

# Making sense of movement: A qualitative inquiry into university students' physical exercise experiences, emotional development and social adaptation

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## ABSTRACT

In the context of increasing emotional vulnerability and social adjustment difficulties among university students in China, there is a growing need to understand the psychosocial mechanisms that support holistic student development. Physical exercise has been widely recognized not only for its physiological benefits but also for its potential role in fostering emotional resilience and social competence. This study adopts a qualitative research approach grounded in social constructivism and practice theory to explore how students construct subjective meaning from their physical exercise experiences in relation to emotional development and social adaptation. Drawing on semi-structured interviews with 25 participants from public universities in Guizhou Province, data were analyzed using grounded theory procedures involving open, axial, and selective coding. A conceptual process model was developed, outlining a sequential pathway from physical exercise (comprising motivation, routine, and embodiment) to emotional development (including emotional intelligence, self-insight, and resilience), leading to social adaptation (expressed through peer integration, communication, and social goal orientation), and culminating in subjective meaning construction. Complementing this, sentiment analysis of student narratives confirmed the predominance of positively valenced emotional experiences—such as confidence, belonging, and personal growth—associated with physical activity. These findings offer theoretical insights by reframing emotional development as a multidimensional mediating process and by redefining social adaptation as an interpretive rather than purely behavioral outcome. Practically, the results suggest that emotionally reflective and socially integrative physical activity programs may serve as viable interventions for student development in higher education. Future research may extend these findings through mixed-methods approaches or cross-cultural comparisons to further validate and enrich the model.

**Keywords:** Physical exercise, emotional development, self-insight, social adaptation, grounded theory.

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## INTRODUCTION

As China's higher education system undergoes profound transformation, the psychological well-being and social adaptability of university students have become urgent concerns. The acceleration of societal pace, intensifying academic competition, shifting family structures, and heightened uncertainty in the graduate job market have contributed to increasingly complex adaptive challenges among youth (Mancaniello and Lavanga, 2024). These

pressures are especially acute during the university stage, where students transition from structured dependence to autonomous adulthood. Recent studies have reported a significant rise in emotional dysregulation, interpersonal detachment, and social anxiety among undergraduates, particularly in the post-pandemic context (Bortolan, 2023; Luo et al., 2024).

In response to such systemic distress, physical exercise

has gained traction across medical, psychological, and behavioral science domains as a non-pharmacological intervention with demonstrated efficacy in improving emotional regulation and fostering social competence. Within educational settings, national policy initiatives such as the Healthy China 2030 Plan and the Guidelines on Physical Education in the New Era have foregrounded physical activity as a central axis of holistic student development, linking it explicitly to emotional resilience and broader social integration (Croatto et al., 2023; Liu et al., 2024; Z. Zhang et al., 2022).

Echoing this policy orientation, many universities have begun to reconceptualize physical education not merely as a curricular requirement but as a vehicle for psychosocial growth. Survey data released by Chen et al. (2017) reveal that over two-thirds of university students—particularly those born after 1995—affirm that physical exercise helps alleviate emotional distress and strengthen interpersonal confidence. Despite such optimism, however, several structural and pedagogical challenges remain. Participation in physical education is often inconsistent and motivation varies widely across individuals and contexts. Moreover, the lack of integrated curricular frameworks that connect physical activity with emotional and social development has left students' experiential understanding of exercise fragmented and underexamined.

Much of the existing literature has approached the relationship between physical activity and mental health from a functionalist paradigm, emphasizing the causal effects of exercise on quantifiable psychological outcomes such as emotional intelligence, self-efficacy, and resilience (Jiao, 2025; Wang et al., 2022; Yang et al., 2024). While this line of inquiry has provided valuable statistical evidence, it often overlooks the experiential dimensions of how students actually interpret and engage with physical exercise in their everyday lives. Questions such as how students understand their bodily practices, how they emotionally experience exercise, and how social meaning is negotiated through participation remain largely unexplored.

To address these gaps, this study focuses on undergraduate students in Guizhou Province—a region marked by relatively under-resourced educational institutions and a high proportion of first-generation college students. According to the Guizhou Statistical Yearbook (2022), the average student-to-faculty ratio in Guizhou's public universities is approximately 23.8:1, significantly higher than the national average of 17.2:1, indicating systemic limitations in educational support capacity. In addition, a recent national survey revealed that over 61% of university students in Guizhou are first-generation college entrants, compared to 38% in developed eastern provinces (H. Zhang et al., 2022). Compounding this, access to on-campus psychological counseling remains uneven: only 13.5% of Guizhou universities offer full-time student mental health services, a figure markedly below

the national average of 32% (Guo et al., 2022). These characteristics render Guizhou a socially salient and underrepresented context for investigating how students interpret and embody emotional and social meaning through physical exercise, particularly when formal support structures are limited or uneven.

If physical activity is to be understood not simply as a behavioral input but as an emotionally and socially embedded practice, it requires close empirical attention to its lived meanings. This study thus seeks to explore how students in public universities construct subjective interpretations around their exercise experiences—especially as those meanings relate to emotional development and social adjustment. The goal is to illuminate the interpretive mechanisms through which students negotiate psychosocial adaptation, mechanisms that are often obscured in variable-centered models but are no less central to the lived realities of youth in higher education.

## LITERATURE REVIEW

### **Social adaptation in higher education: Theoretical foundations and research context**

Social adaptability refers to the capacity of individuals to effectively align themselves with changing social environments through psychological regulation, behavioral adjustment, and relational negotiation (Toh and Kirschner, 2023). In the context of higher education, this capacity plays a central role in determining whether students can successfully transition from adolescence to adulthood, construct coherent self-identities, and prepare for integration into professional life. As the organizational structure of universities becomes increasingly complex—with shifting pedagogical models, accelerated life rhythms, and diverse interpersonal networks—the adaptive demands placed on students are correspondingly intensified. Social adaptability has thus emerged as a crucial mediator between psychological well-being and academic achievement.

Psychological capital theory emphasizes the positive roles of hope, resilience, optimism, and self-efficacy in fostering adaptive capacities (Wong et al., 2023). Recent studies have highlighted the significance of psychological capital in enhancing academic adjustment and success among university students, with academic adjustment serving as a mediating factor between psychological capital and academic outcomes (Baluku et al., 2021; Hassan et al., 2023).

Ecological systems theory, in contrast, locates adaptability within a multilevel interactional framework involving institutional support, parenting styles, and broader sociocultural contexts (Ghasemi, 2025). This perspective underscores the importance of considering the various environmental systems that influence student

development and adaptation.

Psychological capital plays a key role in academic outcomes, including academic performance, engagement, burnout, adjustment, stress, and intrinsic motivation among university students. From a thematic standpoint, the extant literature on student social adaptability generally follows three major analytical trajectories. First, a psychological-pathway approach investigates the causal influence of individual-level factors—such as self-efficacy and emotional intelligence—on adaptive behaviors (Liu, 2025). Second, an environmental-pathway approach examines the effects of contextual conditions, including dormitory relations, faculty-student interactions, and institutional support systems (Undurraga and Pokorny, 2024). Third, a socio-cultural-pathway approach interrogates the impact of macro-level changes, such as digital learning environments, geographical mobility, and multicultural tensions, on students' adaptive capacities (Shonfeld et al., 2021).

Nevertheless, the literature reveals several notable limitations. Chief among them is a persistent focus on adaptation as an outcome rather than a dynamic, subjective process. Existing studies tend to treat adaptability as a measurable state, overlooking how students interpret, experience, and reconstruct the meanings of adaptation in context-specific situations (North et al., 2021; Orlove, 2022). Additionally, dominant methodological approaches—centered around survey instruments and statistical modeling—may capture correlational structures but fail to adequately represent the lived affective, cognitive, and relational dimensions of adaptation. This gap is especially evident in experiential domains such as physical activity, group engagement, and intercultural exchange, where adaptive capacities are often forged through embodied participation and emotional negotiation.

In light of these gaps, there is a pressing need for research that foregrounds students' subjective meaning-making processes and explores how they understand and internalize social adaptation within specific interactional settings. A qualitative, interpretive approach may offer deeper insights into the experiential and symbolic dimensions of adaptation, enabling scholars to theorize social adaptability not merely as a behavioral response but as a complex interplay between lived practice and psychological transformation.

### **The role of physical exercise in emotional regulation and social adaptation**

In the context of higher education, physical exercise is increasingly recognized not merely as a form of bodily movement but as a psychologically and socially embedded practice through which students regulate emotions, establish identities, and navigate interpersonal relationships (Block et al., 2021). This study adopts a

multidimensional understanding of three key constructs: physical exercise experiences are defined as individuals' embodied engagements with sports and fitness activities, encompassing their subjective interpretations and emotional meanings; emotional development refers to the evolving ability to identify, regulate, and express emotional states in response to academic and social demands; and social adaptation denotes the dynamic process of adjusting to complex sociocultural environments through the acquisition of relational competence, belonging, and resilience.

Regular participation in physical activity is positively associated with a range of emotional benefits among university students. These include enhanced positive affect, reduced levels of anxiety and depressive symptoms, and improved emotion regulation capacities (Luo et al., 2025; Z. Zhang et al., 2022). These outcomes are believed to result from both neurophysiological mechanisms—such as endorphin release and activation of the hypothalamic-pituitary-adrenal axis—and psychosocial mechanisms, such as increased perceived competence, task mastery, and social feedback loops.

Beyond emotion regulation, physical activity serves as a powerful context for fostering social adaptability. Engagement in team-based sports or group fitness environments frequently requires cooperative action, role negotiation, and mutual support, providing rich opportunities for the development of trust, empathy, and communication skills (Karimi and Farivarsadri, 2025). Participation in such contexts also facilitates the internalization of social norms, strengthens group identity, and enhances students' sense of belonging—all of which are essential for navigating the pluralistic and high-pressure environments of modern universities (Hu and Dai, 2021). Accordingly, physical exercise can function as a mediating site where emotional and social development co-evolve through embodied, interactional experience (Shi and Tian, 2025).

Theoretical perspectives on this relationship have increasingly moved beyond early cognitive-behavioral models. While Bandura and Wessels (1997)'s concept of self-efficacy and Mayer and Salovey (1993)'s emotional intelligence framework remain foundational, more recent scholarship suggests that relational and situated processes—such as shared goals, perceived autonomy, and context-specific meaning-making—play a central role in explaining the emotional and adaptive impacts of exercise (Champ et al., 2023; Mossman et al., 2024). These frameworks recognize that physical activity does not merely produce outcomes but serves as a dynamic platform for affective learning and social positioning.

Despite these advances, the majority of empirical work in this area continues to rely heavily on quantitative methods, including structural equation modeling (SEM) and regression analysis, to test the directional associations among variables such as exercise frequency, emotional intelligence, and social adjustment. While these

methods offer statistical precision, they often overlook the lived meanings, contextual interpretations, and emotional trajectories that shape how students engage with physical activity in their daily lives.

This study, therefore, adopts a qualitative approach to address these gaps. Rather than asking whether physical activity contributes to emotional and social outcomes, the focus is on how students experience and interpret these processes within the embedded context of university life. This perspective allows for a richer understanding of physical exercise as a symbolic, relational, and emotionally mediated practice—one that not only responds to psychological needs but actively shapes students' developmental pathways.

### **The missing perspective: Subjective meaning-making in physical exercise participation**

Prior studies investigating the relationship between physical exercise and psychological or social outcomes have predominantly framed exercise as a behavioral intervention—a measurable input intended to generate predefined effects such as enhanced emotional regulation, increased self-efficacy, or improved social functioning. Quantitative investigations based on psychological constructs like emotional intelligence (Mayer and Salovey, 1993), self-efficacy (Bandura and Wessels, 1997), and psychological resilience (Connor and Davidson, 2003) have generated robust evidence of the statistical associations between exercise frequency and mental health indicators among university students. Similarly, research employing structural equation modeling (SEM) or hierarchical regression has explored the predictive capacity of physical activity in mediating anxiety reduction, interpersonal adjustment, and subjective well-being (Guo et al., 2024; Yao et al., 2023).

Within this paradigm, physical exercise is conceptualized as a functional tool—a “cause” from which desirable psychological or social “effects” are derived. Such designs allow for clarity in hypothesis testing and generalizability of findings, but they also prioritize variable relationships over processual meaning. For example, recent meta-analyses of exercise psychology have revealed consistent positive correlations between sports participation and stress coping skills (Lochbaum et al., 2022), yet offer little insight into how students themselves interpret the emotional or social significance of such experiences in their daily lives. The affective and symbolic textures of physical engagement—how a student understands their bodily action in relation to self-concept, emotional recovery, or social belonging—remain underexplored.

A small but important stream of research has begun to shift focus toward experiential aspects of exercise. Studies inspired by phenomenological or narrative approaches have examined how individuals derive meaning from sport

participation, negotiate gender and identity in athletic environments, or interpret their embodied experience in terms of agency and vulnerability (Ainsworth et al., 2022; Deslippe et al., 2024). These works suggest that the psychosocial effects of exercise cannot be reduced to inputs and outcomes alone, but are often mediated through symbolic processes, identity work, and contextual meaning-making. However, such perspectives remain marginal relative to the dominant functionalist discourse.

This imbalance points to a conceptual and methodological gap: although physical activity is increasingly recognized as an emotionally and socially charged practice, few studies have attended to how its meanings are constructed by participants in context. The assumption that exercise is universally beneficial obscures the fact that its significance is often situationally negotiated, socially mediated, and emotionally variable. In university settings, students may engage in sports for diverse reasons—peer acceptance, self-expression, emotional regulation, or academic credit—and the meanings they assign to such practices are likely shaped by both personal history and institutional discourse.

To investigate these underexamined dimensions, this study adopts a social constructivist and practice-theoretical lens. These frameworks reject the notion of behavior as a purely objective act and instead focus on how individuals construct symbolic worlds through routine practices. In the context of physical exercise, this entails understanding how students experience, interpret, and narrate their bodily engagement as part of broader trajectories of emotional growth and social integration.

From this perspective, the present study does not ask simply whether exercise contributes to emotional and social outcomes, but rather how students come to experience exercise as emotionally and socially meaningful. It seeks to illuminate the psychological symbols, cultural expectations, and social interactions that render exercise a site of subjective negotiation and adaptive practice. This interpretive shift provides the foundation for a qualitatively grounded investigation into the emotional and social meanings that students ascribe to their physical activity experiences.

## **RESEARCH METHODS**

### **Research design**

This study adopts a qualitative research design rooted in an interpretivist epistemology. A purposeful sampling strategy was employed to identify participants with relevant and diverse perspectives on the experiential, pedagogical, and evaluative dimensions of physical exercise. The total sample consists of 25 individuals, categorized into three stakeholder groups as shown in Table 1.

**Table 1.** Participant groups and their roles in the study.

Participant group	Code range	Institutional source	Role in the study
University students	S1–S15	Five undergraduate institutions in Guizhou Province	Core informants provide first-hand narratives on physical exercise experiences and social adaptation
Physical education teachers	T1–T5	Same institutions as student participants	Offer institutional insights and pedagogical observations on students' exercise engagement and behavior
Employer representatives	E1–E5	Regional industries and organizations	Provide post-graduate perspectives on social adaptability, emotional competence, and employability

### Data collection and interview framework

The semi-structured format ensured both thematic coherence and narrative openness, allowing participants to articulate personal meanings while providing flexibility to probe emergent insights. The interview protocol was guided by two key theoretical lenses: social constructivism and practice theory. From the perspective of social constructivism (Keaton and Bodie, 2011), interview questions were designed to uncover how students co-construct emotional and social meanings through daily practices. Practice theory informed the emphasis on embodied experiences, routines, and socially situated actions within physical exercise contexts (Rouse, 2007). Together, these frameworks directed attention to how physical exercise is not merely performed but

experienced and symbolically interpreted.

Each set of interview questions corresponded directly with the study's research objective—to understand how students from HEIs assign subjective meaning to physical exercise in the context of emotional development and social adaptation. To triangulate perspectives, tailored frameworks were constructed for three distinct groups: students, physical education teachers, and employer representatives. Questions for students emphasized emotional experience, social interaction, and meaning-making; questions for teachers addressed observational insight and institutional context; questions for employers explored perceived adaptability and graduate readiness.

Table 2 presents the consolidated interview framework used in this study:

**Table 2.** Interview framework for university students, PE teachers, and employers.

Participant group	Thematic area	Key interview questions
University students (S1–S15)	Subjective meaning of exercise	What does physical exercise mean to you personally? Can you describe an experience where exercise influenced your emotions or self-perception?
	Emotional development	In what ways has participating in exercise helped you manage stress, anxiety, or other emotional challenges?
	Social adjustment	Have you experienced changes in your relationships or social integration as a result of exercise? Can you elaborate on how exercise has impacted your communication or group participation?
	Support and institutional environment	What kinds of support from teachers, peers, or the university would motivate or sustain your participation in exercise?
Physical education teachers (T1–T5)	Exercise behavior observation	How would you describe students' general participation in physical activity? What changes have you observed in their emotional or social behavior?

Table 2. Continues.

Employer (E1–E5)	representatives	Perceived impact		In your view, how does exercise contribute to students' emotional stability or social adaptability? Can you provide examples?
		Pedagogical practice		How do you integrate emotional or social development goals into your PE instruction? What challenges do you face?
		Social adaptability assessment		What emotional or interpersonal qualities do you most value in university graduates? In your experience, are these adequately developed during university education?
		Expectations and recommendations	and	What suggestions do you have for universities to better prepare students for emotional resilience and social adaptability, particularly through physical or co-curricular activities?

This framework served as a flexible guide rather than a rigid script. Interviewers encouraged elaboration, follow-up stories, and reflective dialogue, particularly to capture emergent symbolic constructions and contextual interpretations. All interviews were audio-recorded with participant consent, transcribed verbatim, and anonymized for coding and analysis.

### Data analysis and ethical considerations

The collected data were analyzed using thematic analysis within the framework of grounded theory coding, facilitated by NVivo 12 software. This analytical strategy was selected for its capacity to uncover latent meanings, emotional trajectories, and social interpretations embedded in participants' narratives—aligning closely with the study's focus on subjective meaning construction in the context of physical exercise. The analysis followed a three-stage coding process: open coding, axial coding, and selective coding (Corbin, 2017).

In the open coding phase, interview transcripts were read line-by-line to identify emergent concepts and recurring experiential themes, resulting in a preliminary set of nodes capturing emotions, social dynamics, embodied experiences, and contextual interpretations. In the axial coding stage, these initial codes were clustered into broader categories by exploring conditions, interactions, and consequences, enabling the identification of patterned relationships between emotional development and social adaptability within physical activity contexts. Finally, in the selective coding phase, a central category—namely, "experiential meaning-making through physical engagement"—was established to integrate all subcategories into a coherent theoretical narrative that addressed the study's core objective.

To ensure the trustworthiness and rigor of the analysis, several strategies were employed. Triangulation was

achieved through multi-stakeholder interviews (students, teachers, employers), offering diverse yet convergent insights. Member checking was conducted with selected participants to validate the interpretations of their narratives. Audit trails were maintained throughout the coding process to ensure transparency and replicability. The analytical process was iterative, reflexive, and theoretically driven, maintaining fidelity to both participants' voices and theoretical constructs.

From an ethical standpoint, the study adhered strictly to academic ethical guidelines for human subjects research. Informed consent was obtained from all participants prior to the interviews, detailing the research purpose, confidentiality measures, and the voluntary nature of participation. Participants were informed that they could withdraw at any stage without consequence. All interviews were conducted in private, audio-recorded with consent, and subsequently anonymized in the transcription and reporting processes. Data were stored securely on encrypted devices and used exclusively for academic purposes. No identifying information was retained in the analysis or dissemination of findings.

Through this integrated and ethically grounded analytic approach, the study not only captures the subjective meanings that students assign to their exercise experiences but also ensures that these meanings are interpreted with methodological integrity and ethical responsibility.

## RESULTS

### Open coding

Open coding represents the initial and foundational phase of grounded theory analysis, wherein raw qualitative data are systematically fractured, labeled, and organized into emergent conceptual categories (Corbin, 2017). In this

study, NVivo 12 software was employed to facilitate a line-by-line analysis of the interview transcripts collected from 25 participants, comprising 15 university students, 5 physical education (PE) teachers, and 5 employer representatives. The goal of this stage was to remain open to the data—free from prior assumptions—and to inductively generate codes that reflect salient psychological and social meanings related to physical exercise experiences.

Through repeated readings and analytic comparisons, the research team identified discrete meaning units in the interview content that pertained to emotional development, social adaptation, and embodied participation. These meaning units were initially coded using participants' own language where possible, and then grouped into higher-order conceptual themes through constant comparison.

Coding decisions were iteratively discussed and validated among team members to ensure consistency and theoretical sensitivity.

As a result of this process, fifteen core thematic categories were identified. These categories encompass a broad spectrum of participant experiences and include such domains as emotional regulation, sense of belonging, identity formation, peer interaction, and self-efficacy. Each category was saturated with at least ten keywords derived from different respondents, thereby ensuring both conceptual density and empirical credibility. These categories serve as the analytic scaffolding for subsequent axial and selective coding procedures.

Table 3 presents the full set of open coding results, offering a detailed mapping of the emergent themes and associated participant expressions:

**Table 3.** Open coding.

Core theme category	Keywords with respondent codes
Emotional regulation	release (S3), stabilize (S5), relax (S7), manage (S9), balance (S1), soothe (S2), refresh (S6), ease (S4), regulate (S8), improve (S10)
Stress relief	less pressure (S2), relaxed (S4), comfortable (S6), mental break (S1), unwind (S9), relieve (S3), vent (S5), recharge (S7), escape (S8), calm (S10)
Confidence building	confidence (S1), brave (S3), empowered (S6), encouraged (S4), self-assured (S9), assertive (S7), determined (S2), resilient (S5), positive (S10), capable (S8)
Peer interaction	friendship (S4), team (S1), talk (S3), cooperate (S2), communicate (S6), connect (S5), bond (S9), share (S7), group (S10), interact (S8)
Sense of belonging	belonging (S3), group identity (S6), acceptance (S1), recognition (S5), unity (S2), participation (S9), closeness (S7), membership (S4), mutuality (S8), inclusion (S10)
Self-identity	self-awareness (S5), role (S2), values (S1), self-image (S6), purpose (S7), direction (S4), meaning (S3), growth (S9), personal insight (S10), inner voice (S8)
Motivation for exercise	fun (S1), interest (S6), habit (S3), health (S2), requirement (S5), peer influence (S4), body image (S9), challenge (S7), reward (S8), commitment (S10)
Social skills	listen (S3), respect (S1), express (S5), collaborate (S7), negotiate (S4), compromise (S2), relate (S6), speak up (S8), adapt (S10), lead (S9)
Time management	planning (S5), routine (S2), schedule (S1), prioritize (S6), punctuality (S3), structure (S7), responsibility (S4), organization (S9), discipline (S10), order (S8)
Cognitive clarity	focus (S1), clarity (S2), awareness (S4), perspective (S3), insight (S6), sharpness (S7), memory (S5), strategy (S8), processing (S10), reasoning (S9)
Goal orientation	set goals (S2), achievement (S1), direction (S5), improvement (S3), ambition (S6), performance (S7), target (S9), growth (S4), benchmark (S8), progression (S10)
Habit formation	routine (S1), repetition (S4), system (S3), pattern (S2), regularity (S6), consistency (S5), discipline (S8), continuation (S7), practice (S9), habit loop (S10)
Empathy development	sympathy (S4), concern (S1), support (S3), compassion (S2), understanding (S5), perspective-taking (S6), care (S7), altruism (S9), relate (S8), connection (S10)
Adaptability	resilience (S1), coping (S5), flexibility (S2), openness (S4), manage change (S3), versatility (S6), bounce back (S9), readiness (S8), transition (S7), survival (S10)
Self-efficacy	capability (S2), mastery (S1), belief (S3), performance (S6), initiative (S4), success (S5), empowerment (S7), productivity (S9), autonomy (S8), drive (S10)

Figure 1 presents a word cloud generated from the open coding results, offering a visual representation of the most frequently occurring concepts derived from participants'

narratives. The prominence of terms such as self, group, manage, confidence, and growth illustrates the central experiential dimensions identified in the data, particularly



Figure 3 visualizes the affective intensity of selected keywords derived from the open coding process, capturing how university students emotionally interpret their experiences related to physical activity. The bar chart distinguishes between positive (green), neutral (gray), and negative (red) affective valences, with affective strength represented by bar length. This graphical representation not only reveals the emotional polarity of students' responses but also offers a nuanced understanding of the psychological dimensions underpinning their adaptation processes.

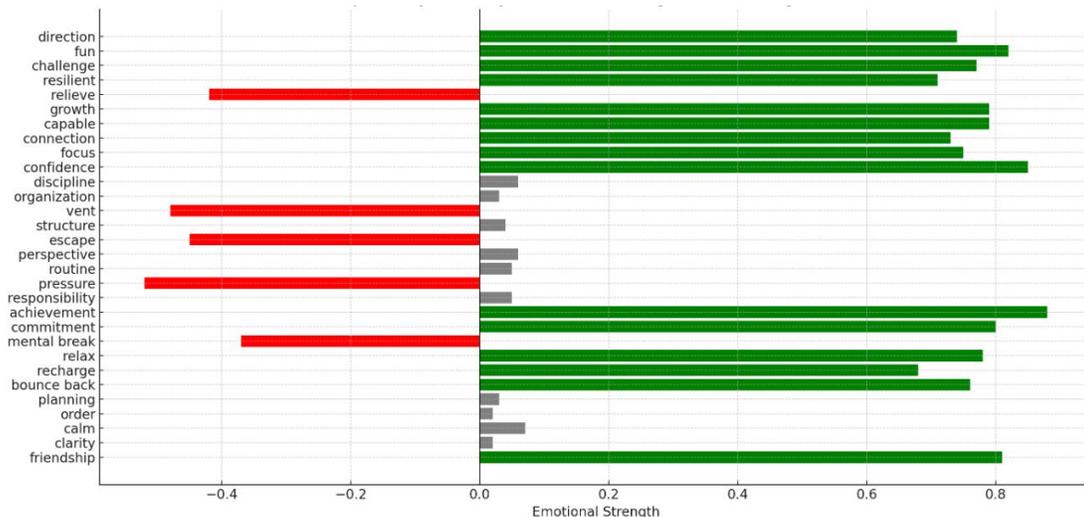
Predominantly, positive affective terms such as "confidence," "empowerment," "belonging," and "achievement" exhibit the highest levels of emotional intensity, suggesting that physical activity fosters a range of constructive psychological states. These findings align closely with the study's broader objective to explore how physical exercise supports emotional regulation and social adaptability. Such affective expressions indicate that engagement in sports not only enhances self-perception and emotional stability but also catalyzes motivational and interpersonal development.

Neutral keywords, including "routine," "structure," and

"planning," although effectively flat, serve a functional role, pointing to the regulatory and organizational dimensions of students' engagement with physical activity. Their prevalence underscores that not all experiential dimensions are emotionally charged, but many contribute to habit formation and time management, which are foundational to adaptive behavior in academic settings.

Importantly, a small subset of negative terms, such as "vent," "coping," and "survival," reflect the ambivalent or stress-buffering dimensions of physical activity, revealing that for some students, exercise is not merely a positive outlet but also a mechanism for managing psychological strain. This complexity supports the need to conceptualize adaptation not as uniformly positive, but as a dynamic process involving multiple emotional trajectories.

In sum, Figure 3 provides both a descriptive and inferential lens through which the emotional textures of students' physical activity experiences can be interpreted. By integrating affective strength with semantic valence, the figure reinforces the study's theoretical positioning—that social adaptation emerges through the interplay of emotional expression, behavioral engagement, and subjective meaning-making within embodied practice.



**Figure 3.** Top 30 keywords by emotional strength.

The integrated findings from the open coding and sentiment analysis reveal the multifaceted and predominantly affirmative role of physical activity in shaping university students' emotional regulation and social adaptability. Through systematic open coding, fifteen core thematic categories were identified—ranging from emotional regulation and peer interaction to self-identity and self-efficacy—each grounded in recurring patterns of participant narratives. These categories underscore the experiential diversity embedded in students' engagement with physical exercise, reflecting both individual psychological processes and broader

interpersonal dynamics.

Sentiment analysis of the coded keywords further substantiated the affective orientation of these experiences. The majority of terms exhibited high positive emotional valence, such as "confidence," "belonging," and "achievement," indicating that physical activity is predominantly perceived as empowering and socially constructive. A smaller subset of neutral terms (e.g., "routine," "planning") and a minimal number of negatively valenced expressions (e.g., "coping," "vent") suggest that while moments of struggle and regulation are acknowledged, they are embedded within a largely

optimistic interpretive framework.

Together, these analytical procedures provide a robust empirical foundation for axial coding by clarifying the emotional, cognitive, and social dimensions of physical activity as interpreted by diverse stakeholders. They also demonstrate that physical activity is not merely an instrumental tool for behavioral adjustment but a symbolically rich, affectively meaningful process through which students construct adaptive identities. This insight serves as a conceptual bridge into the axial coding phase, where the interrelations among these categories will be further theorized to explain the underlying mechanisms of emotional development and social adaptation in the higher education context.

### Axis coding

In grounded theory methodology, axial coding serves as the critical intermediate step between open coding and selective coding, wherein initial codes are regrouped into higher-order categories based on their conceptual relevance and relational coherence (Strauss and Corbin, 1998). While open coding fragments the data into granular thematic units, axial coding aims to “reassemble” these units by identifying patterns, conditional relationships, and central phenomena that reflect participants’ shared

experiences within the context of physical exercise.

The decision to conduct axial coding in this study was driven by the need to reduce thematic redundancy and enhance the explanatory power of the initial codes. By clustering related open codes under broader conceptual umbrellas, the analysis moved from descriptive categorization to interpretive integration. This process entailed examining the interactions among conditions (e.g., psychological states, social contexts), actions (e.g., behavioral engagement in exercise), and consequences (e.g., emotional relief, social competence, self-development), thereby revealing the embedded structures within participants’ narratives.

As a result, seven axial categories were generated—Emotional Regulation, Psychological Empowerment, Social Connection, Identity Formation, Exercise Motivation, Cognitive Structure, and Adaptive Competence. Each of these categories encompasses two or more related open coding categories, reflecting a deeper level of abstraction and meaning condensation. For instance, “Psychological Empowerment” unifies themes from both confidence-building and self-efficacy, while “Social Connection” synthesizes peer interaction, belonging, and empathy development into a cohesive domain.

Table 4 presents the results of this axial coding process:

**Table 4.** Axial coding results based on open coding categories.

<b>Axial coding category</b>	<b>Associated open coding categories</b>
Emotional regulation	Emotional regulation, stress relief
Psychological empowerment	Confidence building, self-efficacy
Social connection	Peer interaction, sense of belonging, empathy development
Identity formation	Self-identity, goal orientation
Exercise motivation	Motivation for exercise, habit formation
Cognitive structure	Time management, cognitive clarity
Adaptive competence	Adaptability, social skills

These seven categories serve as the scaffolding for theoretical reconstruction, linking micro-level codes to macro-level constructs. More importantly, they lay the conceptual foundation for the upcoming selective coding stage, which aims to identify a core category that not only subsumes the axial categories but also provides a unifying theoretical explanation of how university students subjectively construct the meaning of physical activity in relation to emotional regulation and social adaptation.

### Selective coding

In the selective coding phase, this study built upon the foundations of open and axial coding to further abstract and interpret a set of core concepts that are most salient

to the research objective. Selective coding refers to the process of integrating and refining categories to form a coherent theoretical framework by identifying key concepts that function as central nodes of meaning (Corbin, 2017). In this context, the goal was to uncover high-level constructs that effectively explain how university students’ physical exercise experiences contribute to emotional development and social adaptation.

The selection of keywords was informed by a multi-criteria strategy. Specifically, keywords were prioritized based on their frequency in participant narratives, their sentiment intensity as revealed in the emotional polarity analysis, their alignment with axial codes, and their conceptual resonance with the constructs measured in the quantitative component of the study. Through this rigorous comparative and theoretically sensitive approach, fourteen

keywords were ultimately identified as the most representative and explanatory.

These keywords, as presented in Table 5, capture the essential dimensions of embodied experience as understood by students. Terms such as "confidence", "resilience", and "regulate" illustrate how physical activity contributes to enhanced emotional control, self-efficacy, and psychological resilience. Meanwhile, keywords such as "belonging", "interaction", and "support" reflect the socializing function of exercise, emphasizing its role in fostering interpersonal connection, mutual recognition, and social participation. Concepts like "identity" and "insight" illuminate the reflective and transformational

potential of exercise practices, highlighting their contribution to personal meaning-making and self-understanding.

Together, these keywords not only synthesize the findings of previous coding stages but also form the conceptual scaffolding for the subsequent development of an interpretive model. In the next section, a conceptual process model will be proposed to visually articulate the pathway from physical activity to emotional and social outcomes. The results of selective coding thus serve as both a theoretical consolidation of prior analysis and a launch point for mapping the psychosocial dynamics embedded in students' physical exercise experiences.

**Table 5.** Selective coding: Thematically salient keywords and their interpretive meanings.

<b>Keyword</b>	<b>Interpretive meaning in context of study</b>
Confidence	Represents students' enhanced belief in self-worth and capability through mastery in physical performance; critical to both emotional resilience and social assertion.
Belonging	Reflects students' feelings of acceptance and collective identity within exercise communities, contributing to social anchoring and integration.
Regulate	Denotes emotional self-regulation practices facilitated by exercise, such as managing anxiety, frustration, or mood shifts.
Resilience	Emerges from repeated physical challenge and recovery cycles; underscores adaptive emotional coping and social perseverance.
Growth	Encapsulates students' sense of continuous personal improvement, both emotionally and socially, derived from sustained exercise engagement.
Purpose	Expresses how exercise activities provide goal-directed structure and psychological orientation amid academic and social uncertainties.
Interaction	Refers to relational practices developed through sports—such as communication, teamwork, and empathy—that enhance social adaptability.
Motivation	Captures intrinsic and extrinsic drives to maintain exercise habits, often tied to self-care, stress relief, or peer modeling.
Support	Highlights the role of peers and educators in emotionally reinforcing students' engagement, shaping the social meaning of physical activity.
Identity	Reveals how students construct a sense of self—values, roles, and emotional tone—through embodied participation in sports contexts.
Adaptability	Indicates the transfer of exercise-derived flexibility and openness into broader social contexts, particularly in response to transition or environmental challenges.
Control	Pertains to perceived agency and emotional mastery experienced through managing one's body and behavior in structured physical settings.
Insight	Signifies cognitive clarity and emotional awareness gained through introspective engagement in exercise routines.
Habit	Represents behavioral consistency and discipline developed through repeated physical routines, with implications for emotional stability and social predictability.

### **Conceptual process model of physical exercise and psychosocial meaning-making**

To consolidate the analytical findings derived from selective coding and to make visible the relational dynamics among key thematic constructs, this section presents a refined conceptual process model aligned with the core structure of the empirical data. This model encapsulates how university students interpret and assign psychosocial meaning to physical exercise by tracing the

interconnections among physical behaviors, emotional mechanisms, and socially adaptive outcomes. Its construction is informed by grounded theory insights and reflects the layered interpretive processes through which students negotiate emotional development and social adjustment.

As illustrated in Figure 4, the model is organized into three interrelated domains: the initiating conditions of physical exercise, the mediating processes of emotional development, and the resulting outcomes in social

adaptation. These domains are not merely linear stages but interact in ways that allow for recursive interpretation and embodied reflection.

The first domain focuses on Physical Exercise as the behavioral foundation, comprising three key components: Motivation, Routine, and Embodiment. These factors capture students' intrinsic and extrinsic drivers for participation, the habitual integration of physical activity into daily life, and the sensory, bodily engagement that anchors their experiences. This domain marks the practical and affective entry point into the psychosocial process.

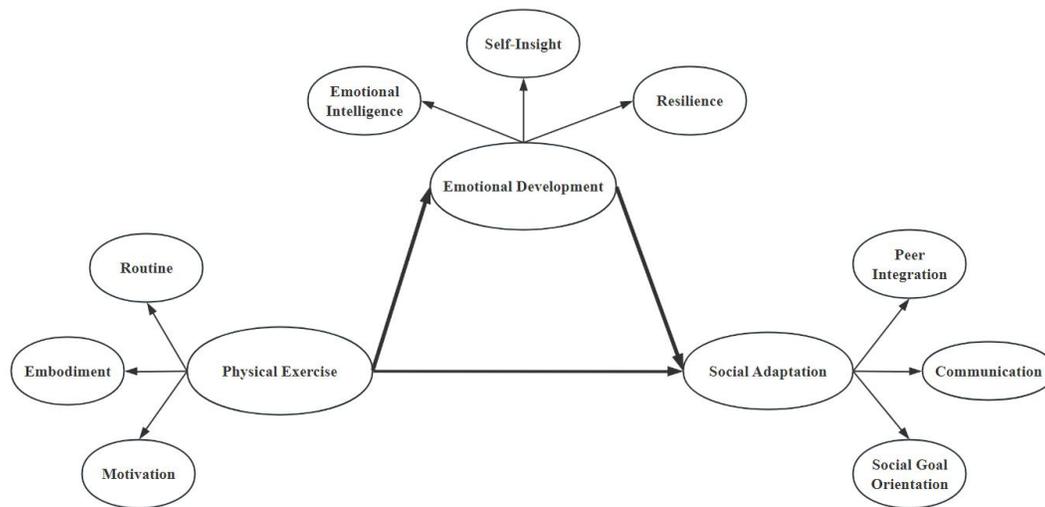
The second domain—Emotional Development—functions as the central mediating layer and is composed of three interdependent psychological constructs: Emotional Intelligence, Self-Insight, and Resilience. These constructs represent the internal transformations through which students regulate emotion, deepen self-awareness, and cultivate adaptive coping strategies in response to stressors and challenges. Rather than treating emotion as a byproduct of exercise, the model foregrounds emotional development as an interpretive and generative mechanism that links physical activity with broader psychosocial outcomes.

The third domain captures the externalized expressions of adaptation, conceptualized as Social Adaptation. This domain includes three socially oriented outcomes: Peer

Integration, Communication, and Social Goal Orientation. These elements reflect how students translate emotional growth into enhanced social functionality—building relationships, improving interpersonal skills, and aligning personal goals with collective norms. Together, they illustrate the outward-facing implications of internal emotional processes shaped by exercise engagement.

At the culmination of these three domains is the synthesized construct of Subjective Meaning Construction, which serves as the integrative endpoint of the model. It captures how students make sense of their physical exercise participation not merely in terms of health or skill, but as a medium through which they negotiate identity, belonging, and psychosocial adjustment in the university context. This construct represents the central interpretive contribution of the study and aligns with the grounded theory objective of theorizing meaning as emergent from practice.

By articulating the sequential and interactive relationships among physical, emotional, and social constructs, the proposed model extends beyond functionalist paradigms to foreground the lived, symbolic, and developmental meanings of exercise. It thereby offers a theoretically grounded account of how physical activity supports university students' psychosocial adaptation and contributes to their holistic development.



**Figure 4.** A process model of psychosocial meaning-making through physical exercise participation.

## DISCUSSION

### Theoretical significance

This study offers a significant theoretical contribution to the interdisciplinary literature on physical activity, emotional development, and student social adaptation by constructing a processual, meaning-centered model

rooted in grounded theory. While previous research has predominantly approached physical exercise as a functional antecedent to psychological outcomes, often measured through variables such as emotional intelligence, resilience, or subjective well-being, these studies have tended to emphasize outcome prediction over the lived, interpretive experiences of student participants (Liu et al., 2023; Wang et al., 2022). In

contrast, the present research reconceptualizes physical exercise as a psychosocially embedded practice through which students construct emotional awareness and socially adaptive capabilities via situated bodily engagement.

A key theoretical innovation of this study lies in its identification of emotional development as a core mediating mechanism in the relationship between physical activity and social adaptation. Whereas prior models often posit emotional intelligence or self-efficacy as discrete mediators (Wang et al., 2022), this study expands the construct of emotional development into three interrelated yet distinct dimensions—emotional intelligence, self-insight, and resilience—each of which emerges as a subjective product of embodied experience. This multidimensional reconceptualization not only enhances the explanatory scope of prior models but also reveals how emotional growth operates as a generative and transformative process rather than a static psychological state.

Particularly novel is the inclusion of self-insight as a separate theoretical construct within the emotional domain. While emotional intelligence has been well-examined in sport psychology, the reflective, interpretive quality of self-awareness has rarely been foregrounded as an independent analytical focus. This study demonstrates that students' engagement in physical activity often facilitates introspective understanding of their roles, identities, and emotional triggers—insights that are foundational to self-regulation and psychological resilience. The addition of self-insight enriches prevailing theoretical models by bridging affective and cognitive dimensions of emotional experience.

Furthermore, this research reframes social adaptation as a composite outcome composed of peer integration, communication competence, and social goal orientation, thereby advancing a more nuanced and developmentally grounded understanding of student adaptation. Existing literature has largely treated social adaptability as either a personality trait or a behavioral output (Liu et al., 2023), often mediated by self-esteem or social-emotional skills. By contrast, this study demonstrates that social adaptation is not simply an endpoint, but rather a processual outcome—one that is progressively enabled by emotionally mediated self-construction and sustained through relational engagement. This repositioning contributes to a more integrative theory of psychosocial adjustment in higher education.

Equally important is the theoretical lens employed. This study is grounded in social constructivism (Keaton and Bodie, 2011) and practice theory (Rouse, 2007), departing from positivist models that treat behavior as objective and universally interpretable. In doing so, it challenges the dominant functionalist paradigm by situating meaning-making as an emergent product of interactional, emotional, and bodily routines. Physical activity is thus reimaged not as a fixed treatment variable but as a contextualized social

practice through which identity, affect, and relational capability are negotiated.

Finally, the model developed in this study contributes to bridging qualitative and quantitative paradigms. While previous studies using structural equation modeling have clarified directional relationships among predefined constructs (Wang et al., 2022), the present research inductively maps the subjective interpretive processes through which students make sense of these relationships in lived practice. The conceptual coherence between emotional, cognitive, and social domains provides a viable theoretical framework for future mixed-methods investigations, especially in the context of youth development, university mental health, and educational policy.

Furthermore, the integration of sentiment analysis strengthens the empirical foundation of the model by confirming that students predominantly associate physical exercise with positively valenced emotional states such as confidence, belonging, and growth. This affective landscape not only supports the conceptual categories generated through grounded coding but also provides auxiliary evidence for the emotional salience of exercise in student narratives, thereby enhancing the theoretical robustness of the emotional development construct.

In sum, the theoretical contributions of this study are fourfold: (1) it expands emotional development into a multidimensional construct with interpretive depth; (2) it introduces self-insight as an emergent affective-cognitive mediator; (3) it reconceptualizes social adaptation as a meaning-based process of psychosocial construction; and (4) it advances a constructivist-practice-based framework that shifts the analytical focus from input-output models to embodied meaning-making processes. These contributions collectively enhance the granularity, depth, and contextual validity of existing theories at the intersection of education, psychology, and sociology.

## Practical implications

The insights generated by this study hold considerable practical relevance for multiple stakeholders within the higher education ecosystem, particularly those engaged in promoting student well-being, emotional development, and social integration. By revealing how physical exercise acts as a meaning-making process through which students negotiate emotional regulation, self-understanding, and relational positioning, this research invites a fundamental rethinking of how universities conceptualize and implement physical education and developmental support.

For instructors and curricular designers responsible for physical education programs, the findings challenge the conventional view of exercise as an isolated skill-training activity. Instead, they point to physical activity as a psychosocial space where students not only build bodily discipline but also process emotional states, reflect on

their identities, and develop adaptive coping strategies. This requires a pedagogical realignment: instructional practice should move beyond technical performance to incorporate moments of emotional reflection and interpersonal engagement. Facilitating student narratives around exercise experience, embedding collaborative routines that foreground empathy and mutual support, or integrating psychosocial themes into course content are all viable directions for transformation. Such redesigns would make physical education not merely a site of exertion, but a medium of emotional literacy and social learning.

The implications extend further into the domain of student mental health. As emotional development emerges in this model not as a fixed trait but as a relational and embodied outcome of exercise, mental health practitioners in universities can explore physical activity as a complementary, low-threshold intervention for promoting emotional resilience. This is especially salient in contexts where formal counseling services are overstretched or culturally stigmatized. Exercise-based emotional literacy workshops, peer-facilitated movement groups that integrate reflective dialogue, and collaborative journaling around bodily experiences may all serve as accessible formats to help students cultivate emotional awareness without clinical framing. Interdepartmental cooperation between sports programs and psychological services would be essential in sustaining such initiatives.

Administrators and student affairs professionals are equally implicated in this new understanding. The model illustrates that social adaptability is not simply a matter of participation in group activities but is shaped through internal processes of emotional self-regulation and interpretive meaning-making. This insight suggests that programming aimed at enhancing student belonging or communication efficacy must work in tandem with emotionally grounded experiences. Designing inclusive sport-based events that privilege dialogue, trust-building, and collaborative goal-setting can offer both social and affective benefits. When such initiatives are aligned with institutional transition programs—such as first-year orientation, intercultural communication training, or leadership development—they can scaffold student adjustment across emotional and social domains simultaneously.

From a governance perspective, the findings advocate for the integration of physical activity within the core developmental architecture of universities. Rather than relegating exercise to the margins of co-curricular offerings, institutions should embed movement practices within broader strategies for student success, psychological well-being, and graduate preparedness. This could involve incorporating physical engagement metrics into learning analytics systems, developing campus-wide developmental portfolios that link physical activity to personal growth outcomes, or institutionalizing wellness as a cross-cutting theme across academic and extracurricular domains. In policy terms, such shifts

resonate with national and global frameworks—such as the “Healthy China 2030” agenda—that emphasize student wellness as a multidimensional, policy-relevant concern.

Ultimately, the study's findings encourage students themselves to reframe how they relate to physical exercise—not as an obligation or an output-driven task, but as an opportunity for self-exploration, emotional recalibration, and meaningful connection. Cultivating this mindset requires cultural change, which may be advanced through storytelling initiatives, peer role-modeling, and integrative feedback systems that validate students' affective and relational growth alongside physical performance.

The results of sentiment analysis further support the practical significance of this study, revealing that students primarily articulate their exercise experiences through a lexicon of positive emotions. This suggests that emotional literacy and confidence-building should be foregrounded in the design of physical activity programs. Institutions may consider using narrative-based or affective feedback mechanisms—such as emotion tracking, reflective writing, or digital mood logs—to monitor students' emotional trajectories within physical education, thereby aligning program design with students' psychological realities.

By offering a theoretically grounded yet empirically actionable account of how physical exercise supports emotional development and social adaptation, this study contributes not only to scholarly debates but to institutional strategies for cultivating flourishing, emotionally attuned, and socially resilient student populations.

## Conclusion

This study investigated how university students construct subjective meaning from their physical exercise experiences, particularly in relation to emotional development and social adaptation. Drawing on a qualitative research design rooted in grounded theory, data were collected through semi-structured interviews with students, physical education instructors, and employer representatives from higher education institutions in Guizhou Province, China. Through a multi-stage coding process—comprising open, axial, and selective coding—the study identified fifteen core thematic categories, which were subsequently integrated into a three-domain conceptual model. This model elucidates the sequential and interpretive relationship between physical exercise (operationalized through motivation, routine, and embodiment), emotional development (captured through emotional intelligence, self-insight, and resilience), and social adaptation (expressed via peer integration, communication, and social goal orientation). The findings demonstrate that physical activity, far from being a merely instrumental practice, serves as a psychosocial process through which students regulate emotions, reflect on self-

identity, and negotiate social belonging. In addition to the model's structural insights, sentiment analysis revealed a strong predominance of positively valenced emotional expressions linked to physical activity, reinforcing the role of exercise as a vehicle for emotional upliftment and social belonging. These findings add empirical weight to the study's conceptual framework and highlight the affective dimension of meaning-making as a critical avenue for future inquiry.

Theoretically, this research contributes to the literature by reconceptualizing emotional development as a central mediating process and by introducing self-insight as a novel dimension of exercise-based affective transformation. The model also expands the construct of social adaptation, shifting it from a behavioral endpoint to a meaning-based psychosocial outcome. These insights challenge functionalist and variable-centered approaches, offering instead a constructivist-practice framework for understanding the developmental role of physical exercise. Practically, the study provides actionable implications for physical education curriculum design, mental health interventions, student affairs programming, and institutional governance. It advocates for integrative strategies that reposition physical activity as a core medium for cultivating student emotional resilience, interpersonal capacity, and holistic growth within the university context.

Despite its contributions, this study is not without limitations. First, the research is contextually bound to higher education institutions in a specific province of China, and while the socio-cultural richness of the region enhances the depth of analysis, it may limit the generalizability of the findings to other geographic or institutional settings. Second, as a qualitative inquiry, the emphasis on meaning-making processes precludes causal inference, and future studies may consider using mixed-methods or longitudinal designs to examine how emotional and social development evolves over time with sustained exercise engagement. Additionally, while the model foregrounds interpretive dimensions, it does not fully account for structural or material constraints—such as access to sports facilities or sociocultural norms around gender and physicality—that may shape students' participation and meaning construction. Future research may build on this study by extending the model across diverse cultural contexts, integrating intersectional perspectives, or quantitatively validating the emergent constructs through large-scale surveys. In doing so, subsequent investigations can further clarify how embodied practices shape not only student development but also institutional cultures and policy design in higher education.

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