectiveness of moral education; second, it points toward professional development directions for faculty development, where teachers need not only to master disciplinary knowledge but also possess abilities to guide students' emotional experiences and value exploration; third, it provides new approaches for constructing teaching quality evaluation systems, where evaluation standards should shift from simple knowledge mastery to comprehensive personality development and moral character enhancement <sup>[57]</sup>. More importantly, this discovery reveals the socialization nature of personality cultivation—that individual moral character is not formed in isolation but gradually constructed through interactions and experiences with others in specific sociocultural environments. Therefore, higher education talent cultivation should place greater emphasis on the role of environmental education, creating educational ecosystems conducive to students' comprehensive development, and promoting healthy personality development and enhanced social adaptation abilities through cultivating positive cultural atmospheres, establishing good teacher-student relationships, and providing rich practical opportunities. From a broader perspective, this study reveals the systematic influence of educational environment design on personality development, which not only provides insights for higher education but also offers theoretical reference for basic education, vocational education, and even lifelong education. However, we must critically recognize that drama education is not a panacea for educational approaches, and its effectiveness is influenced by multiple factors including participant individual differences, cultural backgrounds, and implementation quality. Future practice should avoid "one-size-fits-all" application models and should be individually designed according to specific contexts and target characteristics. It should be noted that this study encountered methodological challenges when verifying the theoretical model of the empathy incubation effect. The original plan was to use structural equation modeling for comprehensive verification, but limited by the complexity of the measurement model and sample characteristics, alternative methods such as path analysis were ultimately employed. This limitation suggests that future research needs to develop more streamlined and effective measurement tools and expand sample sizes to support more complex model verification. Nevertheless, existing analysis results still provide preliminary empirical support for the empathy incubation effect.

### **5.3. Research limitations and critical reflection**

This study has the following limitations that require critical examination: (1) Sample representativeness limitations: Despite employing stratified sampling, the sample mainly came from urban universities with a low proportion of students from rural backgrounds, which may affect the external validity of results; (2) Measurement limitations: Primarily relied on self-report scales, which may involve social desirability bias;

although this was somewhat mitigated through diversified measurements such as behavioral observation, objectivity still needs improvement; (3) Causal inference limitations: Despite employing a quasi-experimental design, it was not a true randomized controlled trial, and the influence of selection bias cannot be completely ruled out; (4) Cultural specificity: The study was conducted within a Chinese cultural context, and the manifestation of the 'empathy incubation effect' in individualistic cultures may differ. Additionally, contradictory phenomena found in the study deserve attention: empathy fatigue experienced by approximately 23.4% of participants suggests that excessive emotional investment may produce negative effects, creating tension with mainstream research emphasizing empathy benefits, requiring subsequent research to deeply explore the boundaries and regulatory mechanisms of empathy cultivation. (5) Statistical analysis limitations: Originally planned to verify the complete theoretical framework of the empathy incubation effect through structural equation modeling, but actual analysis revealed that model complexity exceeded the support capacity of current data structure. This technical limitation affected comprehensive verification of the theoretical model, and future research should make improvements in measurement tool simplification and sample size expansion. (6) Potential bias in sample selection: Although we employed multiple screening tools including PID-5-BF to exclude dysfunctional traits, this strict screening may have resulted in an overly 'healthy' sample, limiting the generalizability of research results to the general university student population. The real university student population may contain more subclinical levels of psychological distress and personality trait variations, and our findings may overestimate the universal effectiveness of drama education. Furthermore, individuals with certain borderline personality traits (such as mild obsessive tendencies or social avoidance) may be potential beneficiaries of drama education but were filtered out by our exclusion criteria.

## **6. Conclusions and prospects**

### **6.1. Main research conclusions**

Through systematic empirical analysis, this study reaches the following five main conclusions:

(1) Drama education environments have significant positive effects on university students' personality cultivation. The study found that students participating in moral narrative theater showed significant improvements across all dimensions of Big Five personality traits, with Openness increasing by 37.8%, Agreeableness growing by 48.6%, Conscientiousness improving by 27.6%, Extraversion enhancing by 19.6%, while Neuroticism levels decreased by 21.3%. These changes not only reached statistical significance but also demonstrated large effect sizes in practical terms, fully demonstrating the unique value and significant effectiveness of drama education environments in promoting comprehensive personality development of university students.

(2) The three-dimensional structural model of empathy incubation effects was successfully constructed and validated. This study innovatively proposed the theoretical concept of "empathy incubation effect" and validated the coordinated development mechanism of three dimensions: cognitive empathy, emotional empathy, and behavioral empathy through empirical research. Data showed that cognitive empathy ability improved by 52.0%, emotional empathy intensity increased by 51.6%, and behavioral empathy frequency increased by 239.1%. The three dimensions exhibited significant positive correlations and synchronous development trends, forming a complete empathy ability development system and providing important theoretical contributions to the improvement and application of empathy theory.

(3) The educational value of moral narrative theater received full empirical support. Research results indicated that moral narrative theater effectively enhanced students' moral sensitivity (increasing by 52.9%),



moral judgment sophistication (increasing by 47.8%), and moral behavioral consistency (increasing by 104.9%) through physical environment creation, social interaction promotion, and cultural atmosphere cultivation. This educational model not only changed students' moral cognitive structures but more importantly promoted internal integration and behavioral expression of moral character, achieving effective transformation of moral education from "knowledge" to "action."

(4) The psychological ecological characteristics of drama education environments have systematic influences on personality development. The study identified three core elements: physical space layout, social interaction networks, and cultural atmosphere cultivation, which form psychological ecosystems conducive to personality development through mutual interaction. Open circular layouts enhanced psychological safety, collective creation strengthened social cohesion, and multicultural integration promoted value coordination. These findings provide scientific basis for optimizing educational environment design.

(5) Personality trait changes demonstrate good stability and continuity. Six-month follow-up data showed that while various personality indicators experienced slight decreases, they remained significantly higher than baseline levels, with test-retest reliability coefficients reaching above 0.82, indicating that drama education's shaping of personality has deep-level and lasting influences. These changes have been internalized as components of individual personality structures, laying solid foundations for individuals' long-term development.

## **6.2. Future prospects**

Based on the findings and theoretical contributions of this study, future research should further deepen and expand in the following five directions. The innovation of this study based on international drama education research lies in systematic theoretical model construction and localized empirical verification. Future research should further engage our findings in dialogue with mainstream international theoretical frameworks (such as the SEL Social Emotional Learning framework and Positive Youth Development theory) to explore the applicability and universality of the 'empathy incubation effect' model across different cultural contexts.

(1) Conduct comparative studies across different cultural backgrounds to explore the universality and specificity of empathy incubation effects. Given that moral concepts and educational traditions differ significantly across cultural backgrounds, future research should validate the educational effects of moral narrative theater in different Eastern and Western cultural contexts, analyzing the moderating effects of cultural factors on empathy development. Through cross-national comparative studies, it will be possible to identify core mechanisms with universal significance in empathy incubation effects and culture-specific manifestations, providing more precise theoretical guidance and practical solutions for moral education in a globalized context.

(2) Deeply explore the differential effects of various drama forms and their applicable conditions. This study primarily focused on moral narrative theater as a specific form; future research should systematically compare the differential impacts of traditional drama, musical theater, experimental theater, digital theater, and other forms on personality development, analyzing the unique advantages and applicable populations of each drama form. Simultaneously, exploration should be conducted on integration models between drama education and other art education forms (such as dance, painting, music), constructing richer and more diversified arts-based education systems to provide personalized development pathways for students with different traits and interests.

(3) Improve the research methodology system, develop streamlined measurement tools more suitable for structural equation modeling analysis, expand sample sizes to support the application of complex statistical models, thereby achieving comprehensive verification of the empathy incubation effect theoretical framework.

(4) Utilize new technologies and methods from neuroscience and cognitive science to reveal the physiological mechanisms of empathy incubation. Combining brain imaging technology, physiological monitoring, and cognitive experimental paradigms, explore the impacts of drama education on brain structure and function from a neurobiological perspective, identifying neural network changes related to empathy ability development. Such interdisciplinary research can not only deepen understanding of empathy incubation mechanisms but also provide biological foundations for optimizing educational practices.

(5) Construct personalized drama education systems based on artificial intelligence and big data. Utilize machine learning algorithms to analyze students' personality characteristics, learning preferences, and developmental needs, designing personalized drama education programs and intelligent assessment feedback systems. Through technological empowerment, scaled application and precision intervention of drama education can be realized, allowing more students to benefit from this innovative educational model and promoting the dual goals of educational equity and quality improvement.

## Conflict of interest

The authors declare no conflict of interest.

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