Article

Biomechanical mechanisms of psychological stress and their implications for ideological and political education in higher education

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Abstract: Investigating the impact of psychological stress on the neural system from a biomechanical perspective has become a significant interdisciplinary research focus. Chronic psychological stress, through the interplay of endocrine and neural axes, profoundly affects cellular metabolism and neural plasticity. These biomechanical changes not only compromise the adaptive capacity of the neural system but also impair learning efficiency. In the post-pandemic era, heightened social pressures have exacerbated psychological burdens, further disrupting the development of students' cognitive abilities. Research indicates that disruptions in circadian rhythms and a reduction in biomechanical stimulation within online learning environments contribute to the accumulation of chronic psychological stress, subsequently affecting the homeostatic regulation of neurotransmitters. Based on biomechanical principles, this study proposes that ideological and political education in higher education should prioritize students' mental health by incorporating biomechanical intervention strategies—such as psychological stress monitoring, exercise interventions, and counseling—into online teaching environments. These measures aim to optimize neural adaptability, alleviate stress, and promote emotional regulation, thereby enhancing learning efficiency. This research offers a novel perspective on ideological and political education that integrates mental health considerations from a biomechanical standpoint and provides a theoretical foundation for the development of intelligent education support systems based on biomechanical principles.

Keywords: post-epidemic era; psychological well-being; biomechanics; neural plasticity; online teaching; higher education

1. Introduction

From both psychological and biomechanical perspectives, individual differences are shaped by inherent biological conditions and environmental influences. In the context of psychological well-being, these differences manifest as diverse emotional and cognitive responses, influenced by neural plasticity and mechanobiological interactions. The post-epidemic era has introduced novel psychological challenges, including heightened stress responses and shifts in emotional regulation, driven by factors such as fragmented learning experiences and prolonged online social interaction [1,2]. These challenges highlight the critical importance of integrating psychological well-being into educational strategies that address individual differences at both psychological and cellular levels. In higher education, ideological and political education plays a pivotal role in fostering emotional engagement and promoting mental resilience. By utilizing methods grounded in emotional and cognitive science, educators can enhance students' intrinsic motivation and academic performance, thereby improving their psychological well-being. For instance, emotional resonance between teachers and

students activates neural networks associated with empathy and learning, reinforcing cognitive and emotional development [3]. Psychological well-being forms a foundational framework for character development and coping mechanisms, equipping students with essential tools to navigate life's challenges.

The post-epidemic era necessitates innovative strategies to integrate ideological and psychological well-being education. While online social interactions enable greater connectivity, they also pose risks, such as over-reliance on virtual platforms and exposure to negative stimuli. Long-term online education will cause circadian rhythm disorders and reduced motor mechanical stimulation, which will lead to long-term accumulation of psychological stress and affect the homeostatic regulation of neurotransmitters, thereby affecting learning efficiency. Educational administrators must implement targeted interventions to encourage balanced social interactions, aiding students in managing the complexities of both online and offline relationships. This includes fostering social cognition, empathy, and emotional regulation, all of which are critical for maintaining mental health [4].

In practice, integrating ideological and psychological education in higher education institutions faces challenges such as resource duplication and student fatigue due to overlapping activities. A streamlined approach that blends curricular and extracurricular elements can increase the effectiveness of these initiatives, reducing student burdens while enhancing educational outcomes [5]. This paper investigates the relationship between ideological and psychological education from a biomechanical perspective, underscoring the necessity of a coordinated approach that combines the strengths of both fields.

The COVID-19 pandemic has had a profound impact on psychological well-being, revealing vulnerabilities such as increased rates of depression, anxiety, and insomnia among students. Chronic psychological stress generated in the post-pandemic era negatively affects students' fitness by profoundly influencing cellular metabolism and neuroplasticity through endocrine-neural axis linkage mechanisms. Research shows that these conditions are exacerbated by chronic stress and disruptions to daily routines, emphasizing the need for proactive psychological interventions [9–12]. By integrating ideological and psychological education, higher education institutions can create a synergistic system that fosters mental health and resilience [13–15].

The incorporation of fragmented learning into psychological well-being education presents both challenges and opportunities. While some students face difficulties due to the distractions inherent in digital learning environments, others benefit from increased efficiency through self-directed learning. This underscores the importance of tailored educational strategies that accommodate students' diverse needs [16]. Additionally, developing a well-trained team of educators with interdisciplinary expertise can improve the delivery of psychological and ideological education, supporting the holistic development of students [17,18].

This study explores the negative impact of psychological stress on students from a biomechanical and systemic perspective, highlighting the necessity of integrating ideological and political education with psychological education in higher education. By analyzing the content, methods, and principles of this integration, the study proposes practical measures to address the challenges of the post-pandemic era. The

objective is to enhance teaching quality, improve mental health outcomes, and support the broader mission of higher education institutions in talent cultivation and social contribution [19].

2. Analysis of the teaching mode of institution of higher learning in the post-epidemic era

2.1. The role of network ideology and politics in teaching

During the epidemic, high-efficiency students primarily relied on online courses, showcasing the functional advantages of new online media in transcending temporal and spatial barriers. The internet seamlessly connects teachers and students, enabling students to receive ideological education from the safety of their homes. In disseminating classroom information, online media facilitates the transmission of ideological education content across time and space, revolutionizing traditional methods, adopting diversified formats, exploring new pathways, and enhancing both efficiency and quality. Internet-based ideological education not only deepens students' understanding of knowledge but also profoundly influences their ideological concepts and psychological well-being. During online teaching, students who were less active in offline classrooms exhibited higher motivation and participation, demonstrating the adaptability of online pedagogy to engage diverse learners. At the same time, teachers gained internet knowledge and application skills, using popular online vocabulary to foster closer teacher-student interaction. The integration of internet thinking has become a pivotal element in enhancing the interactive nature of ideological education [20].

Despite these advancements, the practical application of online ideological education during the epidemic revealed significant challenges, particularly in terms of unified scheduling and management [21]. The lack of standardized regulations has limited its potential, highlighting the need for systematized frameworks. Cheng and Lan's [22] exploration of the PERMA model in college mental health education provides valuable insights into addressing these issues. This model emphasizes positive education frameworks that align well with the psychological and emotional demands of the post-epidemic era, offering a structured approach to enhance student engagement and resilience. Schools implemented initiatives such as ideological and political cloud classrooms, leveraging new media to provide psychological interventions during public emergencies. These efforts underscore the practicality of online ideological education, which must continue to evolve to meet the demands of epidemic prevention and broader socio-political needs.

2.2. Biomechanics brings help to online ideological and political education

To further enhance online ideological education, higher education institutions can adopt interdisciplinary approaches by integrating global perspectives. For example, Macdonald et al. [23] discuss the importance of incorporating kinesiology into educational narratives, which parallels the interdisciplinary integration of ideological education and psychological well-being. By embedding physical and

mental health education frameworks, institutions can foster well-rounded and resilient students prepared to navigate complex challenges. Biomechanics-based strategies, as discussed by Han and Wang [24], offer further opportunities to integrate physical and cognitive activities into online curriculum design, promoting psychological well-being and mental health during this period. By incorporating physical movement, stress reduction techniques, and interactive activities, biomechanics can support cognitive engagement and enhance students' emotional regulation during online learning. These strategies encourage a holistic approach to online education, which aligns with the need for emotional resilience and mental health care in the post-epidemic educational environment.

Integrating biomechanical strategies into education offers multiple benefits. First, the integration of physical movement with cognitive activities optimizes neural system function. Appropriate exercise interventions can enhance neurotransmitter secretion and cerebral blood flow, promoting neuroplasticity and subsequently improving attention, memory, and learning efficiency. Second, these strategies contribute to emotional regulation and stress alleviation. Aerobic exercise, dynamic stretching, and biofeedback-based posture adjustments can reduce stress hormone levels, mitigate anxiety and stress, and enhance students' emotional resilience. Additionally, biomechanical interventions facilitate the development of a comprehensive health promotion system that integrates physical and mental well-being, improving posture and cognitive engagement in online education while counteracting the negative effects of prolonged sedentary behavior.

This multidisciplinary approach not only addresses current educational gaps but also aligns online ideological education with long-term institutional goals. The post-epidemic era demands that online ideological education reform in a more institutionalized direction, ensuring that it remains relevant and responsive to the changing landscape of higher education.

2.3. Analysis of teachers' willingness to teach in the online teaching mode

The term "post-epidemic era" in this article does not imply the complete end of the epidemic. Instead, it represents a relative temporal concept, referring to the phase in which the teaching order is being fully restored under the framework of normalized epidemic prevention and control. During this recovery phase and beyond, online teaching has become and will continue to be an indispensable component of teaching and learning in institutions of higher learning. Therefore, in the context of education, this phase is referred to as the post-epidemic era.

Attitude, in psychological terms, refers to an individual's learned tendency to make evaluative responses to an object, often expressed persistently through approval or disapproval. Explicit attitudes are typically characterized by conscious evaluations of an object. This paper focuses on two survey questions designed to explore attitudes toward online teaching. The first question examines whether teachers, after the large-scale epidemic, are inclined to continue adopting online teaching, entirely revert to traditional methods, or prefer a hybrid model combining online and offline teaching. This question assesses teachers' preferences regarding

online teaching. The second question delves deeper into what aspects of online teaching require strengthening or improvement if it is to be continued.

The data used in this study were collected from a survey conducted among university teachers. The survey includes questions about their willingness to continue using online teaching, adopt a hybrid teaching model, or discontinue online teaching entirely. For each sub-question, six levels of willingness were provided: "don't know," "unwilling," "less willing," "average," "willing," and "very willing." The frequency and percentage of various teaching attitudes are summarized in **Table 1**.

Table 1. Frequency of teachers' willingness to continue to adopt online teaching after the epidemic.

Options	Continue to use online teaching		Adopt online + offline blended teaching		No online teaching	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Do not know	79	0.6%	63	0.5%	504	3.5%
Unwilling	3265	23.4%	981	7.1%	3914	27.3%
Generally	4324	31.0%	2184	15.9%	6810	47.5%
Original intention	6283	45.0%	11,387	77.9%	3111	21.7%
Total	13,951	100.0%	13,761	100.0%	14,339	100.0%

From **Table 2** and **Figure 1**, it can be seen that 77.9% of college teachers are willing to use online + offline hybrid teaching after the epidemic, 45.0% of teachers are willing to continue to use online teaching, and 21.7% choose not to use online teaching. In order to analyze and study the influence of teachers of different background groups on their explicit online teaching attitudes, this paper adopts statistical methods such as descriptive statistical analysis, chi-square test, one-way ANOVA, and multiple comparisons to examine whether there are significant differences in teachers' attitudes towards online teaching and suggestions for improvement across different background groups.
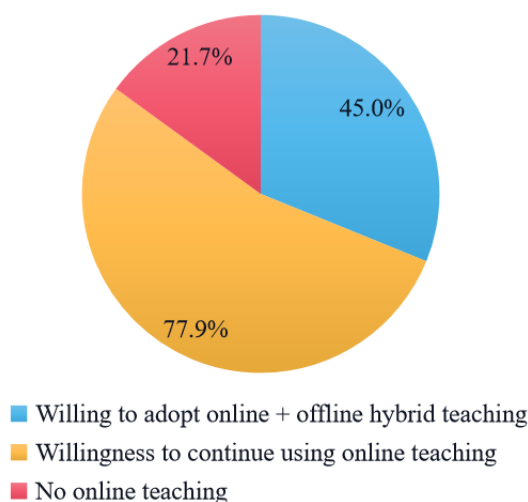

Figure 1. Teachers' willingness to continue to adopt online teaching after the epidemic.

First, exploratory factor analysis was conducted to identify the common factors underlying the improvement suggestions, resulting in three factors with eigenvalues greater than 1. Three new data columns were created to represent the average scores of items related to each main factor. Variance analysis was then performed, combining the basic information of teachers and the data on teachers' attitudes toward online teaching to observe significant differences and trends.

Table 2 and **Figure 1** show the differences in teachers' opinions on online teaching improvement from different background groups.

Table 2. Factor analysis total variance.

Common factor	Extract the load sum of squares			Rotational load sum of squares		
	Total	**Percent variance**	**Accumulation (%)**	**Total**	**Percent variance**	**Accumulation (%)**
Student	10.083	56.024	56.024	4.497	24.981	24.098
Teacher	1.427	7.924	63.694	4.314	23.963	48.924
Network platform	1.231	6.831	70.877	3.931	21.837	70.787

In this paper, the three attitudes of teachers towards online teaching in the post-epidemic era were tested using the chi-square test with relevant background information of teachers. It was found that the attitudes towards the continuous use of online teaching and the non-use of online teaching did not have statistical significance with any background information variables. However, the online + offline blended teaching mode showed statistical significance. Therefore, this paper conducts a separate statistical analysis of blended teaching.

The study considers the teacher groups categorized by their attitudes toward continuing online teaching in the post-epidemic era, adopting online + offline hybrid teaching, and adopting offline teaching (unwilling, general, willing) as independent variables. The three public opinion factors regarding the improvement of online teaching are used as dependent variables. Without considering the influence of other variables, a one-way analysis of variance was conducted to examine whether there are significant differences in online teaching improvement opinions among teachers with different attitudes.

Before the epidemic, significant differences were observed between teachers who conducted online teaching and those who did not in terms of their opinions on the improvement of online teaching and related networks. Teachers who engaged in online teaching demonstrated higher requirements and expectations for network-related improvements.

Teachers who have used online teaching exhibit the highest willingness toward the three categories of improvement opinions. Conversely, the lowest number of teachers express unwillingness regarding teacher improvement opinions, while the fewest teachers exhibit neutral (general) attitudes toward student improvement opinions. Despite these variations, the average value for improvement opinions related to students is the highest among the three categories. In comparison, the average value for teacher-related improvement opinions is the lowest, with network-related improvement opinions falling in the middle, as illustrated in **Figure 2**.

Furthermore, teachers' prior experience with online teaching before the epidemic significantly influences their attitudes. Teachers who had conducted online teaching prior to the epidemic demonstrated a higher degree of willingness toward both teacher and network-related improvement opinions. In contrast, those without prior online teaching experience exhibited lower levels of willingness. This indicates that previous exposure to online teaching positively impacts teachers' attitudes toward its improvement and adoption.
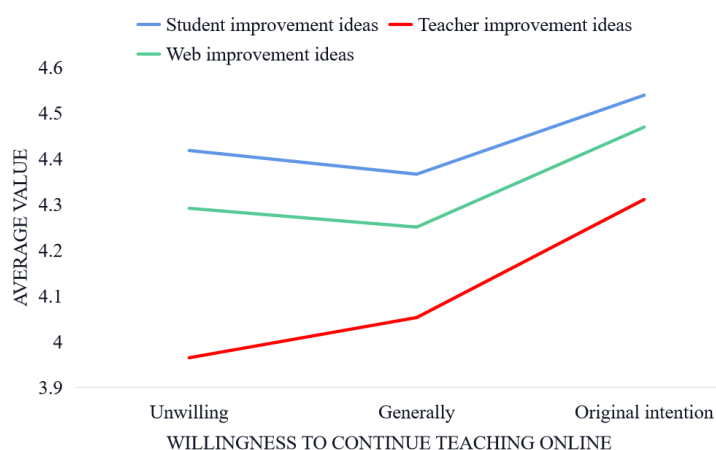

Figure 2. The mean willingness to improve opinions of teachers who continue to use online teaching.

2.4. Analysis of mental health status and the negative impact of psychological stress in the post epidemic era

The influence of psychological well-being education on ideological education is a dynamic and reciprocal process, rather than a one-way interaction. This mutual influence not only directly impacts ideological education but also shapes the development of psychological well-being education itself. At its core, all human conscious behaviors and expressions stem from psychological cognition, which governs emotions, thoughts, willpower, and other transient mental states. Ideological education focuses on shaping individuals' thoughts, political perspectives, and moral values, aiming to correct inappropriate behaviors and attitudes. It serves as a foundation for psychological well-being education in higher education institutions. In higher education, some students struggle to maintain a balanced mindset, failing to objectively assess their circumstances or adapt to new learning and living environments. These students are often prone to psychological distress, lack accurate self-awareness, and face difficulties in identifying their strengths and weaknesses. This highlights the need for psychological well-being educators to integrate sound ideological and political beliefs into their guidance. By instilling accurate and positive worldviews, life views, and values ("three views"), educators can better understand students' psychological traits and address their challenges. A sound ideological framework enables students to evaluate themselves accurately, understand society objectively, and foster harmonious interpersonal relationships, ultimately cultivating an optimistic and healthy psychological state.

In the post-epidemic era, students have faced significant psychological challenges, including anxiety, stress, depression, and a sense of crisis due to the

trauma induced by the COVID-19 pandemic. From a biomechanical perspective, psychological stress triggers continuous secretion of stress hormones such as cortisol through activation of the hypothalamic-pituitary-adrenal (HPA) axis, thereby altering neuroendocrine homeostasis and neurotransmitter equilibrium. This cascade not only impairs neural plasticity but also compromises the functional integrity of critical brain regions (e.g., the hippocampus and prefrontal cortex), significantly affecting cognitive domains including memory consolidation, attentional allocation, and executive decision-making [25]. Prolonged psychological distress further induces chronic sympathetic nervous system activation, precipitating musculoskeletal manifestations such as persistent muscle tension, postural deviations, and impaired motor coordination. Concurrently, these biomechanical perturbations disrupt energy metabolism and hemodynamic regulation, exacerbating fatigue accumulation and immunosuppressive conditions. The multisystemic consequences of psychological stress mediated through biomechanical pathways necessitate interdisciplinary interventions. To address post-pandemic psychological trauma, comprehensive biomechanical rehabilitation strategies incorporating stress mitigation, neural circuit remodeling, and somatic regulation should be systematically implemented. Such integrated approaches demonstrate dual efficacy in restoring neurophysiological balance while optimizing systemic well-being and learning efficiency through synchronized neuromodulatory and biomechanical realignment.

To foster strong psychological literacy, students must develop resilience, an optimistic outlook on life, and exemplary moral character. However, psychological well-being education alone cannot fully achieve these outcomes. The cultivation of a positive mental state requires a solid foundation in ideological literacy. Therefore, comprehensively understanding and addressing the psychological well-being of students is a critical task.

Moreover, incorporating biomechanical principles into the teaching framework can further support the psychological well-being of students. By integrating physical activities, stress reduction techniques, and neural plasticity strategies, higher education institutions can promote both cognitive and emotional resilience, helping students better adapt to the post-epidemic challenges.

In this study, SPSS 21.0 was employed for data analysis, including descriptive statistics and independent sample t-tests, with a significance level set at $P < 0.05$. The statistical findings provide insight into the psychological well-being status of students, as detailed in **Table 3**.

Table 3. Psychological well-being status of students.

Project	Psychological well-being status ($m \pm sd$)	t
Psychotic symptoms	1.92 ± 0.35	19.48***
Suicidal behavior and intentions	1.74 ± 0.64	10.21***
Anxiety	2.39 ± 0.24	22.05***
Depression	2.49 ± 0.36	21.28***
Paranoid	2.34 ± 0.42	21.81***
Self-abasement	2.45 ± 0.25	20.22***
Sensitive	2.72 ± 0.34	29.04***

Table 3. (*Continued*).

Project	Psychological well-being status ($m \pm$ sd)	t
Social anxiety	2.49 ± 0.64	21.45***
Somatization	1.95 ± 0.38	10.17***
Rely	2.51 ± 0.25	20.86***
Hostile attack	2.09 ± 0.42	16.74***
Impulse	2.60 ± 0.39	24.40***
Force	2.67 ± 0.41	24.11***

The study found that academic and employment stress are key factors affecting the psychological well-being of students. During the epidemic, shifts in teaching methods, increased learning challenges, and significant reductions in recruitment opportunities have exacerbated these pressures. As such, strengthening psychological well-being education in higher education institutions, particularly from the perspectives of academics and employment, is critical to addressing students' psychological challenges. Chen et al. [26] emphasized the importance of constructing evaluation models for university ideological and political education effects to enhance overall education quality and psychological support. Unlike middle school education, university education demands higher levels of autonomy, professionalism, and exploration from students. Concurrently, students face multiple pressures, including academic tasks, thesis defenses, and internships. To alleviate these stresses, departments should provide tailored academic and career guidance based on the characteristics of their respective disciplines. This could include freshman orientation programs, peer mentoring between new and senior students, faculty introductions, and workshops on effective study methods. For senior students, targeted thesis writing guidance, further education counseling, and employment support—such as career planning, school-enterprise partnerships, and psychological counseling under stress—should be prioritized. These measures aim to guide students in navigating their academic journey smoothly. Cheng and Lan [27] explored the application of the PERMA model in mental health education, highlighting its utility in fostering resilience and well-being in university students.

The purpose of ideological education is to enhance students' ideological awareness and moral quality. It primarily focuses on cultivating students' worldviews, life outlooks, and values while addressing societal expectations regarding individual ideological, political, and moral norms. Ideological education also emphasizes teaching students to understand nature, society, and the nation and to navigate the relationship between personal and national interests. However, it has certain limitations. Ideological education often overlooks the development of students' self-awareness and personality psychology, offering limited guidance in other areas of personal development. Moreover, it places insufficient emphasis on improving students' psychological resilience and overall mental health. Jin et al. [28] highlighted the importance of integrating biosensor-based monitoring into ideological and political education interventions to address gaps in students' psychological resilience. These shortcomings significantly impact the individual

growth of students' psychological well-being and their receptivity to ideological education.

Psychological well-being education addresses these deficiencies by focusing on students' attitudes toward themselves and their understanding of the objective world. Individuals with strong psychological well-being possess high self-regulation abilities and are free from personality defects or obstacles. Unlike the traditional educational approach of ideological education, which often relies on indoctrination and overlooks the psychological activities of students, psychological well-being education emphasizes subconscious structures and self-awareness. Meng [29] proposed optimizing mental health assessment and ideological-political intervention strategies using biological analysis to create a more student-centric approach. This approach creates a conducive psychological environment for students to internalize correct ideological concepts, expand the scope of ideological education, and enhance its effectiveness. Pillay et al. [30] further demonstrated how criticality in healthcare education could support broader well-being, suggesting transferable practices to other educational contexts. By integrating psychological well-being education with ideological education, institutions can foster the holistic development of students, ultimately contributing to their intellectual, emotional, and moral integrity.

3. Research on the effectiveness of ideological, political and psychological well-being teaching in the post-epidemic era

3.1. Influencing factors of college teachers' information technology application ability

In the context of the post-epidemic era, enhancing and cultivating teachers' information technology capabilities to adapt to teaching reform has become an inevitable trend for the development of online and offline hybrid teaching. The advancement of information technology has introduced a wide array of tools into the field of education, enabling the use of diverse equipment and methods in classroom instruction. For instance, during the pre-class preparation stage, teachers can record micro-course tutorial videos and use diagnostic tests to assess students' initial learning levels through information technology. In classroom teaching, immersive technologies like virtual reality (VR) can enhance students' experiential learning, while artificial intelligence (AI) can be used to teach foundational knowledge and skills. In the post-class guidance stage, information technology can streamline processes such as homework correction, result analysis, and diagnostic evaluations. Based on the influencing factors and issues identified through questionnaire surveys and video analyses, this study proposes strategies across five key dimensions of information technology application ability: technical skills, pedagogical integration, learning design, organizational support, and evaluation competencies. Specific recommendations include establishing robust support systems and policies, actively reshaping traditional educational concepts, and strengthening training in evaluation skills. Tailored training programs should be designed to address the unique characteristics of each dimension, ensuring targeted development of teachers' capabilities.

Moreover, psychological well-being education plays a critical role in fostering resilience and emotional depth among students. Ideological and political educators in higher education must continually innovate their teaching methods to resonate deeply with students. This includes leveraging new media and adopting engaging approaches that integrate real-life narratives. For instance, the stories of unsung heroes during the pandemic—ordinary individuals who demonstrated extraordinary courage—offer rich material for ideological education. By transforming these narratives into meaningful educational resources, educators can enhance the relevance and impact of their lessons. Such efforts bring psychological well-being education closer to students' realities, improving its effectiveness and alignment with their experiences.

The integration of biomechanical principles into online and offline teaching practices can further support students' psychological well-being. Through strategies that incorporate physical activity and stress reduction techniques, educators can provide students with additional tools to manage academic pressures, promoting emotional regulation and mental resilience. Combining these approaches with information technology can create a more holistic educational experience that nurtures both the cognitive and emotional development of students.

Finally, improving teachers' information technology capabilities requires a combination of internal and external support mechanisms. These include strategic investments from relevant departments, enhanced software and hardware resources, and the establishment of comprehensive institutional frameworks. Schools must also prioritize infrastructure development, scheduling, and resource allocation to support these initiatives effectively. The reliability and validity of the questionnaire used in this study, along with the analysis of each dimension, are presented in **Table 4**.

Table 4. Reliability analysis of each dimension of the questionnaire.

Dimension	Cronbach coefficient	Number of items
Information technology literacy	0.952	11
Planning and preparation	0.901	8
Organization and management	0.994	9
Assessment and diagnosis	0.937	13
Learning and development	0.997	14

The Cronbach's coefficient of this questionnaire is greater than 0.8, indicating that its internal consistency is high and the reliability of the scale is very good. The coefficients of each dimension were all higher than 0.9, and the Cronbach's α value of the five dimensions were all greater than 0.8, indicating that the overall reliability of the questionnaire was good.

There are 11 questions in the descriptive analysis of technical literacy, and the data is organized as shown in **Figure 3**.

Figure 3. Descriptive analysis data of technical literacy.

According to **Figure 3**, it can be considered that information technology has had a positive and far-reaching impact on online teaching during the epidemic.

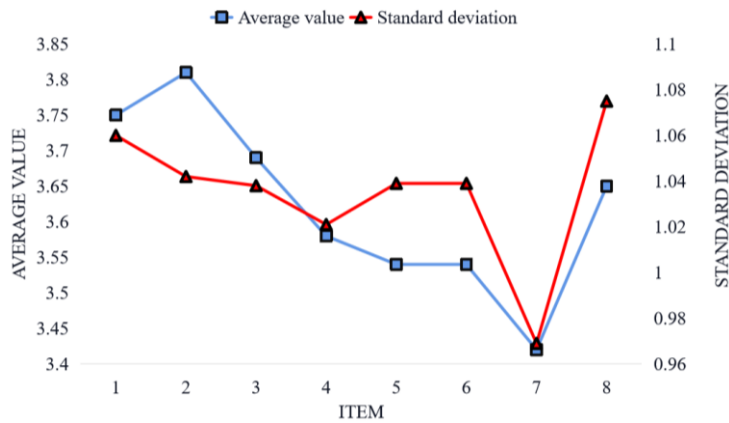A descriptive analysis of planning and preparation is shown in **Figure 4**.

Figure 4. Descriptive analysis data for planning and preparation.

It can be seen from **Figure 4** that after the epidemic, the average score of using information technology reasonably according to learning objectives is higher; the score is lower in predicting problems, processing digital resources, and normal use of equipment. Explain the need to strengthen the use and learning of equipment and educational resources.

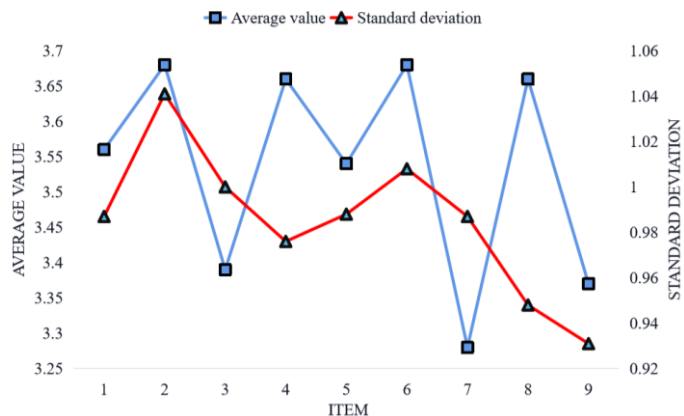A descriptive analysis of organization and management is shown in **Figure 5**.

Figure 5. Descriptive analysis results of organization and management.

It can be seen from **Figure 5** that there is a slight deficiency in choosing appropriate information technology to improve their teaching methods. There is also little use of information technology to collect feedback from students and to make adjustments and appropriate interventions in a timely manner. These are all manifestations of incomprehension of the concept of informatization teaching and the inability to convert the teaching concept in time. The organizational and management capabilities of the application of information technology need to be improved.

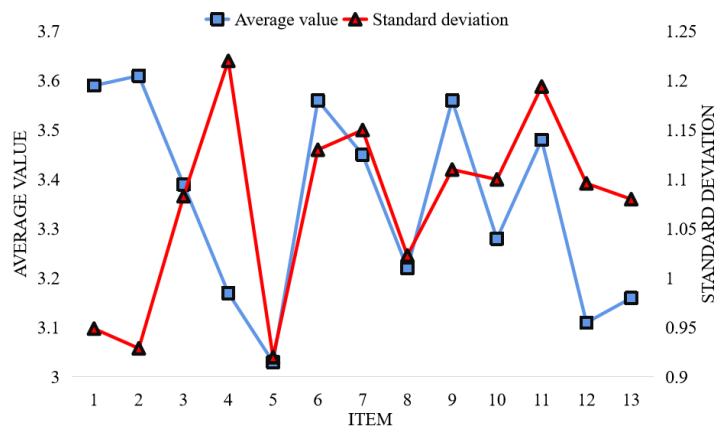A descriptive analysis of assessment and diagnosis is shown in **Figure 6**.

Figure 6. Descriptive analytics data for diagnosis and assessment.

It can be seen from **Figure 6** that teachers ignore the data analysis function of the online teaching platform and lack comprehensive and accurate analysis of students. It is necessary to continuously improve and strengthen teaching evaluation capabilities.

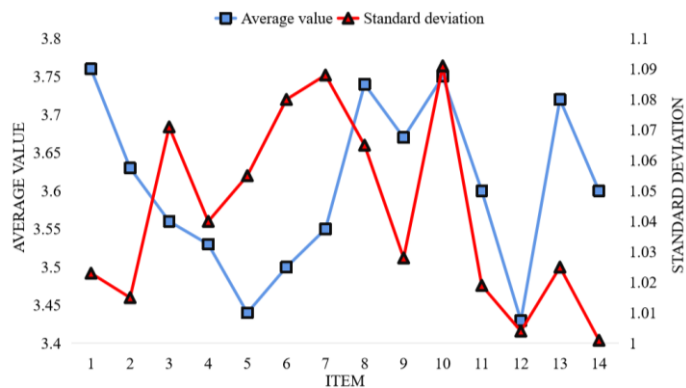A descriptive analysis of learning and development is shown in **Figure 7**.

Figure 7. Descriptive analytics data for learning and development.

As shown in **Figure 7**, teachers predominantly utilize only the basic office functionalities of software such as Microsoft Office. Simultaneously, the lack of adequate information technology teaching resources and infrastructure remains a significant barrier to improving teachers' information technology capabilities. These deficiencies directly affect teachers' motivation to explore and independently develop their skills in integrating information technology into their teaching

practices. From these findings, it is evident that several systemic challenges hinder the development of teachers' information technology capabilities. Teachers generally exhibit weak information awareness and low self-efficacy. Moreover, there is a lack of accessible platforms and resource libraries to support their technological integration. In terms of planning and preparation, teachers' understanding of information technology remains limited to basic technical operations, reflecting a lack of institutional emphasis on fostering a comprehensive information literacy environment. Organizational and managerial challenges include incomplete hardware and equipment in schools and an absence of relevant policies and systems to support digital integration. Similarly, evaluation practices for technology use are underdeveloped, with limited understanding of digital assessment methods and low interest and frequency in the use of teaching evaluation software. Additionally, school leadership often undervalues the development of teachers' information technology skills, resulting in insufficient and unfocused training programs, along with minimal external incentives for technology adoption.

To address these challenges, this study proposes strengthening localized support for teachers' information application capabilities by increasing policy backing and financial investment. A structured approach should prioritize cultivating information literacy, ensuring that theoretical knowledge is closely tied to practical skills development. Efforts should focus on enhancing lesson preparation processes, fostering collaborative learning communities among teachers, and improving their planning and preparation capabilities. Furthermore, the integration of biomechanics-based strategies into teaching practice can promote physical well-being and mental resilience among educators, supporting them in adapting to new technological tools. By incorporating stress management, ergonomic practices, and physical exercises into teachers' daily routines, schools can foster a healthier and more adaptive teaching environment.

The use of new media channels and advanced technological tools can significantly enhance the interactivity of online ideological education, increasing student engagement and participation. Furthermore, leveraging information technology to transition from teacher-centered to student-centered classroom models is essential. Such a shift promotes a multi-dimensional and comprehensive approach to classroom teaching, enabling students to better understand and absorb the content of ideological education. This approach aligns with the broader goal of achieving the desired educational outcomes, fostering deeper student involvement, and enhancing the overall quality of education. By integrating both technological tools and psychological well-being practices into educational frameworks, educators can create an environment that supports the holistic development of both students and teachers.

3.2. Influencing factors of online teaching students

To analyze the structural changes in students' academic participation across online and offline teaching contexts, existing studies often use time investment indicators as a primary observational tool. This study focuses on the time investment and time allocation structure of students' participation to explore shifts in their

academic participation paradigms under different teaching modes. The findings reveal that as students transition from traditional offline classrooms to online cloud classrooms, their daily extracurricular autonomous time allocation undergoes significant structural changes. However, the exact influence of these time allocation structures and academic participation paradigms on teaching effectiveness requires further investigation. The analysis indicates that while there are significant differences in teaching effectiveness across subjects in traditional offline teaching contexts, no statistically significant differences between subjects have been observed in online teaching contexts. However, a negative trend in the teaching effectiveness of science and engineering disciplines was identified, albeit without statistical significance. This suggests that the inability of online teaching environments to fully replicate experimental and hands-on scenarios may diminish the perceived teaching effectiveness for science and engineering students. Additionally, the transformation from offline to online teaching environments appears to erode the advantages of academic selection traditionally associated with teaching effectiveness in institutions of higher learning.

Emotions play a critical role in academic participation and educational outcomes. As an experiential attitude based on cognition, emotions possess both positive and negative dimensions and can drive individuals to act through cognitive processing. From a biomechanical perspective, emotions are not merely subjective experiences but also reflect the dynamic regulation of the nervous, endocrine, and musculoskeletal systems. The positive and negative dimensions of emotions modulate the release of neurotransmitters such as dopamine and serotonin, thereby influencing neural plasticity and muscle coordination [31]. For instance, positive emotions are often associated with efficient neural transmission and moderate muscle relaxation, which contribute to enhanced cognitive flexibility, learning efficiency, and motor performance. In contrast, negative emotions may activate the sympathetic nervous system, leading to increased secretion of stress hormones such as cortisol, resulting in muscle tension, postural rigidity, and heightened cardiovascular load. These biomechanical changes not only directly affect physical movement but also interfere with cognitive processes such as attention, memory, and decision-making. Therefore, emotions exert a bidirectional influence on motor function and cognitive abilities through their regulation of physiological mechanisms.

Psychological research highlights that students selectively absorb educational content, with their choices heavily influenced by emotions. Recognizing this, psychological well-being educators emphasize the importance of leveraging emotions in education to foster engagement and positivity. Establishing effective emotional communication channels between teachers and students is vital for ensuring that students actively absorb educational content and that their positive emotions are stimulated, thereby deepening the impact of psychological well-being education.

Considering the distinct characteristics of online teaching, this study incorporates additional independent variables, such as online course adaptation and the online learning environment, to comprehensively analyze the mechanisms influencing online teaching effectiveness. Moreover, integrating biomechanics-based strategies—such as physical activities, stress reduction techniques, and emotional

regulation—into the online learning environment can further enhance students' psychological well-being. These strategies can help mitigate the stress and emotional challenges students face, thereby improving their engagement and participation in online learning. The results, derived using the ordered probit model, provide deeper insights into the factors shaping teaching outcomes in online contexts. The detailed findings are presented in **Table 5**.

Table 5. Ordinal probit regression of influencing factors of online teaching effectiveness.

Independent variable		Estimated coefficients
Student academic involvement	Regular participation	−0.031
	Process participation	0.102**
	Autonomous participation	0.075**
Online course adaptation	Elearning support	−0.075
	Network course structure adjustment	0.298***
	Internet interactive teaching	0.087*
Online learning environment	Home network environment	0.158***
Teacher teaching method	Regulated teaching	−0.087*
	Interactive teaching	0.053
	Feedback teaching	0.069

In both online and offline teaching contexts, teachers' teaching methods have a differential impact on teaching effectiveness. Notably, regulated teaching methods that emphasize students' consistent participation before and after class—such as mandatory coursework and pre-class reading—prove less effective in online teaching environments. While traditional offline classroom teaching benefits significantly from regulation-based teaching, interactive teaching, and feedback-based teaching methods, the same regulated approaches show a negative trend in online cloud classrooms, inhibiting teaching effectiveness.

The study revealed that teachers' teaching methods account for 13.5% of the variations in offline teaching results but only 4.1% of the changes in online teaching outcomes. This disparity highlights the challenges associated with replicating the effectiveness of structured, rule-based teaching in online contexts. One key factor contributing to this is students' aversion to regulated teaching methods in online environments, where strict rules for participation, such as coursework deadlines and pre-class preparations, can lead to disengagement and negatively affect overall teaching effectiveness. This issue is further exacerbated by the lack of direct physical presence in online classrooms, which diminishes emotional engagement and reduces the ability of teachers to gauge students' psychological states.

Therefore, in addition to pedagogical methodologies and academic engagement, optimizing the adaptation of online courses and improving the online learning environment are critical to ensuring teaching effectiveness. Successful online teaching requires an integrated and cooperative approach involving multiple elements. These include tailoring course content to the online medium, enhancing the accessibility and usability of technological tools, and fostering a more engaging

and supportive virtual learning environment. Moreover, incorporating psychological well-being and biomechanics strategies can improve online learning outcomes. Techniques such as stress reduction practices, incorporating physical activities into online learning, and promoting emotional regulation can help mitigate the stress and fatigue often experienced in virtual environments, fostering better engagement and enhancing learning experiences. By addressing these factors, institutions can bridge the gap in teaching effectiveness between online and offline contexts and improve the overall learning experience for students.

3.3. Interventions and mental health teaching strategies based on biomechanical principles

From a psychological perspective, effective psychological interventions require an in-depth understanding of the individual's mental state and its underlying causes to develop targeted treatment plans. Therefore, integrating mental health support into ideological and political education in higher education institutions can be achieved by creating online psychological counseling platforms, providing students with a space to express their psychological concerns, and effectively alleviating psychological stress [32].

From a biomechanical perspective, incorporating appropriate physical exercise into psychological education can regulate the neuromuscular system and endocrine responses, thereby reducing psychological stress and enhancing learning efficiency. Moderate-intensity aerobic exercises, such as yoga, promote the secretion of β-endorphins and serotonin, improving mood and alleviating anxiety. Dynamic stretching and core stability training optimize proprioceptive input, enhance neural adaptability, and reduce muscle tension and fatigue caused by prolonged sedentary learning. Additionally, biofeedback-based posture adjustment training can improve the physical load during learning and enhance focus and cognitive flexibility by regulating the balance between the sympathetic and parasympathetic nervous systems. These interventions require minimal space and are well-suited for online education environments, guiding students to use physical activity effectively to regulate their psychological state during the learning process.

Beyond exercise interventions, psychological education should also address students' emotional needs to enhance their motivation for autonomous learning [33]. Continuous encouragement and care can strengthen students' motivation to learn in challenging environments [34]. Moreover, in specific contexts, guiding students to explore religious coping strategies may be beneficial. Studies indicate that religious beliefs or related activities, as coping mechanisms for stress, can effectively alleviate negative emotions in cancer patients and improve mental health and quality of life [35]. This mechanism may also serve as a valuable reference in broader psychological adjustment processes.

4. Conclusion

Ideology education in institutions of higher learning is a cornerstone of ideological and political work. However, traditional approaches often struggle to address the complex contradictions and challenges of the new era. This study

analyzes and researches from the perspective of biomechanics and concludes that the combination of ideological and political education and mental health education has become an inevitable requirement for the ideological and political work of modern colleges and universities. This combination aims to reduce the negative impact of psychological stress on students in the post-epidemic era through professional guidance and peer influence, improve students' personal initiative, and promote students' participation in independent learning. Psychological stress not only affects students' emotional regulation and learning motivation but also triggers physiological fatigue, reduces cognitive function, and affects motor control through neuro-endocrine-muscular system interactions. Therefore, integrating mental health education and ideological and political education can help reduce the negative effects of long-term psychological stress through scientific interventions and enhance students' cognitive and adaptive abilities.

By merging psychological well-being education with ideological teaching, institutions can create a more supportive and engaging environment that promotes both emotional resilience and academic motivation. Institutions can establish professional counseling centers to provide targeted consulting services, such as time management support, addressing students' individual needs, and enhancing academic efficiency. Additionally, fostering a positive learning culture through peer dynamics can promote autonomous learning and academic engagement. Teacher training programs should focus on adaptive adjustments in learning support, course structure, and interactive teaching. At the same time, technical teams can assist in transitioning traditional courses to effective online formats, ensuring that students can maintain engagement and emotional connection to their learning even in virtual environments.

During the epidemic, many online courses were transferred directly from offline platforms without proper adaptation, and teachers often lacked the experience or support to maximize online teaching effectiveness. To address these challenges, institutions must provide specialized training and clear guidance to help teachers effectively adjust their teaching methods for both online and offline contexts. Furthermore, integrating biomechanics-based strategies, such as incorporating physical activities or stress reduction techniques into the online environment, can improve students' mental health and learning outcomes by reducing stress and promoting emotional regulation.

While the strategies proposed in this research are based on problem analysis and influencing factors, their practicality and sustainability must be tested in real-world applications. Future efforts should focus on implementing these strategies, monitoring their effectiveness, and iteratively refining them based on practical outcomes to ensure their relevance and success in diverse educational settings. By combining ideology education with psychological well-being and biomechanics, institutions can foster a more holistic and resilient learning environment that equips students to thrive academically and emotionally.

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