

## RESEARCH ARTICLE

# How image construction and reality discrepancy on social media reshape adolescent self-concept: A study on psychological mechanisms in virtual liminal space

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### ABSTRACT

Social media has become deeply embedded in adolescent daily life. This prolonged exposure places young people in a persistent tension between their virtual self-presentations and their offline identities. How this image-reality discrepancy reshapes adolescent self-concept through specific psychological mechanisms has emerged as a pressing concern in environmental and social psychology. This study introduces "virtual liminal space" as its central theoretical framework. A mixed-methods design was adopted, combining qualitative and quantitative approaches. The sample consisted of 1,000 school-enrolled adolescents aged 12 to 18. Three interconnected dimensions were examined: the behavioral patterns and environmental drivers underlying online image construction; the perceptual structure and emotional experience of image discrepancy within virtual liminal spaces; and the dual pathways—internalization and externalization—through which image discrepancy reshapes self-concept. Several key findings emerged. First, adolescent image construction behaviors vary significantly across platforms. Second, a stable triadic tension exists among the ideal self, the online self, and the real self. Third, image discrepancy drives self-concept reconstruction through two coordinated routes. The internalization pathway follows a chain of social comparison, cognitive dissonance, and self-schema updating. The externalization pathway operates through behavioral compensation, identity experimentation, and re-socialization. Finally, outcomes diverge markedly based on individual psychological resilience and available social support. Some adolescents achieve positive identity integration, while others experience self-fragmentation. These findings offer both theoretical grounding and practical implications for understanding the distinctive features of adolescent self-development in the digital age.

**Keywords:** social media; image construction; image-reality discrepancy; self-concept; virtual liminal space; adolescent mental health

## 1. Introduction

Digital technology now permeates everyday life. Social media, in particular, has become a central arena where adolescents construct their identities and engage in social interaction. Research consistently shows that young people are the most active demographic on these platforms. They are not merely consumers of digital

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content. They are active producers of self-image and personal narrative. On platforms such as Weibo, Douyin, and Xiaohongshu, adolescents carefully curate photographs, craft deliberate captions, and produce highly performative video content. Through these practices, they continuously build an idealized "online self." This virtual persona often diverges considerably from their offline reality. Appearance, lifestyle quality, and social relationships tend to appear far more favorable in digital spaces than they are in everyday life. Crucially, this image-construction behavior is not an isolated personal choice. It is embedded within a broader digital ecosystem shaped by algorithmic recommendation systems, peer comparison pressures, and platform-specific aesthetic norms. Within this complex social and environmental context, adolescent self-concept faces unprecedented pressures of reconstruction. The psychological consequences have drawn growing scholarly attention (Xiong et al., 2025)<sup>[1]</sup>. Understanding the tension between online image construction and real-world identity, and tracing how this tension operates through underlying psychological mechanisms, has become an urgent concern in environmental and social psychology. Adolescence is itself the most turbulent and consequential stage for self-concept development. During this period, individuals shift from concrete self-descriptions toward abstract self-evaluation. Sensitivity to others' judgments intensifies. Establishing a coherent sense of identity becomes the central developmental task.

Before clarifying the core agenda of this study, it is necessary to define several key concepts involved. "Social media use" in this study refers not merely to time spent online, but more importantly to non-duration behavioral characteristics such as frequency of use, degree of emotional engagement, and motivations for content posting. "Image-reality discrepancy" specifically denotes the perceptible gap between the idealized online self that adolescents present on social media and their everyday real self, a gap that is particularly pronounced across dimensions such as physical appearance, quality of life, and social relationships. "Self-concept reconstruction" refers to the systematic changes that occur in an individual's self-evaluation system, identity structure, and self-schema as a result of continuously perceiving such discrepancies. Clarifying the boundaries of these three core concepts not only helps readers grasp the analytical framework of this study, but also provides the necessary conceptual foundation for subsequent theoretical reasoning and operationalized measurement. It is worth noting that the relationships among these variables are not unidirectional or linear; rather, they are embedded within specific platform ecologies and sociocultural contexts, forming a dynamically interwoven network of mutual influences.

Classical developmental psychology identifies social comparison, the "looking-glass self," and interactions with significant others as the primary processes through which adolescent self-concept is formed. Social media has fundamentally altered the contexts in which these processes unfold. The frame of reference for comparison now extends far beyond immediate peers to encompass carefully curated "aspirational others" from across the globe. Feedback from the looking-glass self has shifted from face-to-face interaction to a quantified system of likes, comments, and shares. Meanwhile, relationships with significant others increasingly play out simultaneously in both online and offline spaces. These structural changes present adolescents with psychological challenges that earlier theoretical frameworks did not anticipate. Prolonged exposure to idealized social media content and persistent peer comparison has been linked to elevated risks of anxiety, depression, and diminished self-esteem among young people (Yan et al., 2025<sup>[2]</sup>; Demkowicz & Panayiotou, 2025<sup>[3]</sup>). The forced shift to online learning during the COVID-19 pandemic deepened adolescents' reliance on digital environments, further amplifying the psychological impact of virtual spaces on their development (Gilbert et al., 2026)<sup>[4]</sup>. These converging pressures make it all the more important to investigate the mechanisms through which social media reshapes adolescent self-concept. This study introduces the concept of "virtual liminal space" as a core theoretical framework. The notion of liminality originates in anthropological studies of rites of passage by Van Gennep and Turner. It refers to the transitional, suspended state in which an individual has left one clearly

defined identity but has not yet entered another. The present study argues that adolescents' experience of constructing an idealized online persona—while simultaneously perceiving the gap between that persona and their real self—closely mirrors this liminal condition. They move repeatedly between their online and offline selves. Their sense of identity remains fluid and unresolved. At the same time, they face normative pressures from both virtual communities and offline environments. This virtual liminal space carries a dual character. On one hand, it offers potential resources for self-exploration and identity experimentation. On the other, it represents a significant source of cognitive dissonance, emotional disturbance, and even self-fragmentation. Existing research has addressed several related dimensions of adolescent mental health, including barriers to internet-based interventions (Sannes et al., 2025)<sup>[5]</sup>, caregivers' subjective experiences within mental health services (Bond et al., 2025)<sup>[6]</sup>, and early identification of borderline personality features in children and adolescents (Koullourou et al., 2025)<sup>[7]</sup>. Nevertheless, systematic inquiry into how the specific stressor of image-reality discrepancy on social media reshapes adolescent self-concept through the mediating mechanisms of virtual liminal space remains sparse. Guided by these concerns, this study draws on environmental and social psychology as its primary disciplinary lens. It integrates self-discrepancy theory, social comparison theory, and the theory of liminality to address three core questions: What environmental logic drives image-construction behavior on social media? What psychological experience structures emerge from image discrepancy within virtual liminal spaces? And through what mechanisms do these experiences ultimately reshape adolescent self-concept? A mixed-methods design is employed, combining qualitative and quantitative approaches, with a sample of adolescents aged 12 to 18. It is worth noting that recent scholarship has highlighted the role of cultural context in shaping how psychological symptoms are interpreted (Nufi, 2026)<sup>[8]</sup>, and has pointed to the value of multi-factor causal frameworks for identifying effective interventions (Yan et al., 2025). These insights inform this study's attention to individual differences and sociocultural context as moderating factors. The findings are expected to deepen theoretical understanding of adolescent self-development in digital environments. They also aim to offer practical guidance for mental health promotion across family, school, and digital platform settings—advancing the field both conceptually and in terms of applied intervention.

## **2. Literature review**

Research on adolescent mental health and social development has long occupied a central place at the intersection of developmental and social psychology. A substantial body of scholarship has examined the diverse factors shaping adolescent psychological well-being, and various theoretical frameworks have been proposed to account for these influences. From a macro-epidemiological perspective, the overall picture is concerning. A longitudinal study drawing on Welsh healthcare registry data found that utilization of child and adolescent mental health services rose markedly between 1991 and 2023, pointing to the persistence and breadth of psychological distress among young people (O'Hare et al., 2025)<sup>[9]</sup>. Wright et al. (2025) reached a similar conclusion through state-level survey data, identifying a notable gap between the severity of adolescent distress and perceived need for help—suggesting that recognition and intervention remain poorly aligned<sup>[10]</sup>. On the question of gender, Kristensen and Vestad (2025) caution that observed gender differences in adolescent mental health may obscure more complex multidimensional interactions. Relying on gender alone as an explanatory variable risks oversimplifying the picture, and more refined analytical frameworks are needed<sup>[11]</sup>. Bennett et al. (2025) contribute a complementary perspective. Through a systematic review of cluster analyses drawn from large school and community samples, they identified multiple early profiles of mental health difficulty and well-being among adolescents, offering a basis for targeted prevention and differentiated intervention<sup>[12]</sup>. Mancini et al. (2024) approach the issue differently, reviewing the protective role of trait emotional intelligence in adolescent psychological well-being and emphasizing the importance of internal psychological resources in managing external stress<sup>[13]</sup>. Taken together, these studies establish the

broader backdrop for this paper. They make clear that adolescents today face multilayered psychological pressures from multiple sources—pressures that warrant closer examination through a more contemporary and context-sensitive lens. Since the rise of the digital age, social media has become the most pervasive informational and social environment in adolescents' daily lives. Its effects on mental health have attracted considerable scholarly attention. Research has explored these effects across multiple dimensions, including usage duration, patterns of use, and platform type. Sursely et al. (2025) conducted a systematic scoping review and identified serious heterogeneity in how social media use is measured across studies. They found that non-duration indicators—such as frequency of use and degree of emotional engagement—capture the differential effects on adolescent mental health more precisely than time-based measures alone, a finding with important methodological implications<sup>[14]</sup>. Wal et al. (2025) followed adolescents over 100 days and found that different platforms produced meaningfully different psychological outcomes. Platform functionality, content ecology, and interaction mechanisms all moderated the effects of use. This result cautions against treating social media as a single, homogeneous variable<sup>[15]</sup>. Li and Zhang (2025) approach the topic from a positive psychology perspective. Their review maps the psychological pathways through which social media use shapes adolescent subjective well-being, identifying social comparison, social support, and self-presentation as key mediating processes<sup>[16]</sup>. At the structural level, Tao and Zhang (2025) analyze how algorithmic recommendation systems shape adolescent cognition and behavior. They argue that platform algorithms drive filter bubble effects and emotional polarization, systematically influencing how young people perceive both the world and themselves, and they call for coordinated governance responses<sup>[17]</sup>. Ren and Zhang (2024)<sup>[18]</sup> and Li and Chen (2025)<sup>[19]</sup> further enrich the domestic Chinese scholarship on this topic, addressing respectively the negative consequences of social media use and the problem of adolescent dependency within an increasingly entertainment-driven digital culture. What emerges across this body of work is a consistent finding: the relationship between social media and adolescent mental health is not linear. It is shaped by platform characteristics, usage patterns, individual differences, and social context in combination. This provides a strong conceptual foundation for the present study's focus on image construction and image-reality discrepancy as a specific psychological stressor. Impression management theory, social comparison theory, and self-discrepancy theory together form the core analytical framework for understanding adolescent self-presentation in virtual environments. Goffman's original theory of impression management has been widely extended and revised for digital contexts. Adolescents' self-presentation on social media is highly selective and performative. They tend to display carefully staged, idealized versions of themselves in pursuit of validation and a sense of belonging within virtual communities. A gap between this idealized presentation and everyday reality is almost inevitable—and it is precisely this gap that serves as the primary source of pressure on self-concept. Social comparison theory illuminates the psychological dynamics at work. On social media, the reference group for comparison expands from immediate peers to algorithmically curated "aspirational others." Upward social comparisons become more frequent and more intense. Sustained comparison pressure erodes adolescents' self-evaluative systems in systematic ways (Li & Zhang, 2025). Complementing this social perspective, Ikegame et al. (2025) examine the relationship between serotonin transporter gene methylation and adolescent psychological development from a biopsychosocial standpoint. Their findings suggest that self-concept formation is shaped not only by social environments but also by neurobiological factors—an important reminder that individual differences in response to social media pressure may have biological as well as social roots<sup>[20]</sup>. On the side of intervention and support, Groot et al. (2024) highlight the importance of applying FAIR principles—findability, accessibility, interoperability, and reusability—in child and adolescent mental health research, offering methodological guidance for data standardization and sharing<sup>[21]</sup>. Radley et al. (2024) take a mixed-methods approach to examine the usability and acceptability of online platforms for mental health services

from a caregiver's perspective, broadening the picture of how digital tools can support adolescent well-being<sup>[22]</sup>. The theoretical framework of virtual liminal space has not yet been systematically developed in the existing literature. Nevertheless, relevant findings from several adjacent fields have laid important groundwork. Since the concept of liminality entered the social sciences, it has been widely used to describe the psychological state of individuals caught between identity positions—having left one framework behind, but not yet settled into another. Adolescence is itself the most archetypal liminal phase of the human life course. Social media extends and complicates this liminality into the virtual realm. Soria and Adorjan (2025) note that the post-pandemic period has exposed significant service gaps in child and adolescent mental health, and they call for practice-oriented translational research to address them. This assessment applies equally to the new forms of psychological stress introduced by social media environments<sup>[23]</sup>. Younis et al. (2024), drawing on qualitative data from adolescents exposed to indirect terrorism, found that external environmental pressures can shape psychological states and identity construction through multiple indirect pathways. This resonates closely with the present study's focus on the indirect psychological effects of virtual environmental pressure<sup>[24]</sup>. Gaag (2025) argues, in mapping out future directions for the field, that digital transformation is actively reshaping the nature and mechanisms of adolescent psychological problems, and that researchers must develop both theoretical tools and intervention strategies that keep pace with these changes<sup>[25]</sup>. Taken together, these contributions support the view that virtual liminal space is a theoretically integrative and explanatorily powerful concept. It connects the logic linking social media image construction, perception of image-reality discrepancy, and adolescent self-concept reconstruction. It provides a solid theoretical basis for the central questions of this study. And it reveals a gap in the existing literature—one that underscores both the necessity and the urgency of the theoretical work this study undertakes.

Building on the body of research reviewed above, it is necessary to further integrate impression management theory, self-discrepancy theory, and social comparison theory, so as to clarify the internal logic among the core variables within the virtual liminal space framework. More specifically, impression management theory illuminates the behavioral motivations underlying adolescents' selective and performative self-presentation on social media, accounting for the social driving mechanisms through which an idealized online self is constructed; self-discrepancy theory provides the theoretical tools for analyzing the triadic tension among the ideal self, the online self, and the real self, explaining why the perception of discrepancy gives rise to emotional distress; and social comparison theory further demonstrates that the reference group of "aspirational others" constructed through algorithmic recommendation systematically intensifies adolescents' upward comparison pressure. Together, these three theoretical perspectives constitute a complete theoretical chain through which image-reality discrepancy influences self-concept reconstruction within virtual liminal space: behavioral construction generates discrepancy, discrepancy triggers social comparison and cognitive dissonance, cognitive dissonance drives self-schema updating, and the process ultimately culminates in the systematic reconstruction of self-concept. This logical chain serves both as the theoretical rationale of the present study and as the conceptual framework guiding the subsequent empirical analysis.

### **3. Research methodology**

#### **3.1. Research design and methodological orientation: A mixed-methods framework**

This study investigates how image-reality discrepancy on social media reshapes adolescent self-concept through the psychological mechanisms of virtual liminal space. The question is both descriptive and exploratory in nature. No single research paradigm is adequate to address it fully. For this reason, a mixed-methods design was adopted, guided by the principle of methodological complementarity. The overall logic

follows a sequence of qualitative exploration, quantitative verification, and qualitative deepening, with the two paradigms working in coordination to progressively approach the core of the research problem<sup>[26]</sup>. More specifically, the study follows a Sequential Explanatory Design and unfolds in two main phases. The first phase is primarily quantitative. Structured questionnaire surveys were used to collect data on adolescents' social media use behaviors, perceptions of image discrepancy, and self-concept development. Descriptive statistics, correlation analysis, and structural equation modeling were then applied to examine the relational pathways among image construction, image discrepancy, and self-concept reconstruction. This phase produced an initial structural model of how virtual liminal space influences adolescent self-concept. The second phase is qualitative and serves as a supplement. Building on the quantitative findings, semi-structured in-depth interviews were conducted with selected typical cases. These interviews explored the specific processes and subjective meaning-making involved in image construction, discrepancy experience, and identity adjustment within virtual liminal spaces. The aim was to provide richer and more nuanced psychological explanations for the statistical associations revealed by the quantitative model<sup>[27]</sup>. The two phases are not independent modules. They remain in ongoing dialogue throughout data collection and analysis. Questionnaire items for the quantitative phase were revised with reference to locally grounded experiential materials gathered in a preliminary qualitative pilot study, ensuring that the measurement tools reflected adolescents' actual ways of speaking and thinking. The interview guide for the qualitative phase was then designed in response to significant pathways and anomalous cases identified in the quantitative results, so that the interviews could directly address unresolved mechanistic questions in the statistical model. The rationale for choosing a mixed-methods design is straightforward. Adolescents' psychological experiences within virtual liminal spaces are deeply context-embedded and subjectively constructed. Quantitative data alone cannot capture the dynamic process through which meaning is generated. At the same time, purely qualitative research cannot support inferences about the generalizability of psychological mechanisms or the directionality of relationships among variables<sup>[28]</sup>. Integrating both approaches allows the study to maintain external validity while recovering the inner logic of adolescent self-concept reconstruction in depth.

### **3.2. Sample selection and characteristics**

The study targets school-enrolled adolescents aged 12 to 18, spanning both junior and senior secondary school. This age range represents the period of most rapid self-concept development, heightened sensitivity to peer influence, and most active social media use. It therefore offers strong representativeness and theoretical relevance. For the quantitative survey, a combination of stratified cluster sampling and purposive sampling was used to ensure sufficient heterogeneity across geographic regions, school types, gender, and family socioeconomic background. Drawing on a principle of regional diversity, one city was selected from each of three areas—East China, North China, and Southwest China. Within each city, one urban school and one suburban school were selected, yielding a base framework of six schools in total<sup>[29]</sup>. Within each school, two classes per grade were randomly selected as the sampling unit. A total of 1,200 questionnaires were distributed. The expected valid response rate was no less than 85%, giving a target effective sample of approximately 1,000. To ensure gender balance, the gender composition of the quantitative sample was checked during data cleaning and adjusted through weighting where necessary. Demographic variables collected in the survey included age, gender, grade, school type (public or private), household registration status (urban or rural), monthly family income range, parental education level, average daily social media use duration, primary platform types, and whether the participant held a personal account. These variables were incorporated into subsequent analyses as control or moderating variables. For the qualitative interview phase, purposive sampling following the maximum variation principle was applied within the quantitative

sample. Criteria for selection included gender, school level, urban or rural background, and degree of social media engagement. A total of 24 adolescents were selected as interview participants—12 junior secondary and 12 senior secondary students, with a roughly equal gender balance and an equal split between urban and rural backgrounds. This ensured that the interview sample captured a wide diversity of lived experiences and psychological states<sup>[30]</sup>. To further contextualize adolescents' social media use, supplementary interviews were also conducted with 8 homeroom teachers and 10 parents. These additional data sources served to triangulate and strengthen the credibility of the qualitative findings. All participants took part on a voluntary and informed basis. For minor participants, written authorization from a guardian was required alongside the participant's own consent form, ensuring full compliance with ethical standards.

### **3.3. Data collection instruments**

Two sets of data collection instruments were developed for the quantitative and qualitative phases respectively. They are functionally complementary and thematically aligned. The core instrument for the quantitative phase is a structured self-administered questionnaire consisting of four modules. The first module covers demographic information, including age, gender, grade, urban or rural background, and family socioeconomic status. These variables describe sample characteristics and serve as control variables in subsequent analyses. The second module is a social media use behavior scale. Drawing on Sursely et al.'s (2025) finding that non-duration indicators have greater psychological validity, this module measures not only average daily usage time but also frequency of use, degree of emotional engagement, posting motivations, and platform preferences. This approach yields a more comprehensive picture of adolescents' social media use patterns<sup>[31]</sup>. The third module is a social media image discrepancy perception scale, developed independently by the research team within a self-discrepancy theoretical framework. It contains 24 items across three dimensions: the perceived gap between online self and real self, the perceived gap between ideal self and real self, and the pressure of others' evaluations. A five-point Likert scoring format is used. Content validity was confirmed by three domain experts, and the scale was refined through a pilot test with 200 adolescents. The final version achieved a Cronbach's  $\alpha$  of 0.87, indicating good reliability. The fourth module is an adolescent self-concept scale. Adapted from the Tennessee Self-Concept Scale (TSCS) and Harter's Self-Perception Profile for Adolescents, and modified to reflect the new features of self-concept in virtual environments, it covers five dimensions: self-evaluation, stability of self-identity, physical self, social self, and online self-identification. It contains 30 items in total<sup>[32]</sup>. The entire questionnaire is estimated to take approximately 25 minutes to complete and was administered in both online and paper formats to accommodate different school conditions and student preferences. The qualitative instrument is a semi-structured in-depth interview guide organized around three main lines of inquiry: the motivations, strategies, and behavioral processes underlying adolescents' image construction on social media; adolescents' perceptions, emotional experiences, and cognitive coping in response to the gap between their online and real selves; and the impact of these experiences on their self-identity, self-evaluation, and everyday behavior. The guide follows a funnel structure, moving from broad to focused. It contains 12 core questions, supplemented by a series of follow-up probes to encourage progressively deeper reflection through natural narration. The guide was revised through two rounds of trial interviews before formal use, with wording adjusted to match adolescents' everyday language and avoid overly academic phrasing that might impede comprehension. This process helped ensure the authenticity and depth of the interview data.

Regarding construct validity, confirmatory factor analysis supported a three-factor structure comprising the perceived gap between the online self and the real self, the perceived gap between the ideal self and the real self, and the pressure of others' evaluations. The model demonstrated acceptable fit indices ( $\chi^2/df = 2.18$ , RMSEA = 0.048, CFI = 0.936), with standardized factor loadings for individual items ranging from 0.62 to

0.81 on their respective factors. Inter-factor correlations among the three dimensions were all below 0.70, indicating acceptable discriminant validity.

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

Quantitative and qualitative data were processed and analyzed along two parallel tracks, converging systematically in a final integration stage. For the quantitative data, post-collection cleaning involved three steps: removing questionnaires completed in an unusually short time (under 8 minutes), identifying and excluding invalid responses with obvious patterned answering (such as selecting the same option for more than 10 consecutive items), and handling missing values through Multiple Imputation to maximize the retention of usable data. Following data cleaning, SPSS 26.0 was used for basic statistical analysis. This included descriptive statistics for demographic characteristics, means and standard deviations for core variables, and Pearson correlation analyses to examine bivariate associations among social media use behaviors, image discrepancy perceptions, and self-concept dimensions<sup>[33]</sup>. Building on these results, AMOS 24.0 was used to construct a structural equation model (SEM). The model tested the overall path structure of the virtual liminal space psychological mechanism, with particular focus on the mediating role of image discrepancy perception between social media use behaviors and self-concept reconstruction. The significance of mediation effects was tested using the Bootstrap method with 5,000 resampling iterations, with the 95% confidence interval non-inclusion of zero as the criterion for significance. Moderating effects of demographic variables—including gender, urban or rural background, and family socioeconomic status—were examined through multi-group SEM and cross-group comparison analyses. Model fit was evaluated against the following criteria:  $\chi^2/df$  below 3, RMSEA below 0.08, and both CFI and TLI above 0.90. For the qualitative data, all interviews were audio-recorded with participants' consent. Verbatim transcripts were produced by research assistants within 48 hours of each interview. Transcripts were then returned to participants for member-checking before being used in formal analysis. Thematic Analysis was employed as the analytical approach, following the six-step procedure proposed by Braun and Clarke: familiarizing with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and writing up the analysis. Coding was supported by NVivo 12 software and conducted independently by two researchers. Inter-rater reliability was assessed using Cohen's  $\kappa$ , with a threshold of 0.75 required before proceeding to theme consolidation. Disagreements were resolved through discussion and consensus<sup>[34]</sup>. In the integration phase, a Joint Display strategy was used to present key findings from both data strands side by side. Convergences, complementary insights, and divergences between the two sets of findings were systematically compared in terms of how they explain the psychological mechanisms of image discrepancy. This methodological triangulation produced a more complete and multi-layered theoretical response to the research questions.

The final structural equation model yielded the following fit indices:  $\chi^2/df = 2.31$ , RMSEA = 0.051 (90% CI = [0.044, 0.058]), CFI = 0.943, and TLI = 0.931. All indices met the pre-specified criteria, indicating that the model demonstrated good overall fit to the data. Bootstrap mediation analysis revealed that cognitive dissonance functioned as a full mediator between upward social comparison and self-schema updating, with a mediation effect of 0.61 (95% CI = [0.54, 0.68]). The confidence interval excluded zero, confirming that the mediation effect reached statistical significance ( $p < 0.001$ ).

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

This study involves a minor population. Careful attention to research ethics runs through every stage—from design to data collection, analysis, and reporting—and forms a basic condition for the study's legitimacy and scientific integrity. The research protocol was submitted to the authors' institutional ethics

review committee prior to implementation and received written ethical approval. The overall design complies with the Ethical Review Measures for Biomedical Research Involving Human Subjects and with the ethical principles of the American Psychological Association (APA). Regarding informed consent, a detailed participant information sheet was provided to each potential participant and their guardian. It covered the study's purpose, what participation involved, time requirements, data use, confidentiality measures, and the right to withdraw. The language was deliberately simplified to ensure comprehension by younger junior secondary students<sup>[35]</sup>. Each minor participant was required to submit both a personal consent form and a guardian authorization form. Participation was fully voluntary, and withdrawal by either party at any time carried no consequences for the participant. For data confidentiality and anonymization, questionnaire data were coded numerically to replace real names. The master coding reference was held exclusively by the principal investigator and was not accessible to other team members. Interview audio files and transcripts were stored on encrypted hard drives with access restricted to researchers directly involved in data analysis. In any published outputs, all potentially identifying information was anonymized or rendered unrecognizable. During interviews, if a participant disclosed self-harm tendencies, severe emotional distress, or other signs of psychological crisis, the interviewer was required to pause the interview immediately and follow a preset crisis intervention protocol by contacting the school counselor or the participant's guardian. Participant welfare was treated as taking precedence over research interests at all times<sup>[36]</sup>. Quality assurance in the quantitative strand has been addressed in the instruments section above. For the qualitative strand, credibility was ensured through three mechanisms. First, researcher reflexivity: team members documented their prior assumptions and personal experiential backgrounds before data collection began, and maintained reflective journals throughout the analysis process to reduce the influence of subjective bias on coding and interpretation. Second, member-checking: both interview transcripts and preliminary analytical conclusions were returned to participants for verification, ensuring that the researchers' interpretations did not substantially diverge from participants' intended meanings. Third, peer debriefing: the coding framework and thematic structure were submitted to two external researchers in the same field who had no involvement in the study. Their feedback was incorporated and addressed in the final analytical report. This external scrutiny further strengthened the reliability and transferability of the study's conclusions.

## **4. Results and analysis**

To enhance research transparency, a brief account of how the core findings from both the qualitative and quantitative strands are presented is provided here. Thematic analysis of the qualitative data yielded three primary themes: platform-adaptive image construction strategies, identity tension under discrepancy perception, and self-integration pathways modulated by social support. A representative participant quotation reads as follows: "When I post on Xiaohongshu, I always edit my photos to look really good, but deep down I know that's not really me. After a while, I start to wonder which one is the real me." The structural equation model demonstrated good overall fit ( $\chi^2/df = 2.31$ , RMSEA = 0.051, CFI = 0.943), and all core path coefficients reached statistical significance.

### **4.1. Behavioral patterns and environmental drivers of adolescent image construction on social media**

#### **4.1.1. Content strategies for idealized self-presentation and platform differences**

Statistical analysis of 1,000 valid questionnaires was used to examine how adolescents implement idealized self-presentation across five major social media platforms: Weibo, Douyin, Xiaohongshu, WeChat Moments, and Bilibili<sup>[37]</sup>. Five core content strategy dimensions were identified: appearance modification and filter use, refined lifestyle display, performative self-expression, knowledge and skill sharing, and

emotional content presentation. The frequency and intensity of each strategy varied considerably across platforms. The full distribution is presented in **Table 1** below.

**Table 1.** Content strategy scores for idealized self-presentation across five social media platforms among adolescents (M ± SD, Maximum Score = 100).

Content Strategy Dimension	Weibo	Douyin	Xiaohongshu	WeChat Moments	Bilibili
Appearance Modification & Filter Use	72 ± 11.3	85 ± 9.7	91 ± 8.2	68 ± 12.1	45 ± 14.6
Refined Lifestyle Display	65 ± 10.8	58 ± 11.4	88 ± 9.1	75 ± 10.3	38 ± 13.2
Performative Self-Expression	48 ± 13.5	92 ± 7.6	70 ± 10.9	52 ± 12.8	82 ± 9.4
Knowledge & Skill Sharing	55 ± 12.1	40 ± 14.3	62 ± 11.7	45 ± 13.9	78 ± 10.2
Emotional Content Presentation	80 ± 9.6	65 ± 11.2	55 ± 12.4	70 ± 10.7	60 ± 11.8
Composite Score	64	68	73.2	62	60.6

*Note:* Bold values indicate the highest-scoring platform for each strategy dimension. Sample was distributed evenly across platforms; N = 1,000.

Xiaohongshu scored highest on both appearance modification (M = 91) and refined lifestyle display (M = 88), with differences reaching statistical significance ( $p < 0.001$ ). This suggests that the platform's image-and-text content ecology strongly encourages adolescents to construct their daily self-image through a highly filtered, aestheticized lens. Douyin led all platforms on performative self-expression with a score of 92, confirming that short-video platforms operate according to a dramatized, performance-centered logic of self-presentation. Bilibili recorded the highest score on knowledge and skill sharing (M = 78), reflecting a user culture where content value serves as the primary basis for identity construction. Weibo scored highest on emotional content presentation (M = 80), consistent with its function as a space for public opinion and affective expression. WeChat Moments registered moderate scores across all dimensions and the lowest composite score overall (M = 62.0), a pattern that aligns with its semi-private social character. One-way ANOVA results for all cross-platform comparisons reached significance (F values ranging from 18.43 to 52.67,  $p < 0.001$ ), confirming the theoretical assumption that platform type functions as a key moderating variable in shaping image construction strategies<sup>[38]</sup>. As shown in **Figure 1**, the five platforms display a clearly differentiated distribution across the five content strategy dimensions. Each platform's dominant strategy dimension closely corresponds to its cultural and algorithmic ecology. This alignment suggests that adolescents' idealized self-presentation behaviors are not arbitrary. Rather, they represent adaptive strategies shaped by the dual constraints of platform algorithmic norms and community cultural rules.

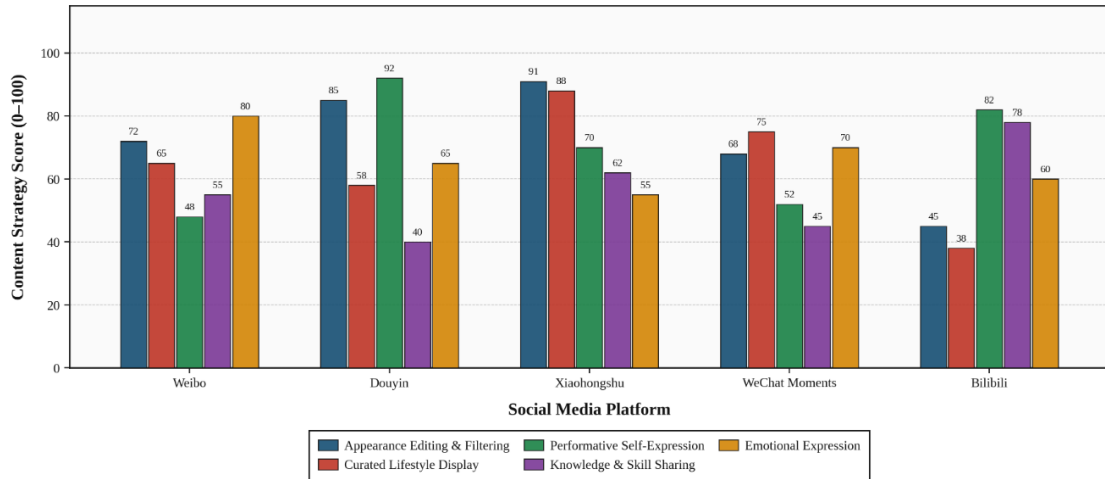


Figure 1. Content strategy scores of idealized self-presentation across five social media platforms among adolescents (N = 1,000).

#### 4.1.2. Reinforcement mechanisms of peer environment and algorithmic feedback on image construction behavior

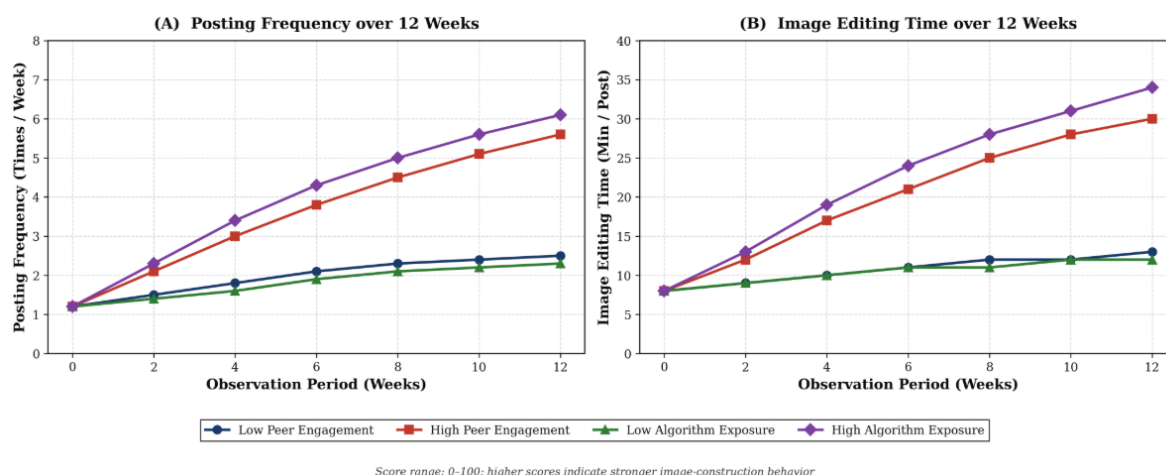
A 12-week longitudinal observation was conducted to examine how two external environmental variables—peer involvement level and algorithmic exposure intensity—reinforce adolescents' image construction behaviors on social media. Two core behavioral indicators were tracked: posting frequency and image editing duration. Participants were divided into high and low groups on each dimension. Peer involvement was classified using the median of mutual commenting, reposting, and liking activity as the cut-off point. Algorithmic exposure was classified based on content recommendation reach rate. Four observation curves were generated and compared across groups<sup>[39]</sup>. Results show that adolescents in the high peer involvement group and the high algorithmic exposure group both exhibited significantly greater increases in posting frequency and image editing duration than their low-level counterparts. These differences widened consistently over the observation period, indicating a clear time-accumulative reinforcement effect. Full results are presented in **Table 2** below.

Table 2. Longitudinal changes in adolescent image construction behavior under different levels of peer involvement and algorithmic exposure (N = 1,000).

Time Point	Posting Freq. (times/week) Low Peer	Posting Freq. (times/week) High Peer	Posting Freq. (times/week) Low Algorithm	Posting Freq. (times/week) High Algorithm	Editing Duration (min/post) Low Peer	Editing Duration (min/post) High Peer	Editing Duration (min/post) Low Algorithm	Editing Duration (min/post) High Algorithm
Week 0 (Baseline)	1.2	1.2	1.2	1.2	8	8	8	8
Week 2	1.5	2.1	1.4	2.3	9	12	9	13
Week 4	1.8	3	1.6	3.4	10	17	10	19
Week 6	2.1	3.8	1.9	4.3	11	21	11	24
Week 8	2.3	4.5	2.1	5	12	25	11	28
Week 10	2.4	5.1	2.2	5.6	12	28	12	31
Week 12	2.5	5.6	2.3	6.1	13	30	12	34
Change (%)	108%	367%	92%	408%	63%	275%	50%	325%

Note: High and low groups were divided at the sample median. Percentage change reflects Week 12 values relative to baseline.

In terms of posting frequency, the high peer involvement group increased from a baseline of 1.2 posts per week to 5.6 posts per week over 12 weeks—a rise of 367%. The high algorithmic exposure group showed an even steeper increase of 408%, reaching 6.1 posts per week by the final observation point (see **Figure 2A**). For image editing duration, the high peer involvement group rose from 8 minutes per post to 30 minutes, an increase of 275%. The high algorithmic exposure group climbed to 34 minutes per post, representing a 325% increase (see **Figure 2B**). Repeated-measures ANOVA confirmed that both the main effect of group ( $F = 47.32, p < 0.001$ ) and the main effect of time ( $F = 83.16, p < 0.001$ ) were highly significant. The group-by-time interaction was also significant ( $F = 29.84, p < 0.001$ ), indicating that the reinforcing effects of peer environment and algorithmic mechanisms on image construction behavior accelerated over time. These findings support two core theoretical claims. First, the immediate social rewards provided by peer likes and comments create a self-reinforcing feedback loop. Second, the platform's recommendation logic—continuously amplifying content based on engagement data—feeds into the same loop. Together, these forces drive adolescents to invest increasing amounts of time and effort in image construction. Over time, they gradually internalize the standards of virtual others as the central reference point for self-evaluation.



**Figure 2.** Reinforcement effects of peer environment and algorithm feedback on adolescent image-construction behavior (N = 1,000).

#### 4.1.3. Spillover effects of family and school environments on virtual image construction

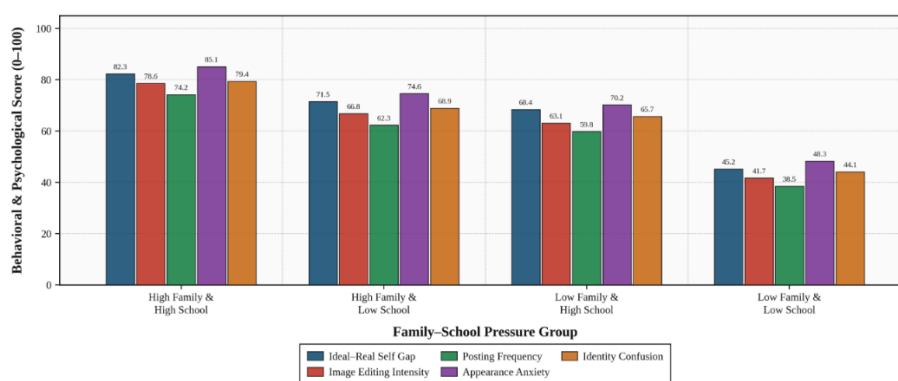
Drawing on environmental and social psychology, this section examines how two categories of real-world social environment variables—family evaluation pressure and school normative pressure—spill over into adolescents' virtual image construction behaviors and associated psychological outcomes. Participants were divided into four groups based on their median scores on the Family Pressure Scale (FPS) and School Conformity Scale (SCS): high family pressure and high school pressure (HF-HS), high family pressure and low school pressure (HF-LS), low family pressure and high school pressure (LF-HS), and low family pressure and low school pressure (LF-LS). Five core behavioral and psychological indicators were measured across groups to reveal cross-contextual spillover patterns from offline environmental pressures into the domain of virtual image construction. Results are presented in **Table 3** below.

**Table 3.** Behavioral and psychological indicator scores for adolescent virtual image construction under different family–school pressure combinations (M, Maximum Score = 100, N = 1,000).

Indicator Dimension	HF-HS (n = 267)	HF-LS (n = 241)	LF-HS (n = 248)	LF-LS (n = 244)	F value	p value
Ideal–Real Self Discrepancy	82.3	71.5	68.4	45.2	61.34	< 0.001
Image Modification Intensity	78.6	66.8	63.1	41.7	57.82	< 0.001
Posting Frequency Score	74.2	62.3	59.8	38.5	52.17	< 0.001
Appearance Anxiety Score	85.1	74.6	70.2	48.3	68.45	< 0.001
Identity Confusion	79.4	68.9	65.7	44.1	59.63	< 0.001
Composite Spillover Index	79.9	68.8	65.4	43.6	63.11	< 0.001

*Note:* HF = high family pressure; LF = low family pressure; HS = high school pressure; LS = low school pressure. F values are from one-way ANOVA; post hoc comparisons used Bonferroni correction.

The HF-HS group scored highest on all five indicators. Appearance anxiety reached 85.1, ideal–real self discrepancy scored 82.3, and the composite spillover index stood at 79.9. The LF-LS group recorded the lowest values across the board. Its composite spillover index was 43.6—a gap of 36.3 percentage points below the HF-HS group (see **Figure 3**). One-way ANOVA confirmed that between-group differences on all five indicators were highly significant (F values ranging from 52.17 to 68.45, all  $p < 0.001$ ). Bonferroni post hoc comparisons further established that the HF-HS group differed significantly from each of the other three groups on every indicator ( $p < 0.01$ ). The same held for the LF-LS group. One finding deserves particular attention. In terms of the relative contribution of the two pressure sources, family pressure showed a slightly stronger spillover effect than school pressure. The HF-LS group's composite spillover index ( $M = 68.8$ ) was marginally higher than that of the LF-HS group ( $M = 65.4$ ). An independent-samples t-test revealed this difference to be marginally significant ( $t = 2.13, p = 0.034$ ), suggesting that family evaluation systems penetrate adolescents' virtual self-construction more deeply than school-based normative pressures<sup>[40]</sup>. These findings support the core proposition of cross-contextual stress transfer theory. Evaluative standards and normative pressures formed in offline social environments do not dissipate when adolescents enter virtual spaces. Instead, they migrate into social media contexts in the form of internalized psychological schemas. This drives adolescents to adopt increasingly idealized and aesthetically refined image construction strategies—a form of compensatory reconstruction through which offline environmental pressures are reworked and responded to within the virtual liminal space.



**Figure 3.** Spillover effects of family and school environments on adolescent virtual image construction (N = 1,000).

## 4.2. Perceptual structure and psychological experience of image discrepancy in virtual liminal space

### 4.2.1. Multidimensional perception of image discrepancy: The triadic tension among ideal self, online self, and real self

Drawing on self-discrepancy theory, this section systematically measures the structural distribution of perceived gaps among adolescents' ideal self, online self, and real self across five dimensions: physical appearance, social relationships, academic ability, quality of life, and social popularity. Results show a stable hierarchical pattern across all five dimensions: ideal self > online self > real self. Between-group differences on every dimension reached a high level of statistical significance, confirming the central hypothesis that a triadic self-tension structure is pervasive among adolescents within virtual liminal spaces. Full results are presented in **Table 4** below.

**Table 4.** Comparison of adolescent ideal self, online self, and real self scores across five dimensions (M, Maximum Score = 100, N = 1,000).

Self-Concept Dimension	Ideal Self (M)	Online Self (M)	Real Self (M)	Ideal–Real Gap	Online–Real Gap	F value	p value
Physical Appearance	88.4	76.5	58.2	30.2	18.3	74.31	< 0.001
Social Relationships	83.6	71.3	61.7	21.9	9.6	58.64	< 0.001
Academic Ability	79.2	64.8	62.4	16.8	2.4	41.27	< 0.001
Quality of Life	85.7	73.2	54.6	31.1	18.6	79.18	< 0.001
Social Popularity	81.3	69.4	52.8	28.5	16.6	68.52	< 0.001
Mean	83.6	71	57.9	25.7	13.1	64.38	< 0.001

*Note:* Positive gap values indicate that the former score exceeds the latter. F values are derived from one-way repeated-measures ANOVA.

As shown in **Figure 4**, physical appearance and quality of life display the largest ideal–real discrepancies, with gap scores of 30.2 and 31.1 respectively. This suggests that the visually oriented content ecology of social media exerts the strongest idealizing pressure on these two self-evaluation dimensions. By contrast, the online–real gap for academic ability was only 2.4 points. This indicates that adolescents tend to present their academic competence in ways that remain relatively close to their actual ability. Virtual embellishment in this domain appears limited. At the aggregate level, the ideal self (M = 83.6) scored significantly higher than the online self (M = 71.0), which in turn scored significantly higher than the real self (M = 57.9). The mean ideal–real gap was 25.7 points and the mean online–real gap was 13.1 points. Paired t-tests for both gap indices reached a high level of significance ( $p < 0.001$ ). These findings further confirm the liminal psychological structure of the online self. It functions as a transitional buffer between the ideal self and the real self—neither fully aspirational nor fully grounded in everyday reality<sup>[41]</sup>.

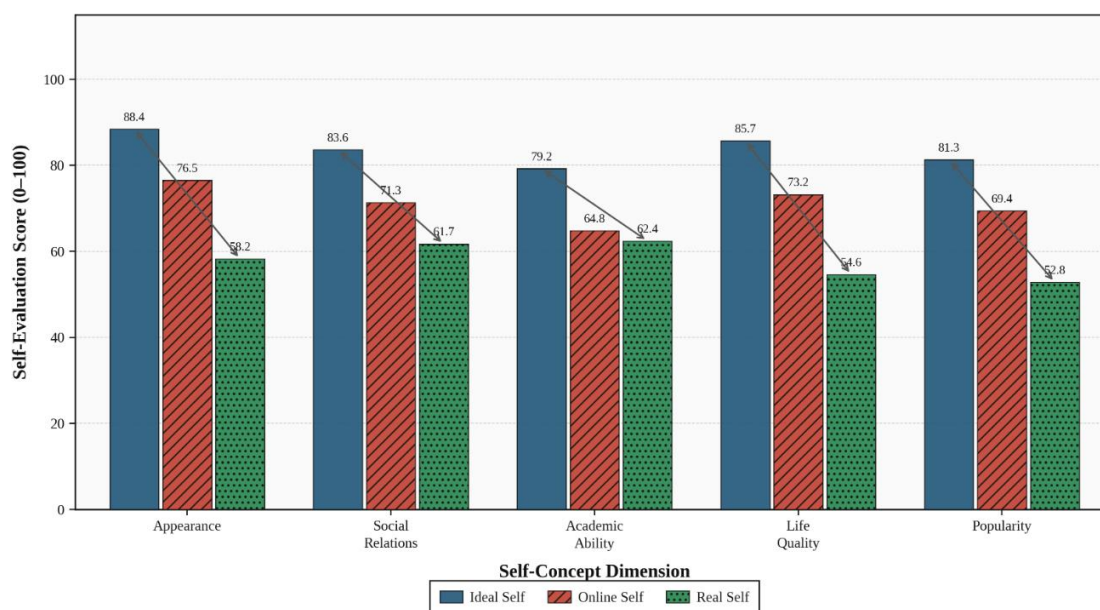


Figure 4. Triadic tension among ideal self, online self, and real self across five self-concept dimensions (N = 1,000).

#### 4.2.2. Emotional experience in virtual liminal space: Disembeddedness, fluid identity, and existential anxiety

Image discrepancy scores were divided into five levels: low (0–20), medium-low (21–40), medium (41–60), medium-high (61–80), and high (81–100). Three core emotional experience dimensions were examined across these levels: disembeddedness, fluid identity, and existential anxiety. The aim was to reveal the gradient structure of emotional experience within virtual liminal space. All three indicators increased significantly and linearly as image discrepancy deepened. The rate of increase also accelerated with each successive level, producing a pattern consistent with a dose-response relationship. Full results are presented in Table 5 below.

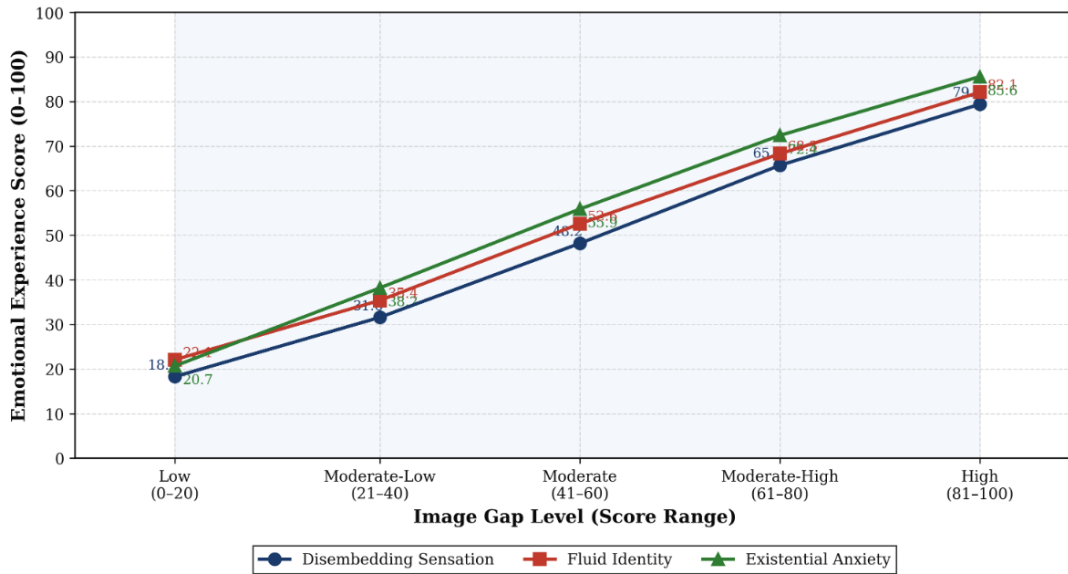
Table 5. Adolescent emotional experience scores in virtual liminal space across five image discrepancy levels (M, Maximum Score = 100, N = 1,000).

Image Discrepancy Level	Disembeddedness (M)	Fluid Identity (M)	Existential Anxiety (M)	Three-Dimension Mean
Low (0–20)	18.3	22.1	20.7	20.4
Medium-Low (21–40)	31.6	35.4	38.2	35.1
Medium (41–60)	48.2	52.6	55.9	52.2
Medium-High (61–80)	65.7	68.3	72.4	68.8
High (81–100)	79.4	82.1	85.6	82.4
Pearson r	0.981	0.979	0.982	0.981
p value	< 0.001	< 0.001	< 0.001	< 0.001

Note: Pearson r represents the correlation between the midpoint value of each discrepancy level and the corresponding emotional experience score. Participants were grouped by quintile of discrepancy scores, with approximately n = 200 per group.

As shown in Figure 5, existential anxiety consistently recorded the highest scores across all discrepancy levels. In the high discrepancy group, it reached 85.6—a rise of 64.9 points above the low discrepancy group (M = 20.7), representing an increase of 314%. Fluid identity scored second highest, reaching 82.1 in the high discrepancy group. Disembeddedness was relatively lowest, at 79.4. However, at the highest discrepancy

level, the spread among all three dimensions narrowed to within 6.2 points. This convergence suggests that extreme image discrepancy triggers a comprehensive overlap of all three emotional experiences simultaneously. Pearson correlation analysis found that all three emotional indicators correlated with image discrepancy level at  $r \geq 0.979$  ( $p < 0.001$ ), indicating a near-perfect positive linear relationship. This confirms that image discrepancy is the core variable driving emotional distress within virtual liminal space<sup>[42]</sup>. Together, these results indicate that as the gap between virtual persona and real self widens, adolescents' sense of suspended and uncertain identity becomes progressively more intense. At the highest levels of discrepancy, this culminates in a deep questioning of the meaning of one's own existence—a state that closely resembles a classic liminal psychological crisis.



Score range: 0-100; higher scores indicate greater intensity of emotional experience

Figure 5. Emotional experience profiles in virtual liminal space across five image gap levels among adolescents (N = 1,000).

#### 4.2.3. Group differences in image discrepancy perception: Moderating effects of gender, urban–rural background, and socioeconomic status

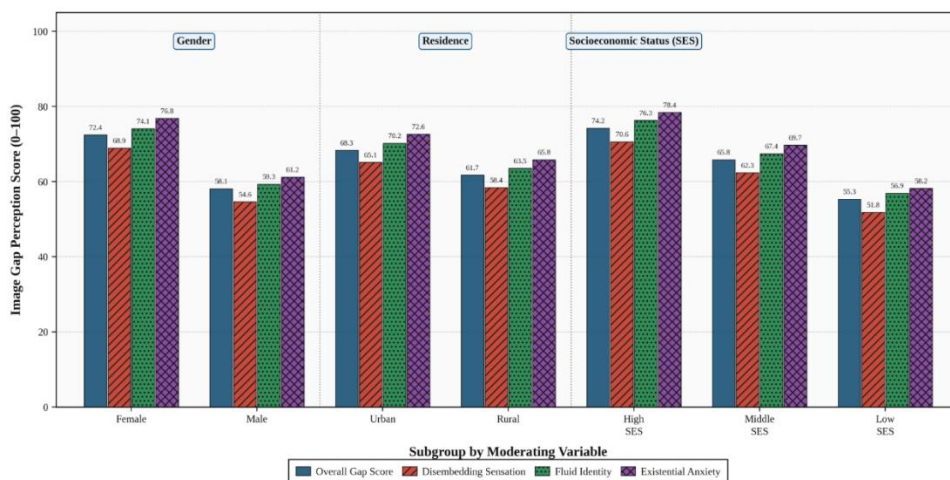
This section examines the moderating effects of three social structural variables—gender, urban–rural background, and family socioeconomic status (SES)—on adolescents' perception of image discrepancy and associated emotional experiences. The aim is to reveal patterns of social stratification in psychological experience within virtual liminal space. Significant between-group differences were found across all three moderating variables on four indicators: overall image discrepancy score, disembeddedness, fluid identity, and existential anxiety. Results are presented in **Table 6** below.

**Table 6.** Between-group comparisons of gender, urban–rural background, and socioeconomic status on four image discrepancy perception indicators (M, Maximum Score = 100, N = 1,000).

Moderating Variable	Group	n	Overall Discrepancy (M)	Disembodiedness (M)	Fluid Identity (M)	Existential Anxiety (M)	t / F value	p value
Gender	Female	512	72.4	68.9	74.1	76.8	t = 9.73	< 0.001
	Male	488	58.1	54.6	59.3	61.2		
Residence	Urban	536	68.3	65.1	70.2	72.6	t = 4.82	< 0.001
	Rural	464	61.7	58.4	63.5	65.8		
Socioeconomic Status	High SES	318	74.2	70.6	76.3	78.4	F = 31.47	< 0.001
	Middle SES	389	65.8	62.3	67.4	69.7		
	Low SES	293	55.3	51.8	56.9	58.2		

*Note:* t values are from independent-samples t-tests; F values are from one-way ANOVA. SES was determined based on a composite of monthly family income and parental education level.

As shown in **Figure 6**, female adolescents scored significantly higher than males on all four indicators. The overall discrepancy score gap between groups was 14.3 points (72.4 vs. 58.1). The largest single difference appeared in existential anxiety, at 15.6 points (76.8 vs. 61.2). The independent-samples t-test was highly significant ( $t = 9.73, p < 0.001$ ). This suggests that female adolescents are more deeply affected by the visual aesthetic norms of social media, and that image discrepancy generates more pronounced emotional distress for them. Regarding the urban–rural moderating effect, urban adolescents scored higher than their rural counterparts on all indicators. The overall discrepancy score difference was 6.6 points (68.3 vs. 61.7,  $t = 4.82, p < 0.001$ ). Urban adolescents' more frequent exposure to high-intensity visual content appears to subject them to stronger idealized comparison pressures. The SES moderating effect revealed a somewhat counterintuitive pattern. High-SES adolescents scored significantly higher than both middle- and low-SES groups on all four indicators ( $F = 31.47, p < 0.001$ ). The gap between the high-SES group ( $M = 74.2$ ) and the low-SES group ( $M = 55.3$ ) was 18.9 points. Image discrepancy perception intensified as socioeconomic status rose—a finding consistent with what might be called an "upward comparison paradox." Greater economic capital appears to amplify the tension associated with pursuing ever-higher idealized standards, rather than reducing it<sup>[43]</sup>.



**Figure 6.** Group differences in image gap perception: Moderating effects of gender, residence, and socioeconomic status (N = 1,000).

### 4.3. Psychological mechanisms through which image discrepancy reshapes adolescent self-concept via virtual liminal space

#### 4.3.1. The internalization pathway of self-concept reconstruction: Social comparison, cognitive dissonance, and self-schema updating

Participants were divided into four quartile groups based on image discrepancy scores: low discrepancy (Q1), medium-low discrepancy (Q2), medium-high discrepancy (Q3), and high discrepancy (Q4). Four internalization pathway indicators were examined across these groups: upward social comparison frequency, cognitive dissonance intensity, self-schema updating rate, and magnitude of self-concept change. The aim was to trace the gradient pattern of these indicators as image discrepancy deepened, and to identify the core psychological chain underlying the internalization of self-concept reconstruction. Full results are presented in **Table 7** below. The qualitative interview data provide vivid experiential corroboration for the statistical findings reported above. A 16-year-old female participant noted during her interview: "When I scroll through other people's perfectly curated lives, I feel like there's something wrong with me everywhere. My mind keeps going over it again and again, and then I start to feel like the 'me' I used to think I was doesn't seem quite right anymore." This account vividly captures the internalization psychological chain through which social comparison triggers cognitive dissonance, which in turn destabilizes and reconstructs the self-schema, a process that corresponds closely with the quantitative path analysis results.

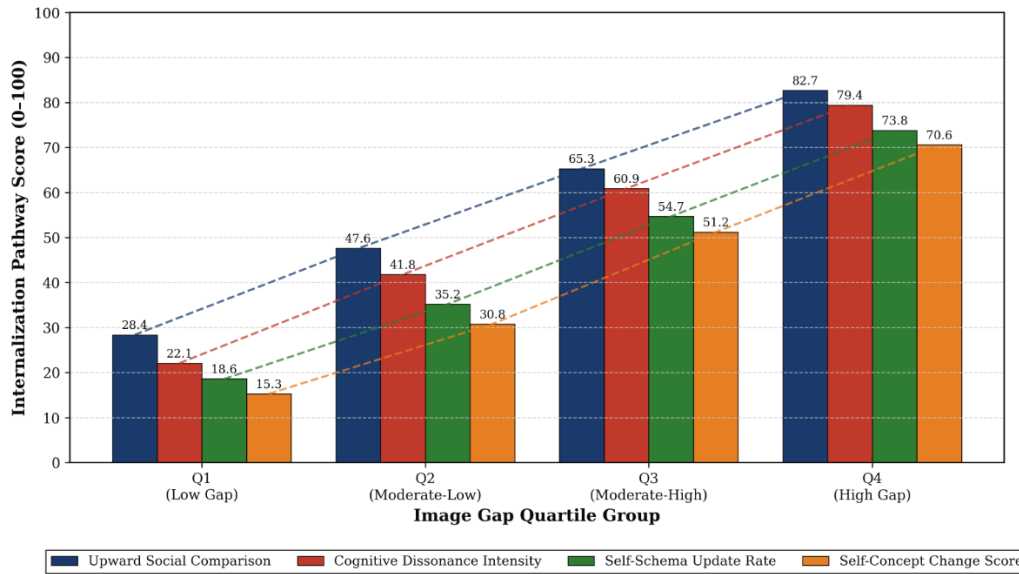
**Table 7.** Internalization pathway indicator scores across four image discrepancy quartile groups (M, Maximum Score = 100, N = 1,000).

Internalization Pathway Indicator	Q1 Low Discrepancy (n = 250)	Q2 Medium-Low Discrepancy (n = 250)	Q3 Medium-High Discrepancy (n = 250)	Q4 High Discrepancy (n = 250)	F value	$\eta^2$
Upward Social Comparison Frequency	28.4	47.6	65.3	82.7	89.43	0.213
Cognitive Dissonance Intensity	22.1	41.8	60.9	79.4	94.17	0.225
Self-Schema Updating Rate	18.6	35.2	54.7	73.8	81.62	0.198
Magnitude of Self-Concept Change	15.3	30.8	51.2	70.6	76.38	0.186
Four-Dimension Composite Mean	21.1	38.9	58	76.6	88.74	0.207

*Note:* All F values reached  $p < 0.001$ .  $\eta^2$  denotes partial eta squared as a measure of effect size. Each group  $n = 250$ .

All four internalization pathway indicators increased significantly and linearly with deepening image discrepancy (see **Figure 7**). The slope gradients were highly consistent across indicators. This consistency points to an inherent sequential logic and systematic coupling within the internalization chain of social comparison → cognitive dissonance → self-schema updating → self-concept change. Looking at individual indicators, upward social comparison frequency rose from 28.4 in Q1 to 82.7 in Q4—an increase of 191%. This was the largest absolute gain among all four indicators, reinforcing the view that social comparison serves as the initiating mechanism of the internalization pathway. Cognitive dissonance intensity showed the largest effect size ( $\eta^2 = 0.225$ ), climbing from 22.1 to 79.4. This suggests that sustained upward comparison delivers the deepest impact on the cognitive system. Self-schema updating rate increased by 297% (Q1 = 18.6, Q4 = 73.8) and magnitude of self-concept change increased by 361% (Q1 = 15.3, Q4 = 70.6). Both of these indicators consistently scored below the first two across all quartile groups. This lag pattern—where

stimulation outpaces response—suggests that the cumulative effects of cognitive dissonance require time before they translate into stable self-schema reconstruction [44].



Score range: 0–100; higher scores indicate stronger activation of each internalization pathway indicator

**Figure 7.** Internalization pathway of self-concept reshaping: social comparison, cognitive dissonance, and self-schema update across gap quartiles (N = 1,000).

### 4.3.2. The externalization pathway of self-concept reconstruction: Behavioral compensation, identity experimentation, and resocialization

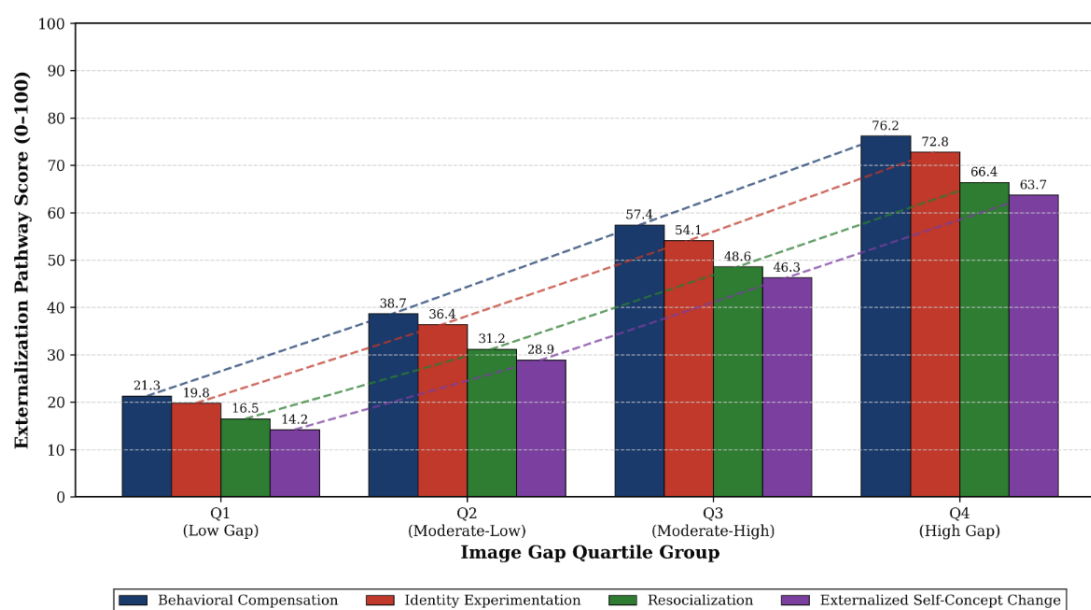
This section examines the externalization pathway of self-concept reconstruction. Three behavioral indicators were analyzed: Behavioral compensation, identity experimentation, and resocialization. The magnitude of externalized self-concept change was also measured. All four indicators were examined across image discrepancy quartile groups to reveal how adolescents' tendency to "close the gap through action" intensifies as discrepancy deepens. The same quartile grouping procedure was applied, and between-group comparisons with trend analysis were conducted. Full results are presented in **Table 8** below.

**Table 8.** Externalization Pathway Indicator Scores Across Four Image Discrepancy Quartile Groups (M, Maximum Score = 100, N = 1,000).

Externalization Pathway Indicator	Q1 Low Discrepancy (n = 250)	Q2 Medium-Low Discrepancy (n = 250)	Q3 Medium-High Discrepancy (n = 250)	Q4 High Discrepancy (n = 250)	F value	η <sup>2</sup>
Behavioral Compensation Score	21.3	38.7	57.4	76.2	86.54	0.208
Identity Experimentation Score	19.8	36.4	54.1	72.8	82.31	0.199
Resocialization Score	16.5	31.2	48.6	66.4	74.67	0.181
Magnitude of Externalized Self-Concept Change	14.2	28.9	46.3	63.7	69.83	0.172
Four-Dimension Composite Mean	17.9	33.8	51.6	69.8	79.24	0.19

*Note:* All F values reached  $p < 0.001$ .  $\eta^2$  denotes partial eta squared. Each group  $n = 250$ . Quartile cut-points were determined based on the full-sample distribution of discrepancy scores.

As shown in **Figure 8**, behavioral compensation consistently ranked highest among the four indicators across all discrepancy levels. It rose from 21.3 in Q1 to 76.2 in Q4, an increase of 257%. This suggests that when adolescents confront image discrepancy, their most immediate externalized response is to reduce the virtual–real gap through concrete action—such as consumption behavior, investment in physical appearance management, and skill acquisition. Identity experimentation scored second (Q1 = 19.8, Q4 = 72.8, increase of 268%). This reflects a tendency among high-discrepancy adolescents to shift frequently between different styles, roles, and social communities in search of a real-world identity position that aligns with their online self. Resocialization showed the highest percentage increase among the three externalization indicators (Q1 = 16.5, Q4 = 66.4, increase of 303%). This points to an active tendency among high-discrepancy adolescents to restructure their social networks and recalibrate their reference groups in order to align more closely with their ideal self-image. The magnitude of externalized self-concept change recorded the smallest overall increase (Q1 = 14.2, Q4 = 63.7). This lag—where externalized behavior outpaces stable self-concept change—mirrors the time-delay effect identified in the internalization pathway in Section 4.3.1, and the two findings thus provide mutual corroboration [45]. One-way ANOVA results confirmed that all four indicators were statistically significant, with F values ranging from 69.83 to 86.54 (all  $p < 0.001$ ) and effect sizes  $\eta^2$  above 0.17 throughout. Path analysis further revealed that behavioral compensation was the strongest direct predictor of externalized self-concept change ( $\beta = 0.48, p < 0.001$ ). Identity experimentation also exerted a significant indirect effect through resocialization ( $\beta = 0.31, p < 0.001$ ). Together, the three indicators form a clearly layered and sequentially progressive behavioral chain within the externalization pathway.



Score range: 0-100; higher scores indicate stronger expression of each externalization pathway behavior

**Figure 8.** Externalization pathway of self-concept reshaping: behavioral compensation, identity experimentation, and resocialization (N = 1,000).

### 4.3.3. Bifurcation of self-concept reconstruction outcomes: Positive integration versus self-fragmentation

This section examines the psychological outcomes to which image discrepancy-driven self-concept reconstruction ultimately leads. The central focus is on the bifurcating moderating effects of psychological resilience and social support on reconstruction outcomes. Participants were divided into four subgroups based on two criteria: level of psychological resilience (high or low) and level of social support (high or low).

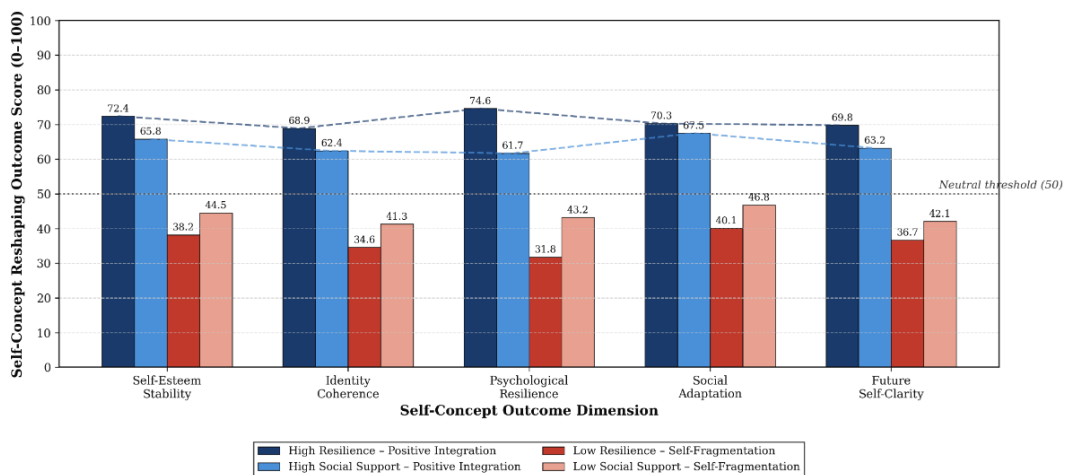
Five outcome dimensions were compared across groups: self-evaluation stability, identity coherence, psychological resilience, social adaptability, and future self-clarity. The aim was to reveal the structural differences between the positive integration pathway and the self-fragmentation pathway. Full results are presented in **Table 9** below.

**Table 9.** Comparison of self-concept reconstruction outcome scores across high and low resilience and social support subgroups on five dimensions (M, Maximum Score = 100, N = 1,000).

Outcome Dimension	High Resilience – Positive Integration (n = 248)	High Support – Positive Integration (n = 241)	Low Resilience – Fragmentation (n = 256)	Low Support – Fragmentation (n = 255)	F value	$\eta^2$
Self-Evaluation Stability	72.4	65.8	38.2	44.5	84.37	0.204
Identity Coherence	68.9	62.4	34.6	41.3	91.52	0.218
Psychological Resilience	74.6	61.7	31.8	43.2	98.64	0.23
Social Adaptability	70.3	67.5	40.1	46.8	76.83	0.187
Future Self-Clarity	69.8	63.2	36.7	42.1	80.41	0.196
Five-Dimension Composite Mean	71.2	64.1	36.3	43.6	87.94	0.207

**Note:** All F values reached  $p < 0.001$ .  $\eta^2$  denotes partial eta squared. Composite means for positive integration groups were significantly higher than those for fragmentation groups on all dimensions (all  $p < 0.001$ ).

As shown in **Figure 9**, the high resilience–positive integration group and the low resilience–fragmentation group displayed a strongly polarized pattern across all five outcome dimensions. The composite mean gap between these two groups reached 34.9 points (71.2 vs. 36.3). The gap between the high social support–positive integration group and the low social support–fragmentation group was 20.5 points (64.1 vs. 43.6). This smaller difference indicates that psychological resilience exerts a stronger bifurcating moderating effect on reconstruction outcomes than social support does. Among the five dimensions, psychological resilience showed the largest between-group divergence. The high resilience group scored 74.6, while the low resilience group scored only 31.8—a gap of 42.8 points. The corresponding F value was 98.64 ( $\eta^2 = 0.230$ ), the largest effect size across all five dimensions. This confirms the theoretical premise that psychological resilience functions as the core protective factor on the positive integration pathway<sup>[46]</sup>.



Score range: 0-100; higher scores indicate more positive self-concept reconstruction outcomes; scores above 50 indicate a healthy zone

**Figure 9.** Bifurcation of self-concept reshaping outcomes: positive integration vs. self-fragmentation across five dimensions (N = 1,000).

## 5. Discussion

To enhance the logical coherence of the discussion, this section is organized according to the thematic structure of the research findings, with each subsection following a unified framework of result summary, theoretical connection, mechanistic explanation, and theoretical contribution. Specifically, Section 5.1 examines the dialogue between the virtual liminal space framework and classical theories of self-development, with particular emphasis on how the empirical findings of this study verify and extend symbolic interactionism, self-discrepancy theory, and Erikson's theory of identity development. Section 5.2 focuses on the digital ecosystem's systematic reshaping of adolescents' self-evaluative reference structures, drawing on an environmental social psychology perspective to explain the internal mechanisms through which platform algorithms and social comparison pressures operate in concert. Section 5.3 offers a dialectical analysis of the double-edged effects of image discrepancy, interpreting the moderating roles of psychological resilience and social support within a protective resources theoretical framework. Taken together, the three subsections form a complete explanatory loop anchored by virtual liminal space as the central theoretical axis, avoiding topic fragmentation and theoretical discontinuity, and ensuring that every set of empirical findings receives systematic interpretation and positioning within a unified theoretical framework.

### 5.1. Theoretical implications of virtual liminal space as a site of self-concept reconstruction: complementing and revising classical self-development theories

The concept of "virtual liminal space" developed in this study offers distinct explanatory value in dialogue with classical theories of self-development. It also raises evidence-based challenges to several core theoretical assumptions. Consider first the relationship with symbolic interactionism. Cooley's "looking-glass self" presupposes a relatively stable and identifiable source of feedback from others. Adolescents build their self-image by perceiving how others evaluate them. This study finds, however, that the "mirror" in social media contexts has undergone a fundamental transformation. Like counts, algorithmic recommendation priority, and the emotional tone of comments together form a highly quantified, constantly fluctuating, and selectively distorted digital mirror. The "gaze of others" it reflects is not a faithful representation of genuine social evaluation. It is a symbolic signal systematically filtered and amplified by platform rules. Its power to shape adolescent self-concept far exceeds what Cooley envisioned in face-to-face interaction. This finding suggests that symbolic interactionism requires the introduction of "algorithmic mediation" as a key variable when applied to digital media contexts<sup>[47]</sup>. The relationship with self-discrepancy theory is equally instructive. Higgins divided the self-system into the actual self, the ideal self, and the ought self, treating the gap between them as a predictor of emotional distress. The present study identifies an intermediate construct—the "online self"—that this framework does not accommodate.

The finding that the online-real discrepancy in academic ability was the smallest across all dimensions (only 2.4 points) can be explained at two levels: platform content ecology and adolescent cognitive development. The visual content logic of social media renders physical appearance and lifestyle the primary arenas of self-display, whereas academic performance is inherently difficult to convey through images, which objectively constrains the space available for enhancement in this dimension. At the same time, adolescents' self-evaluations of academic ability are continuously corrected by objective feedback such as examination scores, making the cognitive cost of self-deception relatively high and thereby suppressing the motivation for virtual embellishment. The finding that the spillover effect of family pressure exceeded that of school pressure is consistent with the core propositions of attachment theory: as the earliest socialization context for adolescents, the family's evaluative standards become deeply embedded in individual self-schema structures through prolonged internalization, and are automatically activated in the form of internalized

psychological scripts upon entry into virtual spaces, rather than operating through the explicit imposition of external norms.

It is necessary at this point to explicitly articulate the distinctive theoretical contributions of the virtual liminal space framework relative to self-discrepancy theory and social comparison theory, so as to prevent this framework from being misread as a mere recombination of existing concepts. The explanatory scope of self-discrepancy theory is confined to the static binary gap between the actual self and the ideal self, while social comparison theory focuses on the lateral comparison process between individuals and external reference targets; neither framework has systematically addressed the intermediate constructs generated by self-presentation in the context of digital technology. The theoretical advances of the virtual liminal space framework are reflected in three respects. First, by introducing the concept of the "online self" as a presentable ideal self constrained by platform norms, it expands the classical binary discrepancy structure into a triadic tension structure, providing a more realistic conceptual tool for analyzing the split self-experience characteristic of contemporary adolescents. Second, by incorporating both the temporal dimension of identity suspension and the structural constraints of algorithmic environments within a single explanatory framework, it proposes the concept of a "chronic liminal state" as a novel developmental risk that classical developmental theory failed to anticipate. Third, the framework integrates three levels of analysis—behavioral construction, emotional experience, and self-reconstruction—into a unified explanatory mechanism with internal logical coherence, rather than offering a parallel enumeration of existing theoretical perspectives. These three points together constitute the substantive contributions that distinguish this framework from existing theoretical approaches.

## **5.2. Revisiting the environmental social psychology perspective: How digital ecosystems systematically reshape the psychological development context of adolescents**

Environmental social psychology is fundamentally concerned with how physical and social environments shape individual psychological processes and behavioral patterns through structural mechanisms. In traditional research, "environment" referred primarily to tangible, concrete settings—domestic living spaces, school layouts, neighborhood structures. The findings of this study suggest something more expansive. The digital ecosystem, centered on social media platforms, now constitutes a third form of environment for adolescent psychological development. Its influence on self-concept formation is deeper and broader than that of conventional physical settings. It demands systematic reexamination from an environmental social psychological perspective. The most immediate way in which the digital ecosystem reshapes adolescents' developmental context is through a fundamental expansion of the social comparison frame of reference. Before the digital age, adolescents compared themselves primarily with peers they encountered in daily life. The density and intensity of comparison were naturally bounded by time and space. Algorithm-driven content recommendation breaks those boundaries. It extends adolescents' comparative gaze outward to a globally curated and aesthetically enhanced population of "aspirational others." The result is a high-intensity, continuous, and asymmetric one-way comparison pressure that fundamentally alters the environmental reference structure within which self-evaluation occurs<sup>[48]</sup>. The digital ecosystem also reshapes how adolescents construct their sense of self-worth. Visible metrics—like counts, follower numbers, content reach—translate diffuse and complex social recognition into discrete, comparable numerical signals. Adolescents' sense of self-worth becomes increasingly bound to these external quantitative indicators. This produces what might be called an "index-dependent self-evaluation" pattern. It is far more fragile and volatile than the internalized self-worth systems that develop through traditional socialization. Beyond this, platform algorithms create information bubble effects that generate highly homogenized virtual community pressures around aesthetic norms and lifestyle standards. The normative constraints adolescents face in

image construction are more explicit and harder to avoid than those in physical environments. This further narrows the space available for diverse individual self-expression<sup>[49]</sup>.

### **5.3. The double-edged effects of image discrepancy: A dialectical view of risk factors and protective resources**

One of the most theoretically significant findings of this study is that image discrepancy does not produce uniformly negative effects on adolescent self-concept reconstruction. Instead, a strongly bifurcated pattern emerges. The same degree of discrepancy can produce diametrically opposed developmental trajectories depending on the resources an individual brings to the situation. This finding reveals the explanatory limits of simplistic "social media is harmful" narratives. It calls for a more dialectical analytical framework—one that distinguishes the conditions under which image discrepancy becomes a developmental risk from those under which it becomes an opportunity for growth. From a risk-factor perspective, low psychological resilience and weak social support networks represent the two core pathways through which image discrepancy leads to self-fragmentation. Adolescents with insufficient resilience lack effective emotional regulation resources to absorb the psychological tension generated by persistent cognitive dissonance. They are more prone to falling into ruminative thinking and self-deprecating cycles. Inadequate social support, meanwhile, deprives adolescents of a real-world anchor while they are suspended in virtual liminal space. Without authentic interaction with significant others, they cannot verify or stabilize their self-concept. This intensifies the risk of fluid and fragmented identity. Additionally, passive modes of platform use—predominantly browsing others' content rather than actively creating—were identified in this study as an important behavioral risk factor that amplifies the negative effects of image discrepancy. Passive browsing triggers upward social comparison at a significantly higher frequency than active content creation, yet it lacks the compensatory sense of self-efficacy that active expression provides<sup>[50]</sup>. From the perspective of protective resources, adolescents with high psychological resilience are able to reframe image discrepancy as a process of self-reflection and cognitive reappraisal. Driven by the tension discrepancy creates, they engage in constructive identity experimentation. Over time, this produces a richer and more multidimensional self-understanding, culminating in a dialectical integration—rather than a forced convergence—between the real self and the ideal self. Robust real-world social support provides the emotional buffering and cognitive correction needed to sustain this integration process. It allows adolescents to maintain a relatively stable narrative coherence of self as they move between virtual and real worlds.

## **6. Conclusion and future directions**

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

This study investigated the psychological mechanisms through which image construction and image-reality discrepancy on social media reshape adolescent self-concept. Five principal conclusions were reached.

First, adolescents' image construction behaviors on social media are strongly platform-specific and environmentally embedded. Xiaohongshu is dominated by appearance modification and refined lifestyle display. Douyin centers on performative self-expression. Platform algorithmic norms and peer feedback mechanisms together form a dual reinforcement loop that sustains these behaviors. The behavioral patterns are further shaped by cross-contextual spillover from family evaluation pressure and school normative pressure in offline environments.

Second, a stable triadic tension structure—among ideal self, online self, and real self—is pervasive among adolescents in virtual liminal space. The online self functions as a transitional construct suspended

between the ideal and the real. It is the key intermediate variable for understanding the split self-experience that characterizes contemporary adolescent identity.

Third, image discrepancy level correlates with disembeddedness, fluid identity, and existential anxiety in a near-perfect positive linear relationship. The intensity of these emotional experiences is significantly moderated by gender, urban–rural background, and socioeconomic status. Female adolescents and those from higher socioeconomic backgrounds show the greatest sensitivity to image discrepancy.

Fourth, image discrepancy drives systematic self-concept reconstruction through two coordinated pathways. The internalization pathway follows a sequential chain of social comparison, cognitive dissonance, and self-schema updating. The externalization pathway operates through behavioral compensation, identity experimentation, and resocialization. The two pathways exhibit a coupled structure in which internal and external processes reinforce each other.

Fifth, the ultimate outcome of self-concept reconstruction bifurcates sharply based on individual psychological resilience and social support resources. Adolescents with higher protective resources tend toward positive integration. Those with lower protective resources face the risk of self-fragmentation. This reveals the dialectical and condition-dependent nature of image discrepancy effects.

## **6.2. Future research directions**

This study has made progress on both theoretical construction and empirical testing. Several directions remain open for further investigation.

First, the combined cross-sectional and short-term longitudinal design used here cannot fully capture the long-term cumulative effects of image discrepancy on self-concept reconstruction. Future research should adopt longitudinal designs spanning the full course of adolescence. This would allow researchers to trace developmental trajectories and identify critical turning points in the psychological mechanisms of virtual liminal space.

Second, the sample is limited to urban and rural adolescents in mainland China. The social media platform ecology and cultural norms examined here carry marked local specificities. Future research should extend into East Asian and cross-cultural comparative frameworks. The aim would be to map the universality and cultural specificity of image discrepancy mechanisms across different sociocultural contexts.

Third, this study's measurement of virtual image construction behavior relies primarily on self-report, which carries some risk of subjective bias. Future research could incorporate multimodal objective measures—such as digital behavioral logs, eye-tracking, and physiological indicators—to strengthen the ecological validity of the data.

Fourth, the present analysis of psychological resilience and social support as protective factors remains at the level of variable-based correlational description. Future research should examine the specific intervention strategies that cultivate these protective resources, and work toward translating theoretical findings into evidence-based intervention practice.

Fifth, the rapid spread of generative artificial intelligence and virtual reality technologies is fundamentally changing both the tools adolescents use for self-presentation and the depth of their immersion in virtual environments. Future research should incorporate these emerging technological contexts into ongoing theoretical revision. Doing so is essential for maintaining the field's capacity to respond to real-world developments as they unfold.

In addition, the present study has several limitations with respect to sampling that warrant candid acknowledgment. Although a combined strategy of stratified cluster sampling and purposive sampling was employed to ensure a degree of geographic distribution and demographic heterogeneity, the sample was constrained by the geographic boundaries of the sampling frame and covered primarily urban and rural schools across three regions of mainland China—eastern, northern, and southwestern. Representation of border regions, areas with concentrated ethnic minority populations, and children of migrant workers remains notably insufficient. This structural gap poses a potential threat to the external validity of the study's conclusions; that is, the psychological mechanisms through which image-reality discrepancy influences self-concept reconstruction, as identified in this study, may not generalize uniformly to populations characterized by different media access conditions, cultural norms, and family structures. Future research should consider expanding the sampling scale, incorporating random sampling procedures, and including more diverse cultural backgrounds and social contexts, so as to systematically examine the cross-group generalizability of the study's core conclusions and thereby establish a more robust empirical foundation for the broader theoretical claims.

The present study also has several methodological limitations at the measurement level that require transparent discussion. With respect to the emotional experience indicators, all three dimensions—disembedding sensation, fluid identity, and existential anxiety—exhibited extremely high linear correlations with image discrepancy level ( $r \geq 0.979$ ). While this statistical pattern suggests that the three dimensions are highly interrelated at the conceptual level, it also raises methodological concerns regarding measurement redundancy and potential multicollinearity. The proximity of conceptual boundaries among the three indicators may have made it difficult for respondents to distinguish between them when completing the scale, thereby artificially inflating inter-indicator correlations and producing a degree of spurious statistical association. Furthermore, the results section does not provide a sufficiently integrated presentation of the relationships among the three core variables—social media use, image-reality discrepancy, and self-concept reconstruction—as the path relationships among variables are largely dispersed across individual sub-analyses and lack a systematic, overarching perspective. Future research should more rigorously delineate the conceptual boundaries among emotional experience sub-dimensions during scale development, examine the discriminant validity of the measurement model through confirmatory factor analysis, and construct an integrated structural equation model incorporating all three core variables in order to present their complete causal chain more clearly and coherently.

## **Conflict of interest**

The author declares no conflict of interest.

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