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The quality of life of students and teachers at school, college, high school and university

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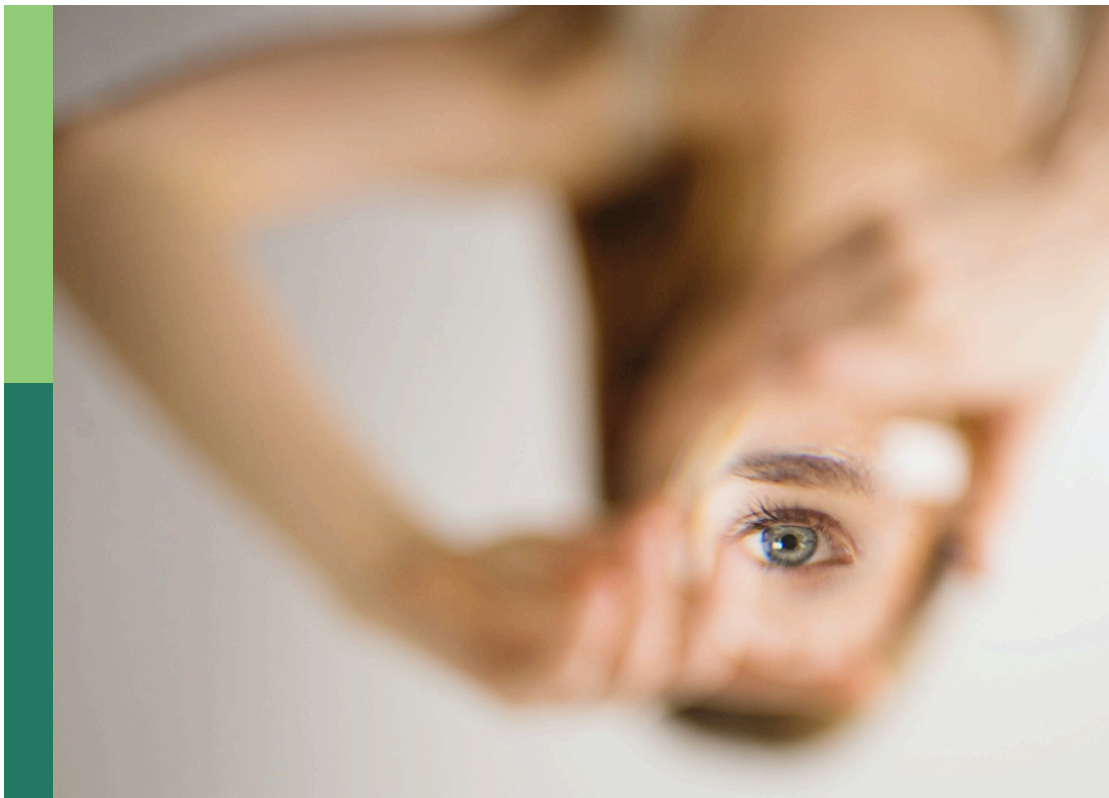

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The quality of life of students and teachers at school, college, high school and university

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Table of contents

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The relationship between flow experience and teaching well-being of university music teachers: The sequential mediating effect of work passion and work engagement

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Objective: The purpose of this study was to investigate the relationship between work passion and work engagement among university music teachers in flow experience and teaching well-being.

Methods: Three hundred forty-three university music teachers were tested by using the Flow State Scale, Teacher Well-Being Scale, Work Passion Scale, and Work Engagement Scale.

Results: University music teachers' flow experience can predict teaching well-being (β=0.248, p<0.001). University music teachers' flow experience has an indirect impact on teaching well-being through work passion (β=0.257, p=0.005), and university music teachers' flow experience has an indirect impact on teaching well-being through work engagement (β=0.144, p=0.018). In addition, work passion and work engagement play a chain-mediating role between university music teachers' flow experience and teaching well-being (β=0.134, p=0.001).

Conclusion: Work passion and work engagement play a sequential mediating role between university music teachers' flow experience and teaching well-being.

KEYWORDS

university music teachers, flow experience, teaching well-being, work passion, work engagement

Introduction

Work can help individuals build good social relations, cultivate a sense of identity, and provide individuals with opportunities to contribute to social development (Savickas, 2005; Blustein, 2006). Therefore, work can be used as a source of personal well-being, achievement, and satisfaction (Myers and Diener, 1995; Angner, 2010;

Kahneman and Riis, 2012). Especially, the teaching profession is a meaningful and influential work (Collie et al., 2015). For example, through music education, teachers can help students gradually establish correct values, philosophies, and healthy psychological quality, and can also cultivate students' aesthetic interest, good quality, sense of honor, enterprising spirit, and intellectuality (Wang, 2011). Moreover, teachers with high well-being can maintain a better relationship with students, which is more conducive to stimulating students' learning motivation and promoting students' development (Anderson et al., 2004). In fact, many international studies have shown that more than one-third of teachers are under pressure or extreme pressure at work (Borg et al., 1991; Thomas et al., 2003; Geving, 2007). These worrying trends should make us think about teachers' teaching well-being (Duckworth et al., 2009; Collie et al., 2012).

Teaching well-being is related to many factors. Erdogan et al. (2012) put forward the viewpoint of workplace well-being, that is, the level of individual well-being depends on satisfaction with the working environment, career development, leadership, and the fit between people and the environment. Other studies have pointed out that teachers' well-being is largely affected by job stress and job burnout (Pakarinen et al., 2010; Spilt et al., 2011). Collie et al. (2015) specifically explained the factors that affect teachers' well-being in the construction of teachers' well-being model, including work pressure, organizational pressure, and student behavior-related pressure. Other scholars have also proved that these factors can have an important impact on teachers' well-being (Aelterman et al., 2007; Konu et al., 2010).

Although research on teachers' well-being has attracted more and more attention in recent years, most of them focus on non-workers such as patients, children, or adolescents (Joo and Lee, 2017), and there is still a lack of empirical research on the well-being of university teachers, especially university music teachers. Therefore, we believe that research on the well-being of university music teachers is an important gap. Moreover, Lyubomirsky et al. (2005) pointed out in the study that happy people are more likely to work actively toward new goals. Therefore, we can speculate whether university music teachers would have a better effect on teaching quality if they can maintain a sense of happiness in the teaching process. In addition, we also discussed the influence of flow experience on teaching well-being in this study. However, after consulting the relevant literature, we found that the experience of cardiac flow appeared more in the articles of physical exercise (Jackson, 1996; Srivastava and Mishra, 2015), e-learning environment (Esteban-Millat et al., 2014), and games (Chou and Ting, 2003; Klasen et al., 2012), which have relatively few applications in university classrooms. As an important factor in promoting well-being, it is necessary to introduce flow experience into teaching. Therefore, this study has important theoretical value to explore the relationship between university music teachers' flow experience and teaching well-being through empirical research.

Literature review and theoretical hypotheses

Flow experience and well-being

The concept of flow was first proposed by Csikszentmihalyi (1991), an American psychologist. It refers to an immersive experience in which individuals devote themselves to an activity and show a high degree of excitement and satisfaction. In this state, individuals often experience a similar feeling of high concentration, automatically filter out ideas and thoughts unrelated to activities, loss of self-awareness, and strong control over the environment. Later, Beck (1992) summarized nine characteristics of flow in his article, namely, balance of challenge and technique, unity of behavior and consciousness, clear goals, full commitment, clear feedback, loss of self-consciousness, change of sense of time, contradiction of control, and self-directed sexual experience.

Teachers' teaching well-being refers to teachers' subjective psychological experience of all aspects of their profession, which is embodied in individuals' positive evaluation of career motivation, work achievement, interpersonal relationships, and physical health (Van Horn et al., 2004). In terms of the investigation and research on teachers' well-being, Dinham and Scott (2000) showed that teachers' job satisfaction and well-being depend on their relationship with students, education and teaching methods, and care for students' growth, while the requirement for social level is relatively low. Positive thoughts generated at work also help individuals enjoy a happier professional life (Raei Dehaghi, 2012). In addition, some scholars have indicated that factors such as work pressure and work achievement of teachers will also have an important impact on teaching well-being (Chapman, 2013). Therefore, we can attribute teachers' teaching well-being to education itself rather than factors other than education.

To sum up, we propose the following hypothesis:

> *H1*: University music teachers' flow experience is significantly positively correlated with teaching well-being.

Flow experience, work passion, and teaching well-being

Work passion means that employees are full of passion for their work, will devote a lot of time or energy, and will prioritize them, so as to achieve work goals as fun (Donahue et al., 2009). Lantara (2019) proposed that salary, working environment, leadership style, and their own education level will affect individuals' work passion. In addition, some scholars have also studied the concept of work passion from the perspective of teachers, which refers to teachers' passion for teaching or the discipline they teach, as well as teachers' love for educators and students. Teachers' work passion is also very important in the educational environment, which will affect

teachers' work attitude and behavior performance (Thayer-Bacon, 2004). For example, people who maintain a high degree of passion for work are often energetic, often try their best to achieve excellent results in work, and spend a long time on work without material rewards (Suliman, 2001). Wright (2007) also said that those individuals who work hard are not entirely for reward. What really supports them is intrinsic motivation, reward, and a sense of mission to work.

As a positive psychological theory, flow channel theory describes the psychological state of high concentration when individuals are immersed in a certain activity, which is characterized by concentration at work, without the need for external rewards, and a sense of problem-solving and innovation. It can generate a sense of satisfaction and pleasure, resulting in a sustained passion for the activity (Csikszentmihalyi, 1991). Especially when individuals encounter difficulties at work, this flow state will urge employees to regard overcoming pressure as a challenging task, which helps to stimulate employees' passion for work, so as to deal with various problems (Lavigne et al., 2012). This passion is triggered by flow and external stimulation (Kaiser et al., 2012). Straume (2008) also said that individuals in the state of flow tend to have more positive work performance and obtain satisfaction from it. For example, the flow experience helps music teachers feel music with their hearts, integrate with music, express emotions with music, and have more musical creativity, so as to reach the peak (Sartika and Husna, 2014). In addition, it is worth noting that, according to the passion binary model of Vallerand et al. (2003), harmonious passions contribute to an individual's job satisfaction, while compulsive passions may lead to individual tension, anxiety, and depression.

Emotional event theory shows that events workplace events trigger individual emotional responses, which in turn affect individual work attitudes and behaviors. Among them, the emotional meaning of events is an important factor leading to individual emotion-driven behavior (Weiss and Cropanzano, 1996). Therefore, we can assume that events that generate passion in individuals trigger emotional responses or actions that excite them (Frijda et al., 1989). Work passion, understood as an attitude and strong emotion in activity performance, has a significant impact on well-being (Bernabé et al., 2014) and can improve individual well-being (Vallerand et al., 2003). When individuals engage in activities that they are passionate about, they often experience positive effects (i.e., well-being or well-being) (Mageau and Vallerand, 2007). Gilal et al. (2019) said that teachers' passion for work can be conveyed to students through emotion and other means. For example, teachers pass on the enjoyment of beauty to students through music, so that students can immerse themselves in it and achieve efficient learning. According to the theory of emotional events, teachers also experience pleasant emotions, known as well-being.

Therefore, we propose the following hypothesis:

> *H2*: Work passion plays a mediating role in flow experience and teaching well-being.

> *H2a*: Flow experience is positively correlated with work passion.

> *H2b*: Work passion is positively correlated with teaching well-being.

Flow experience, work engagement, and teaching well-being

Schaufeli et al. (2002) believed that work engagement refers to a positive and complete emotional and cognitive state related to work, which can maintain concentration without fatigue at work, and has the characteristics of persistence and dispersion, which is characterized by vigor, dedication, and absorption. Vitality means that an individual has plenty of toughness and energy, is not easy to be tired, and is willing to make continuous efforts in work. Dedication means that individuals have a strong sense of work engagement and can maintain a high degree of passion and pride in their work. Absorption is a state in which individuals are fully engaged in work (Schaufeli and Bakker, 2004). Teachers' work engagement can be understood as a kind of working state in which teachers love and recognize educational work, and can actively participate in work and be tireless. Teachers' work engagement has an important impact on teachers' work efficiency and physical and mental health (Darling-Hammond and Youngs, 2002). For example, Hakanen et al. (2006) research shows that teachers with high work engagement are not prone to burnout and related health problems.

Self-determination Theory (Deci and Ryan, 1985) believes that human beings have natural interest and curiosity in new things, and can actively explore and learn. It is a spontaneous and innate essential feature. The behavior inspired by this internal motivation is called self-determined behavior (Deci and Ryan, 1985). As the term "flow experience" (Mirvis and Csikszentmihalyi, 1991) describes, individuals can completely immerse themselves in the work process and ignore what happens around them, and this experience is purely based on the support of internal motivation. Work engagement is also a positive state. People can concentrate on completing work tasks. However, flow is a peak experience based on current activities (Bakker, 2008), while work engagement is a long-term and lasting state (Hu and Wang, 2014). Some scholars have carried out research on the relationship between flow experience and engagement, and found that the process of flow experience is conducive to the formation of work engagement (Lovelace et al., 2007; Schueller and Seligman, 2010). Akiva et al. (2013) also showed that the production of cardiac flow can improve the level of individual work engagement.

Self-worth Theory (Covington, 1984) emphasizes that self-acceptance is the first need of people, and the premise of self-acceptance is to affirm self-worth. If individuals want to better realize their self-worth in the organization, they often set certain goals for themselves and drive themselves to work (Douglas et al., 2004). While individuals affirm and realize their self-worth, their teaching well-being index will also be improved to varying degrees (Covington and Beery, 1976). Waterman (1993) also believes that

when individuals devote themselves to activities to give full play to their potential and realize their self-worth, individuals will reflect pleasure, that is, the feeling of well-being. In addition, a 7-year longitudinal study by Hakanen and Schaufeli (2012) found that the higher the degree of work engagement, the more conducive it is to reduce job burnout and other occupational stress problems, and thus improve personal well-being.

Therefore, we propose the following hypothesis:

> *H3*: Work engagement plays a mediating role in the flow experience and teaching well-being.
>
> *H3a*: Flow experience is positively correlated with work engagement.
>
> *H3b*: Work engagement is positively correlated with teaching well-being.

Work passion and work engagement

Work passion is an individual's willingness to devote time and energy to work, which is a manifestation of attitude and behavior (Ho et al., 2011). It is typically characterized by confident, happy, motivated, and self-sustaining work (Wilson, 1993). Those who are passionate about their work feel meaningful no matter what they do (Hasanuddin and Sjahruddin, 2017). In addition, work passion is also a potential force, which can motivate individuals to participate in work spontaneously and generate positive behaviors (Chang, 2001). For example, in the education industry, teachers' passion can have a positive impact on students' performance and learning motivation (Kunter et al., 2013), thereby promoting the quality of teaching (Frenzel et al., 2009).

According to role investment theory, individuals devote their energy and time to roles that they find important and pleasant because this role provides them with a path to self-realization (Kanungo, 1979). As proposed by Bakker and Bal (2010), work passion can be regarded as an aspect of work engagement. When employees are passionate about their work, that passion can contribute to their success (Neumann, 2006). The attitude-behavior relational model (Ajzen and Fishbein, 1977) also proves that an individual's attitude toward work ultimately drives individuals to exhibit positive work behaviors and good work outcomes. Other scholars have studied the effect of teachers' work passion on work engagement, such as Frenzel et al. (2009) pointed out that teachers often feel passion with students, thereby increasing the sustainability of work engagement (Long and Hoy, 2006).

Therefore, we propose the following hypothesis:

> *H4*: Work passion is positively correlated with work engagement.
>
> *H5*: Work passion and work engagement play a sequential mediating role between flow experience and teaching happiness. The conceptual model and research hypotheses of this study see Figure 1.

Materials and methods

Participants

This study used a cluster random sampling method. We first contacted the person in charge of the University Teacher Training Center of Shandong Province. Through him, we contacted 14 universities with music majors in Shandong Province and distributed electronic questionnaires. The survey was conducted in May 2022. Three hundred ninety-two teachers participated in this survey. For the returned questionnaires, 392 questionnaires were actually recovered, and the questionnaires that were obviously not in accordance with the normal time, missed, and incorrectly filled out were deleted, and finally, 343 valid questionnaires were obtained, with an effective recovery rate of 87.5%. See Table 1 for details. The study was ethically reviewed and approved according to the guidelines of the Declaration of Helsinki, and each faculty gave informed consent.

Measures

Flow state scale

The scale is a nine-dimensional scale designed by Jackson et al. (2001) based on the nine components of the Nakamura and Csikszentmihalyi (2014) flow model, namely, challenge-skill balance, action-awareness merging, clear goals, unambiguous feedback, sense of control, and concentration on the task at hand, loss of self-consciousness, time transformation, and autotelic experience. The scale consists of 36 items, an example question is, "Often feeling that time flies." The scale was assessed on a five-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). In this study, Cronbach's α was 0.962, and the Cronbach's α values of dimensions were 0.851, 0.863, 0.876, 0.854, 0.877, 0.819, 0.856, 0.870, and 0.854, respectively.

TABLE 1 Social demographic features of participants (N=343).

Variables	Percentages
Gender	
Male	46.94%
Female	53.06%
Age	
30–32	56.56%
33–35	27.99%
36–38	6.12%
39–41	3.79%
42–44	5.54%
Title	
Teaching assistant	11.08%
Lecturer	72.30%
Associate professor	11.66%
Professor	4.96%

Work passion scale

The Work Passion Scale (Vallerand et al., 2003) consists of two 7-item subscales: obsessive passion and harmonious passion. An example question is, "This activity is in harmony with other activities in my life." The scale uses a 7-point Likert scale 1 (strongly disagree) to 7 (strongly agree) to assess teachers' work passion. In this study, Cronbach's α was 0.944, and Cronbach's α values of dimensions were 0.939 and 0.940, respectively.

Work engagement scale

The study was assessed using the work engagement scale developed by Schaufeli et al. (2002). The scale is divided into three subscales: vitality, dedication, and focus. An example question is, "I feel that the work I do is purposeful and meaningful." The scale is scored on a 7-point Likert scale ranging from (0 = strongly disagree) to (6 = strongly agree), with higher scores indicating a higher degree of teacher engagement. In this study, Cronbach's α was 0.948, and Cronbach's α values of dimensions were 0.938, 0.925, and 0.917, respectively.

Teacher well-being scale

The scale developed by Collie (2014) was used, which consisted of 16 items related to teachers' work experience. The scale measures three factors of teacher well-being: organizational well-being, workload well-being, and student interaction well-being sense. An example question is, "Relations with students in my class." The scale uses a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree) to assess the well-being of different aspects of a teacher's job. In this study, Cronbach's α was 0.937, and the Cronbach's α values of dimensions were 0.941, 0.943, and 0.921, respectively.

Statistical methods and analysis ideas

In this study, SPSS 22.0 and Mplus version 8.3 were used for data analysis. SPSS was mainly used for data sorting, descriptive statistical analysis, etc. Mplus is mainly used for model inspection. Participants who lacked descriptive data or had many data points were treated by list deletion when running the analysis. In the analysis, teachers' gender, age, and title were used as control variables. Gender is dummy coded (0 = female, 1 = male).

Results

Test of common method deviation

Using Harman's single-factor test method, 15 factors with characteristic root greater than 1 were obtained. The explanation rate of the first factor is 30.152%, which is less than the cut-off value of 40% (Podsakoff et al., 2003), indicating that there is no significant common method bias in this study.

Descriptive statistical analysis

Table 2 lists the major variables and Pearson correlation coefficients between each dimension. As can be seen from Table 2, all dimensions of teaching well-being were significantly positively correlated with all dimensions of flow experiences, all dimensions of work passion, and all dimensions of work engagement. According to the views of Tsui et al. (1995), in this study, the correlation coefficient of all variables is less than 0.75, and there is no serious multicollinearity problem among the major variables.

Model inspection

The model was fitted by Mplus, the fitting index of the model was ML $\chi^2 = 262.571$, df = 155, $\chi^2/df = 1.694$, CFI = 0.963, TFI = 0.955, RMSEA = 0.045, SRMR = 0.035. Each index is in an acceptable range, and the model is ideal. See Table 3.

The significance test of mediating effect

On the basis of good model fitting, the Bootstrap program of Mplus was used to repeat the sample for 5,000 times. The results show that the path coefficients of flow experiences, work passion, work engagement, and teaching well-being are all significant.

Flow experiences are positively related to teaching well-being ($\beta = 0.248$, $p < 0.001$), supporting H1. Flow experiences are positively related to work passion ($\beta = 0.554$, $p < 0.001$), supporting H2a. Work passion is positively related to teaching well-being ($\beta = 0.295$, $p = 0.002$), supporting H2b. Flow experiences are positively related to work engagement ($\beta = 0.250$, $p = 0.002$), supporting H3a. Work engagement is positively related to teaching well-being ($\beta = 0.366$, $p < 0.001$), supporting H3b. Work passion is positively related to work engagement ($\beta = 0.419$, $p < 0.001$), supporting H4. See Table 4.

Table 5 shows the indirect effects of the study path. Work passion mediates the relationship between flow experiences and teaching well-being ($\beta = 0.257$, $p = 0.005$), with a 95% confidence interval [0.103–0.469], excluding 0, supporting H2, and the mediating effect accounted for 27.75%.

Work engagement mediates the relationship between flow experiences and teaching well-being ($\beta = 0.144$, $p = 0.018$), with a 95% confidence interval [0.051–0.300], excluding 0, supporting H3, and the mediating effect accounted for 15.55%.

Work passion and work engagement sequentially mediate the relationship between flow experiences and teaching well-being ($\beta = 0.134$, $p = 0.001$), with a 95% confidence interval [0.072–0.247], excluding 0, supporting H5, and the mediating effect accounted for 14.47%. See Figure 2.

TABLE 2 Means, standard deviations, and correlations of the major study variables.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Gender	0.469	0.500	1																			
2. Age	33.430	2.977	0.03	1																		
3. Title	2.100	0.645	0.055	0.872**	1																	
4. CSB	3.478	0.827	−0.021	0.034	0.033	1																
5. AAM	3.421	0.860	0.006	0.038	0.037	0.559**	1															
6. CG	3.442	0.878	−0.002	0.06	0.062	0.539**	0.559**	1														
7. UFB	3.322	0.877	−0.007	0.053	0.081	0.488**	0.434**	0.520**	1													
8. COTTAH	3.436	0.880	0.004	−0.045	−0.005	0.532**	0.559**	0.591**	0.557**	1												
9. SOC	3.665	0.788	−0.027	0.063	0.087	0.481**	0.475**	0.551**	0.463**	0.537**	1											
10. LOCS	3.343	0.875	−0.013	0.032	0.036	0.562**	0.564**	0.604**	0.546**	0.632**	0.545**	1										
11. TT	3.447	0.826	0.002	−0.018	−0.007	0.582**	0.542**	0.637**	0.572**	0.634**	0.561**	0.672**	1									
12. AE	3.568	0.826	−0.019	−0.029	−0.015	0.600**	0.591**	0.626**	0.535**	0.632**	0.508**	0.626**	0.619**	1								
13. HP	4.107	1.344	−0.013	0.018	0.021	0.323**	0.305**	0.323**	0.348**	0.383**	0.323**	0.342**	0.330**	0.362**	1							
14. AO	4.257	1.324	−0.061	−0.013	−0.02	0.325**	0.284**	0.285**	0.277**	0.335**	0.244**	0.298**	0.273**	0.362**	0.583**	1						
15. VI	3.176	1.391	0.016	0.032	0.022	0.303**	0.222**	0.264**	0.286**	0.337**	0.284**	0.315**	0.312**	0.270**	0.305**	0.283**	1					
16. DE	3.745	1.409	−0.001	0.059	0.083	0.286**	0.240**	0.254**	0.224**	0.344**	0.281**	0.338**	0.294**	0.268**	0.403**	0.360**	0.624**	1				
17. AB	3.331	1.321	−0.023	0.037	0.023	0.257**	0.220**	0.245**	0.241**	0.298**	0.277**	0.309**	0.295**	0.279**	0.311**	0.287**	0.586**	0.568**	1			
18. WWB	4.126	1.392	−0.011	−0.151**	−0.106*	0.179**	0.145**	0.275**	0.330**	0.346**	0.264**	0.303**	0.274**	0.302**	0.384**	0.342**	0.360**	0.379**	0.314**	1		
19. OWB	4.195	1.428	0.042	−0.206**	−0.134*	0.316**	0.364**	0.144**	0.219**	0.337**	0.280**	0.318**	0.301**	0.352**	0.350**	0.332**	0.349**	0.360**	0.314**	0.478**	1	
20. SIWB	3.827	1.514	0.019	−0.118*	−0.09	0.358**	0.419**	0.399**	0.351**	0.264**	0.190**	0.389**	0.378**	0.436**	0.299**	0.318**	0.313**	0.355**	0.321**	0.455**	0.506**	1

$N = 343$. $^{**}p < 0.01$ and $^{*}p < 0.05$. Gender is the dummy variable (0 = female, 1 = male). CSB, challenge-skill balance; AAM, action-awareness merging; CG, cear goals; UFB, unambiguous feedback; COTTAH, concentration on the task at hand; SOC, sense of control; LOCS, loss of self-consciousness; TT, time transformation; AE, autotelic experience; HP, harmonious passion; AO, assessing obsessive; VI, vitality; DE, dedication; AB, absorbed; WWB, workload well-being; OWB, organizational well-being; SIWB, student interaction well-being.

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Discussion

This study found that flow experience can significantly and positively predict teaching well-being, which is consistent with the research hypothesis and previous research results (O'Cass and Carlson, 2010; van Noort et al., 2012). The research also further verifies the relevant views of the positive emotion expansion theory (Fredrickson, 1998), which believed that when an individual is affected by a certain stimulus or meet their own needs, they will produce pleasant and positive emotions, which can keep the physiological function of the emotional subject happy and energetic. Like the profession of a music teacher, it includes not only an educational function but a profession that can make others and yourself better. Because music education is not only a kind of work, but also a kind of beautiful enjoyment. It is easy for music teachers to immerse themselves in their work and gain the experience of flow, which results in positive emotional experiences such as pleasure and well-being.

TABLE 3 Fit indices of the model.

Fit indices	Recommended threshold	Scores	Remarks
ML χ^2	–	262.571	–
Df	–	155	–
χ^2/df	$1 < \chi^2/df < 3$	1.694	Acceptable
CFI	>0.9	0.963	Acceptable
TLI	>0.9	0.955	Acceptable
RMSEA	<0.08	0.045	Acceptable
SRMR	<0.08	0.035	Acceptable

The results of this study show that work passion plays a mediating role between flow experience and teaching well-being. Flow experience can affect teaching well-being through work passion, that is, the higher the level of flow, the stronger the work passion, and the higher the level of teaching well-being. This conclusion verifies the relevant views of the flow channel theory (Mirvis and Csikszentmihalyi, 1991) and the emotional event theory (Weiss and Cropanzano, 1996). Music can bring pleasant feelings to people with its unique artistic charm, just as music teachers often need to demonstrate music skills to students with both voice and emotion in the teaching process, which can trigger teachers' positive emotional experience, stimulate the flow experience, promote their work passion, and sprout the well-being of teaching.

In addition, this study also found that work engagement plays a mediating role between flow experience and teaching well-being. Flow experience can affect teaching well-being through work engagement, that is, the higher the flow experience, the stronger the work engagement, and the higher the level of teaching well-being. This conclusion validates the related views of self-determination theory (Deci and Ryan, 1985) and self-worth theory (Covington, 1984). For music teachers with a high degree of self-determination, they will actively teach and take teaching as a way to realize their own value, so as to gain a sense of teaching well-being. At the same time, they are more willing to actively participate in their work, and then experience the sense of success of self-worth realization. Self-actualization needs are the highest human needs. In the process of music teaching, music teachers' self-realization needs are satisfied and self-worth is realized, and they should obtain a more sustainable teaching happiness experience.

TABLE 4 The direct effect of the research paths and research model hypothesis analysis.

DV	IV	Std. est.	SE	Est./SE	*P*-value	R^2	Hypo and path	Remarks
TWB	FE	0.248	0.070	3.551	***	0.635	H1: FE → TWB	Support
	WP	0.295	0.094	3.130	0.002		H2b: WP → TWB	Support
	WE	0.366	0.077	4.752	***		H3b: WE → TWB	Support
WP	FE	0.554	0.055	10.131	***	0.308	H2a: FE → WP	Support
WE	FE	0.250	0.080	3.116	0.002	0.356	H3a: FE → WE	Support
	WP	0.419	0.085	4.900	***		H4: WP → WE	Support

***$p < 0.001$. FE, flow experiences; WP, work passion; WE, work engagement; TWB, teaching well-being.

TABLE 5 The indirect effect of the research paths.

Path	Std. est.	SE	Est./SE	*p*-value	Boot LLCI	Boot ULCI	The proportion of the effect (%)
H2: FE → WP → TWB	0.257	0.091	2.819	0.005	0.103	0.469	27.75
H3: FE → WE → TWB	0.144	0.061	2.366	0.018	0.051	0.300	15.55
H5: FE → WP → WE → TWB	0.134	0.042	3.193	0.001	0.072	0.247	14.47
TOTALIND	0.536	0.101	5.277	***	0.363	0.779	57.88
TOTAL	0.926	0.123	7.536	***	0.711	1.189	100.00

***$p < 0.001$.

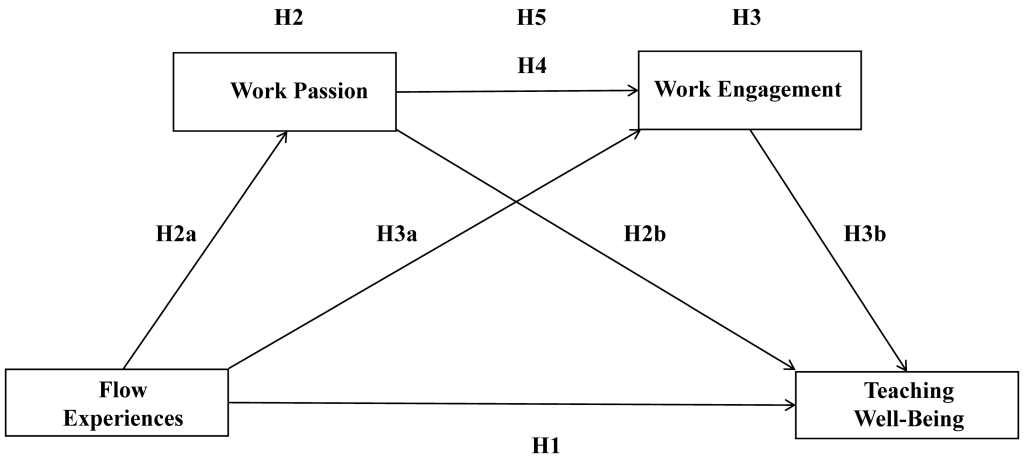

FIGURE 1
The conceptual model and research hypotheses of this study.

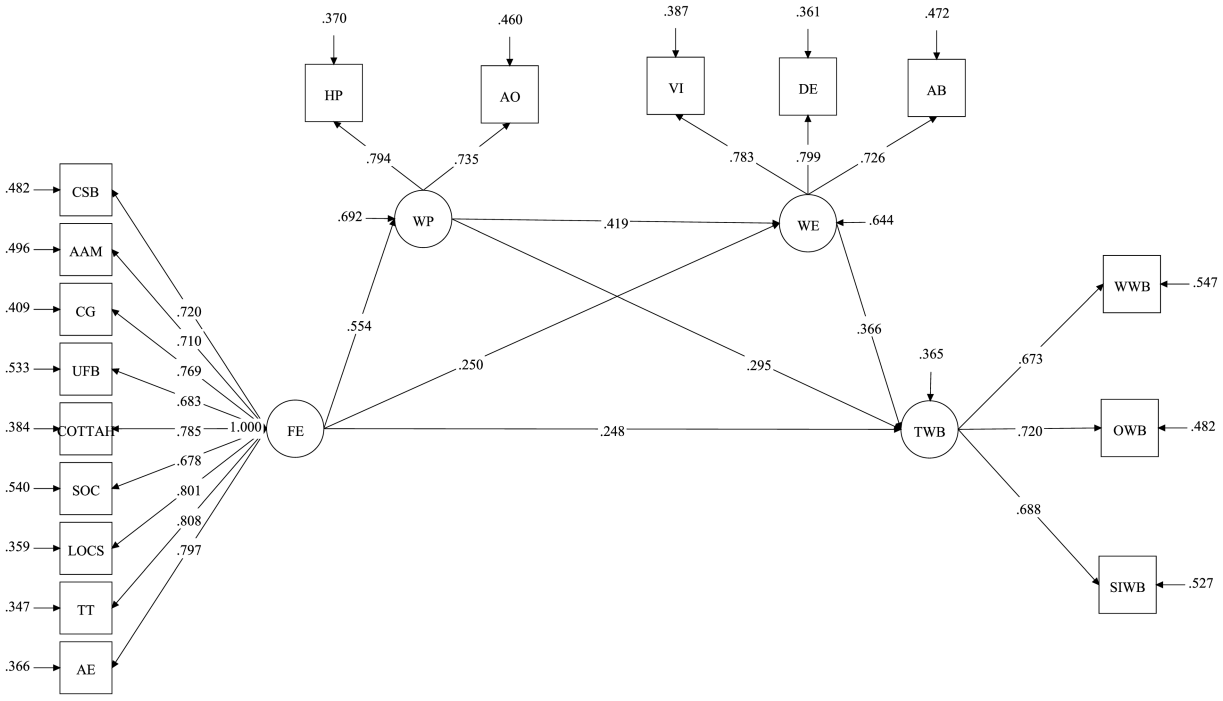

FIGURE 2
Structural equation model.

In addition to finding that work passion and work engagement play a mediating role in flow experience and teaching well-being, respectively, this study also found that work passion and work engagement play a sequential mediating role in flow experience and teaching well-being. This also further validates the related views of role investing theory (Kanungo, 1979). A university music teacher who loves music education and students, has high work passion, is willing to actively invest time and energy in education, is willing to learn and innovate continuously, makes unremitting efforts to realize self-worth, and constantly strives to gain a sense of well-being.

This study also brings us relevant practical enlightenment. Firstly, it is necessary to improve the flow experience of music

teachers and obtain teaching well-being. On the one hand, music teachers should maintain their love for music education. Just like "online shopping," when we do something we like, we can forget time, get a flow experience, and experience the feeling of well-being. On the other hand, music teachers should be good at using technology to empower their work, and use multimedia technology to present teaching content, which is conducive to promoting the development of music teaching more vividly and truly immersed in teaching work. For example, in music appreciation, teachers can use multimedia technology to present teaching content, so that students will obtain psychological pleasure and aesthetic enjoyment through the emotional experience of music and art works (Fang, 2021). Teachers will also gain a sense of achievement and well-being in music teaching in the process. Secondly, enhance the passion of music teachers and improve the well-being of teaching. Organizations such as universities or related education and teaching departments can conduct relevant lectures and trainings for music teachers through various channels, increase music teachers' understanding and learning of related content or courses, and stimulate music teachers' passion for teaching. Finally, improve the level of work engagement music teachers and enhance well-being. Universities should create a relaxed working environment for music teachers, strengthen humanistic care, help teachers relieve pressure, allow music teachers to devote more energy to teaching and research, improve music teachers' work engagement, and then improve their sense of well-being.

Limitations and future research directions

Firstly, the data for this study are from self-report, which may be subjective. In the future, research, observation, interview, and other methods can be used to supplement the self-report method to improve the credibility of the results. Secondly, this study uses a cross-sectional study to explore the effect of flow experience on music teachers' teaching well-being. Although the study is based on sufficient theory and empirical reasoning, and uses high reliability and validity measurement tools to analyze the data, the cross-sectional study cannot reflect the long-term performance of the mechanism studied in this study. Therefore, future research can consider using longitudinal research methods for more in-depth research. In addition, the data collected in this study are susceptible to the force majeure of COVID-19. Comparative studies could be considered in the future after COVID-19 is over or well controlled. Finally, this study only considers the chain intermediary role of work passion and work engagement in the flow experience and teaching well-being, and there may be other intermediary variables. Future research can consider the impact of other factors on music teachers' teaching well-being. Moreover, potential feedback loops should also eventually be taken into account in future research. At the same time, we should notice that flow is amoral (Nakamura and Csikszentmihalyi, 2014), it is not good in an absolute sense (Mirvis and Csikszentmihalyi, 1991; Delle Fave et al., 2011), it has a dark side (Partington et al., 2009), and can also lead to persistence detrimental to psychological health (Chou and Ting, 2003). Therefore, in future research, the mediating effect of flow on passion and its risk of rigid persistence capable of damaging the psychological health of teachers needs to be considered.

Conclusion

The results of this study show that there is a positive correlation between flow experience and teaching well-being. Flow experience can not only affect teaching well-being through work passion, but also affect teaching well-being through work engagement. In addition, this study also found that work passion and work engagement play a sequential mediating role between university music teachers' flow experience and teaching well-being. We believe that these findings will provide an important basis for our future research on university music teachers' teaching well-being and university management practice.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the Research Ethics Committee of the Nanjing Normal University Taizhou College. The patients/participants provided their written informed consent to participate in this study.

Author contributions

XW designed, prepared, and performed the data collection process, analyzed and validated the data, and wrote the article.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Proactive personality and critical thinking in Chinese medical students: The moderating effects of psychological safety and academic self-efficacy

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Objectives: This study aimed to identify the relationship among proactive personality, psychological safety, academic self-efficacy and critical thinking, and to further explore whether psychological safety and academic self-efficacy could be a moderator in the association between proactive personality and critical thinking among Chinese medical students.

Materials and methods: The cross-sectional study was carried out from October to December 2020 in China. Totally, 5,920 valid responses were collected at four Chinese medical universities. Critical thinking, proactive personality, psychological safety, academic self-efficacy and demographic factors were assessed through questionnaires. Hierarchical multiple regression was used to identify interrelationship clusters among variables. Simple slope analyses were performed to explore the moderating effects of psychological safety and academic self-efficacy.

Results: The mean score of critical thinking among medical students was 3.85 ± 0.61. Proactive personality, psychological safety, and academic self-efficacy were shown to be important factors for critical thinking. Psychological safety and academic self-efficacy moderated the association between proactive personality and critical thinking. A simple slope analysis showed that high psychological safety and academic self-efficacy weakened the impact of proactive personality on critical thinking.

Conclusion: Most medical students surveyed in China might have relatively high levels of critical thinking. Psychological safety and academic self-efficacy moderated the association between proactive personality and critical thinking. More interventions related to psychological safety and academic self-efficacy will be helpful to improve critical thinking among Chinese medical students.

KEYWORDS

critical thinking, proactive personality, psychological safety, academic self-efficacy, medical students

Introduction

Critical thinking, regarded as a kind of individual rational thinking of an introspective nature, consists of the synthesis of knowledge, attitudes, and skills (Ennis, 1989). It is divided into two major characteristics: introspection and questioning (Ennis, 1989). The American Philosophical Association emphasizes that critical thinking is a comprehensive capacity that includes purposeful self-adjustment, the active and skillful gathering of information, and summarizing, applying, and analyzing this information (Facione et al., 1994). Generally, critical thinking is considered a key training outcome in the health sciences programs in higher education (Styers et al., 2018). The "Global Minimum Essential Requirements in Medical Education," published by the Institute for International Medical Education, emphasizes the significance of critical thinking ability for medical students with undergraduate degrees (Schwarz and Wojtczak, 2002). In addition, the Standards for Basic Medical Education in China (for trial implementation) formulated by the Ministry of Education's Working Committee for the Accreditation of Medical Education, also highlights the importance of a series of criteria for medical graduates, including scientific attitude, innovation spirit, and analysis and critical spirit (Ministry of Education of the People's Republic of China, 2008). A large amount of literature suggests that critical thinking ability enables medical graduates to better understand complex patient situations in future medical practice (Zori et al., 2010; Pitt et al., 2015). In addition, when medical students with critical thinking ability are faced with conflicts in clinical practice between old and new knowledge, they can compare the knowledge before taking action (Holmes et al., 2015). They can also break through existing knowledge and make use of old and new knowledge to innovate medical science (Eggers et al., 2017). Cultivating medical students' critical thinking ability is of great significance in improving their adaptability to future work and in promoting the development of medical science. Due to the differences between Chinese and western cultures, there was difference in critical thinking Chinese and Western students. Therefore, considering practical value in medical education, the current research specifically focused on critical thinking' influence mechanism among medical students based on the context of Chinese Oriental culture.

Critical thinking is not only restricted by the external environment, but it is also regulated by personality in the process of cultivation (Friedman, 2004). To date, research has found that a proactive personality is the most predictive personality trait for job performance (Thompson, 2005). Proactive personality is a relatively stable behavioral tendency and personality characteristic. It primarily refers to the behavioral tendency of individuals to constantly explore new paths, seize new opportunities, and take action that can change the external environment without being restricted by external resistance (Bateman and Crant, 1993). Based on self-determination theory, medical students with proactive personalities, who are influenced by internal and external motivations, will choose to self-reflect and ask questions to gain more initiative (Sheldon and Krieger, 2007). Therefore, we inferred that proactive personality could be protective factor for critical thinking among medical students as mentioned above and the existed evidence (Tu and Lin, 2018). Moreover, the specific and detail mechanism of the relationship between proactive personality and critical thinking were still unclear. For instance, what psychological conditions may reinforce the relationship between proactive personality and critical thinking. Previous studies demonstrated that college students are more likely to suffering from psychological problems, especially medical student (Yusoff et al., 2013; Bacchi and Licinio, 2015). Medical students are in a passive receiver and negative thinker under Chinese didactic lecture teaching pattern, which may lead to psychological problems and further affect critical thinking (Chen et al., 2010; Deng et al., 2014). It is necessary for scholars that further research focus on the deepen understanding of the psychological conditions mechanisms between proactive personality and critical thinking for medical students under Chinese educational context. Therefore, this study attempts to explore some psychological mechanisms in the relationship between medical students' proactive personality and critical thinking from the perspective of educational promotion. It is worth considering how psychological factors influence the relationship between proactive personality and critical thinking, and how to use the possible conclusion to improve medical students' critical thinking ability.

Psychological safety, as a determinant of mental health, has been widely studied (Wang et al., 2019). The original concept of psychological safety was defined by Edmondson through his research on a model of team learning, he pointed out that psychological safety was a specific confidence, belief and feeling among team members. It is an individual feeling of potential interpersonal risks in their surrounding environment (Edmondson, 1999). About the psychological safety of students in schools, Jeroen defined psychological safety as the feeling that students were able to show and employ themselves in their tasks without fear of negative consequences to self-image, social status, or school career (Schepers et al., 2008). It is to say that psychological safety is a subjective judgment of the certainty and controllability of the environment, which is a state of consciousness based on personal characteristics. Therefore, we agreed with Schepers that psychological safety is regarded as a kind of psychological state that makes students feel safe, comfortable, relaxed, and stable.

However, existing research into psychological safety mostly focuses on the workplace (Carmeli et al., 2009; Hu et al., 2018). Previous studies have suggested that a safe psychological status eliminates fear and tension about negative outcomes among employees, leading to improved positive personality and knowledge sharing as well as learning behaviors (Gong et al., 2012; Frazier et al., 2017). Moreover, previous research into the relationship between personality and security also indicates that personality can predict security among Chinese adolescents (Pan et al., 2018). Medical students influenced by their own personality characteristics often have different levels of psychological safety,

which affects their criticism and innovation behavior (De Dreu and West, 2001). Furthermore, psychological safety is often explored as a mediating variable in a series of relationships (Jia et al., 2017). However, few studies have explored the moderating mechanism among medical students in Chinese cultural background, which is different from the western culture. Supplementally, we regarded psychological safety as a moderator in the relationship between proactive personality and critical thinking among Chinese medical students.

Self-efficacy is a research area in positive psychology (Ouweneel et al., 2013). The theoretical framework of Bandura's social cognitive theory proposes that self-efficacy is a structure that reflects a person's confidence in their ability to successfully perform an action (Bandura, 1977, 2001). Academic self-efficacy is the academic performance of self-efficacy, which refers to the belief and motivation that students can achieve the expected academic level (Zimmerman, 1995). Bandura (1993) proposed four sources of self-efficacy: past performance, vicarious experience, verbal persuasion, and physiological/emotional state. These sources indirectly influence individuals' behavior patterns (e.g., choice and persistence) and thought patterns (e.g., goals and attributions) through their influence on efficacy expectations (Bandura, 1993). Regarding academic performance, medical students with proactive personalities are more active in their studies and have great enthusiasm and confidence in completing their learning tasks (Wu et al., 2020; Chen et al., 2021). Moreover, to obtain more knowledge, better grades, and psychological satisfaction, they constantly question and reflect on the learning process and results (Nur'azizah et al., 2021). Academic self-efficacy is often used as a moderating factor in previous study (Liu et al., 2022). Existing studies have confirmed the relationship between academic self-efficacy and critical thinking (Dong, 2016; Kim and Kim, 2016). Studies have also confirmed the correlation between proactive personality and academic self-efficacy (Lin et al., 2014; Chen et al., 2021). However, the role of academic self-efficacy in the relationship between proactive personality and critical thinking remains unclear. Whether academic self-efficacy has a moderating effect on proactive personality's impact on critical thinking is worthy of further investigation.

In summary, the present study aims to evaluate the critical thinking level of Chinese medical students and explore the relationship between proactive personality, psychological safety, academic self-efficacy, and critical thinking. And to further examine whether psychological safety and academic self-efficacy has a moderating effect in the relationship between proactive personality and critical thinking.

Materials and methods

Participants and procedures

Considering timeliness, cost effectiveness, and accessibility, this study conducted a cross-sectional anonymous online survey in China's Heilongjiang Province from October 2020 to December 2020. A convenience sampling method was used to collect data from the medical students. Students from Harbin Medical University (including Daqing Campus), Jiamusi University, Qiqihar Medical University, and Mudanjiang Medical University were selected as the research subjects. According to Zhou et al.'s (2017) calculation method and standard requirements for the cross-sectional sample size, the minimum sample size of this study was calculated to be 1,824 participants. Given the actual response rate of only 50%, and the problem of questionnaire quality control, a preliminary survey of 3,648 participants was finally conducted.

The specific procedures were as follows. First, the research was conducted following the guidelines of the Declaration of Helsinki and approved by the ethics committee of the Institutional Review Board at Harbin Medical University. All subjects provided informed consent to participate in this study. All information obtained was anonymous and confidential to protect the privacy of the study subjects. Second, before the investigation phase of the study, the researcher sent the research specifications to the educational administrators at the target university and obtained their consent and cooperation. The purpose and significance of the research were explained by the school administrator to the department counselors, who then handed it out to the students in each class to fill out voluntarily. Third, the survey was distributed through the online research platform "Questionnaire Star." The questionnaire was sent to medical students *via* a mobile phone link, and the questionnaire was completed only once per Internet Protocol address. Researchers used the Questionnaire Star platform to conduct real-time monitoring and collate the survey data. Another investigator controlled the quality of the collected questionnaires. Those with short answer times, fixed answering modes, and conflicting answers to reverse questions were excluded. Finally, we collected 5,920 valid questionnaires.

Measurement of critical thinking

Critical thinking was measured using Jiang's five-item revised version of the 10-item California Critical Thinking Disposition Inventory (Jiang and Yang, 2014; Snell and Lefstein, 2018). The results were graded on a five-point Likert scale (ranging from 1 = very much disagree to 5 = very much agree). The total score ranged from 5 to 25. The higher the score, the higher the individual's critical thinking tendency. In the current study, Cronbach's α for the total scale was 0.890.

Measurement of proactive personality

Proactive personality was measured using a simplified version of the Proactive Personality Scale (Parker and Sprigg, 1999), which has been used in many studies to measure the level of proactive personality and includes six items (Wu and Ma, 2019). The results were graded on a five-point Likert scale (ranging from 1 = very

much disagree to 5 = very much agree); the higher the score, the stronger the individual's proactive personality tendency. Cronbach's α for the total scale was 0.826.

Measurement of psychological safety

Psychological safety was measured using the Psychological Safety Scale (Edmondson, 1999; Wang et al., 2019), which has seven items. Li et al. pointed out that Edmondson's scale was originally used to measure psychological safety at the team level (Li and Tan, 2013). In order to measure psychological safety at the individual level, they selected items unrelated to other team members, and this method has good reliability (Li and Tan, 2013). In current study, we measured seven-item psychological safety scale at the individual level modified (Li and Tan, 2013). Examples of scale items include "Even if I make mistakes in class, I will not be criticized by my teachers or classmates." "In our class, students are allowed to take risks (challenge the teacher, ask bold questions, etc.)" Combined with the content from qualitative interviews, the context of the items was modified to conform to the situation of this study. The results were graded on a seven-point Likert scale (ranging from 1 = very much disagree to 7 = very much agree); the higher the score, the higher the degree of perceived psychological safety. Cronbach's α for the psychological safety scale was 0.872.

Measurement of academic self-efficacy

Academic self-efficacy was measured using an eight-item scale modified from the self-efficacy part of the "Learning Motivation Strategy Questionnaire" developed (Garcia and Pintrich, 1996; Wang and Lin, 2007). The results were graded on a seven-point Likert scale (ranging from 1 = very much disagree to 7 = very much agree); the higher the score, the higher the degree of academic self-efficacy. Cronbach's α for the learning self-efficacy scale was 0.956.

Measurement of medical students' demographic characteristics

Eleven demographic characteristics were collected for this study, including gender, grade, educational system, major, origin of student, one-child, first-generation college student, parenting style, academic performance, experience of leadership cadre, and inclined classroom seats. Parenting style was divided into authority type (strict requirements and more companionship), authoritarian type (strict requirements and less companionship), tolerant type (less strict requirements and more companionship), and neglected type (less strict requirements and less companionship) (Maccoby and Martin, 1983). The experience of leadership cadre refers to whether the student is in a class cadre or has joined an autonomous management organization such as the student union. Responses were divided into "yes" and "no." Academic performance was divided into four grades: top 25, 26–50%, 51–75%, and bottom 25%. Inclined classroom seats were divided into front, middle, and back rows.

Statistical analyses

All statistical analyses were performed using IBM SPSS Statistics 21.0, with a two-tailed value of $p < 0.05$ considered to be statistically significant. The correlation of continuous variables was detected using Pearson correlation analysis. A series of hierarchical multiple regressions were applied to examine the association between proactive personality, psychological safety, academic self-efficacy, and critical thinking. The moderating effect of psychological safety and academic self-efficacy on the relationship between proactive personality and critical thinking was explored by adding interaction items (Wen et al., 2005). If the interaction effect was statistically significant, a simple slope analysis was conducted to visualize the interaction term. In the simple slope analysis, for continuous moderators the value at the mean of z and at 1 SD above and below the mean of z were selected as the cut-off points for high and low levels based on the suggestion of scholars (Cohen et al., 1983). The multicollinearity among all variables was evaluated by variance inflation factor (*VIF*); $VIF < 10$ was considered acceptable (Song et al., 2019). In the present study, no problematic *VIF* (> 10) was identified in any model.

Results

Demographic characteristics of participants

A total of 5,920 medical students answered the questionnaire, 28.6% of which were male and 71.4% were female. Half of the respondents were five-year students, accounting for 48.2%, as presented in Table 1.

Correlations among continuous variables

Table 2 showed the correlation between proactive personality, psychological safety, academic self-efficacy, and critical thinking. As shown in Table 2, critical thinking was positively correlated with proactive personality ($r = 0.751$, $p < 0.01$), psychological safety ($r = 0.514$, $p < 0.01$), and academic self-efficacy ($r = 0.634$, $p < 0.01$). In addition, proactive personality was also positively correlated with psychological safety ($r = 0.477$, $p < 0.01$) and academic self-efficacy ($r = 0.594$, $p < 0.01$), while psychological safety was still positively correlated with academic self-efficacy ($r = 0.600$, $p < 0.01$).

TABLE 1 Demographic characteristics of study participants (*N*=5,920).

Characteristics	*N* (%)	
	N	%
Gender		
Male	1,691	28.56
Female	4,229	71.44
Grade		
Freshman	2,363	39.92
Sophomore	1,265	21.36
Junior	1,506	25.44
Senior	647	10.93
Senior 5 and above	139	2.35
Educational system		
Three year system	279	4.71
Four year system	2,471	41.74
Five year system	2,853	48.19
"5 + 2" or seven-year system	106	1.79
"5 + 3" year system	211	3.57
Major		
Medical	3,183	53.77
Medical technology	844	14.26
Pharmacy	921	15.56
Nursing	388	6.55
Biological Sciences	25	0.42
Others	559	9.44
Origin of student		
City	2,527	42.69
Countryside	3,393	57.31
The one-child		
Yes	2,852	48.18
No	3,068	51.82
First-generation college student		
Yes	3,922	66.25
No	1998	33.75
Parenting style		
Neglected type	623	10.52
Tolerant type	3,665	61.91
Authoritarian type	652	11.01
Authority type	980	16.56
Academic performance ranking		
Top 15%	2,614	44.16
26–50%	1738	29.36
51–75%	1,077	18.19
Last 25%	491	8.29
Experience of leadership cadre		
Yes	2,923	49.38
No	2,997	50.62
Inclined classroom seats		
Front row	2,287	38.63
Middle row	3,118	52.67
Back row	515	8.70

TABLE 2 Correlation coefficients among continuous variables of medical students (*N*=5,920).

Variables	*Mean* ± *SD*	1	2	3	4
1 Proactive personality	3.68 ± 0.58	1			
2 Psychological safety	4.96 ± 0.95	0.477**	1		
3 Academic self-efficacy	5.10 ± 1.04	0.594**	0.600**	1	
4 Critical thinking	3.85 ± 0.61	0.751**	0.514**	0.634**	1

**$p < 0.01$ (two-tailed).

Hierarchical regression analyses

Table 3 showed the results of the hierarchical regression analyses. In Model 1, the demographic variables were input as control variables. These included gender, grade, educational system, major, origin of student, one-child, first-generation college student, parenting style, academic performance ranking, experience of leadership cadre, and inclined classroom seats. Model 2 added proactive personality and psychological safety to the list of variables used for Model 1. We found that proactive personality was positively correlated with critical thinking ($\beta = 0.647$, $p < 0.01$), and psychological safety was positively correlated with critical thinking ($\beta = 0.202$, $p < 0.01$). The addition of proactive personality and psychological safety improved the degree of fit of the critical thinking model (*adjusted* $R^2 = 0.598$, $\Delta R^2 = 0.558$, $p < 0.01$). Model 3 added the interaction term between proactive personality and psychological safety to the list used for Model 2. The results of the study indicated that proactive personality × psychological safety interaction items were significantly and negatively associated with critical thinking ($\beta = -0.160$, $p < 0.01$). Psychological safety plays a moderating role in the relationship between proactive personality and critical thinking. Simple slope analysis revealed that when psychological safety is higher, the association between proactive personality and critical thinking becomes weaker. In other words, the slope of low psychological safety was higher than that of high psychological safety, and the slope of low psychological safety was more inclined. Compared with low psychological safety, high psychological safety weakened the influence of proactive personality on critical thinking. The interaction is visualized in Figure 1.

Another regression analysis was conducted repeating the Model 1. Model 4 added proactive personality and academic self-efficacy to the list of variables used for Model 1. The results showed that proactive personality ($\beta = 0.576$, $p < 0.01$) and academic self-efficacy ($\beta = 0.295$, $p < 0.01$) were positively correlated with critical thinking. Moreover, we included the interaction item of proactive personality × academic self-efficacy, shown in the table as Model 5. The results showed that the interaction term between proactive personality × academic self-efficacy was negatively associated with critical thinking ($\beta = -0.109$, $p < 0.01$). Academic self-efficacy played a moderating role in the relationship between proactive personality and critical thinking. As shown in Figure 2, high academic self-efficacy

TABLE 3 Hierarchical multiple regression results of critical thinking among medical students (N=5,920).

Variables	Critical thinking				
	M1(β)	M2(β)	M3(β)	M4(β)	M5(β)
Control variables					
Gender	−0.038**	0.027**	0.025**	0.025**	0.023**
Grade	−0.019	−0.022**	−0.023**	−0.028**	−0.028**
Educational system	0.000	−0.006	−0.007	−0.004	−0.004
Major	−0.012	−0.013	−0.012	−0.004	−0.004
Origin of student	−0.033*	0.002	0.002	0.003	0.003
The one-child	−0.034*	−0.012	−0.012	−0.014	−0.015
First-generation college student	0.001	−0.005	−0.005	−0.003	−0.003
Parenting style	0.038**	0.016	0.016	0.008	0.008
Academic performance ranking	−0.103**	−0.031**	−0.030**	0.010	0.011
Experience of leadership cadre	−0.090**	−0.017*	−0.018*	−0.010	−0.010
Inclined classroom seats	−0.073**	−0.013	−0.013	0.008	0.008
Predictor variable					
Proactive personality		0.647**	0.800**	0.576**	0.681**
Moderator variable					
Psychological safety		0.202**	0.206**		
Academic self-efficacy				0.295**	0.294**
Proactive personality × psychological safety			−0.160**		
Proactive personality × academic self-efficacy					−0.109**
F	23.241**	678.851**	634.596**	741.637**	691.035**
Adjusted R^2**	0.040	0.598	0.600	0.619	0.620
ΔR^2**	0.041	0.558	0.601	0.579	0.621

*$p < 0.05$; **$p < 0.01$ (two-tailed); β is the normalized regression coefficient.

relative to low academic self-efficacy weakens the influence of proactive personality on critical thinking.

Discussion

Current situation and analysis of medical students' critical thinking

The results of this study show that the average critical thinking score of the Chinese medical students surveyed was 3.85 ± 0.61. The critical thinking score was slightly higher than the theoretical median of 3, which is above the average level (Liu, 2017). This indicates that Chinese medical students show a relatively higher average tendency toward critical thinking, which is consistent with the findings of other scholars (Yeh, 2002; Huang et al., 2018). However, some scholars have found that the tendency for critical thinking among medical students in China is relatively lower than in Western countries, such as the United States (Colucciello, 1997; Tiwari et al., 2003). This may be due to the impact of China's medical education personnel training goals and cultural differences between the East and West. Power distance theory may provide a perspective for understanding the current results, particularly difference in Eastern and Western countries (Wanda et al., 2014). Power distance is the degree to which societies expect and accept an unequal distribution of power (Minnis, 1999), and it is particularly pronounced in hierarchical societies (Kim and Cha, 2013). There are considerable differences in power distance under Chinese culture and Western culture. Hofstede believed that China is a high-power distance culture, compared to the Western countries (Hofstede, 1991). In Chinese culture with high-power distance, people take for granted the existence of power hierarchies in society (Fu, 2008). Differences in power distance main caused by culture difference. Compared to Western Christian culture (Page and Wiseman, 1993), China with the Confucian culture is characterized by the Confucian ethics of differential love and the idea of maintaining a hierarchy (Page and Wiseman, 1993; Scarborough, 1998). Chinese Confucianism has had a profound influence on the Chinese people (Scarborough, 1998), including students. Especially, the power distance is relatively larger between teachers and students in medical university setting. Teachers are perceived to hold higher level positions, thus they are held in high esteem and students are less likely to challenge what is taught (Kim and Cha, 2013). Therefore, medical students tend to form teacher-dominated interaction style in the teaching interaction between teacher and student, which may hinder the cultivation of students' critical thinking ability (Kawashima and Petrini, 2004). Under medical educational context, medical teachers are perceived to hold higher level positions, reputation and power and believe that it is their responsibility to ensure students learning that they

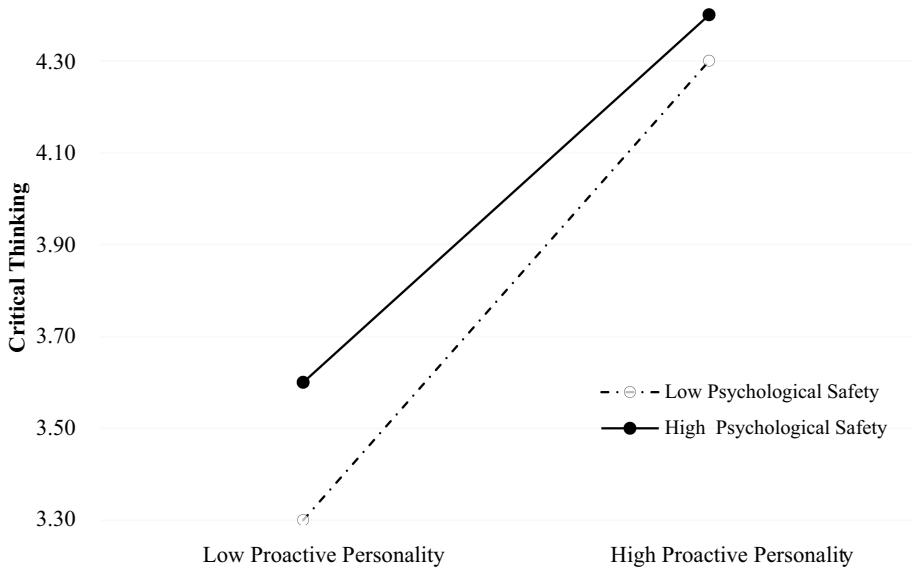

FIGURE 1
Simple slope plot of the interaction between proactive personality and psychological safety on critical thinking.

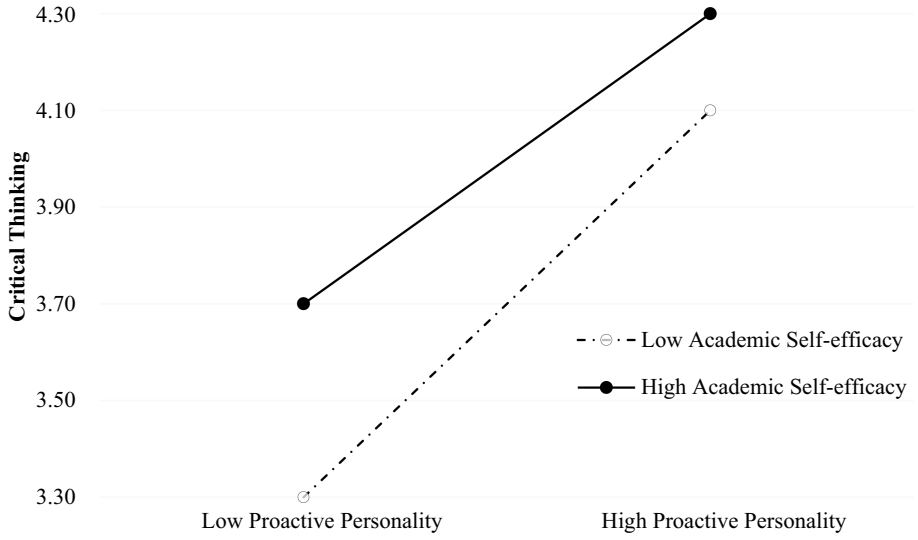

FIGURE 2
Simple slope plot of the interaction between proactive personality and academic self-efficacy on critical thinking.

taught, thus they are held in high-level academic authority and students are less likely to challenge what is taught (Stockhausen, 2007; Chiang et al., 2010). In addition, Chinese people's traditional utilitarian motivation hinders the development of critical thinking (Yan, 1998). Medical students study for the purpose of examination performance, ignoring their own interesting and initiative, which limits, to some extent, the cultivation of critical thinking (Cox, 2009). Meanwhile, traditional medical education focuses on improving students' professional knowledge and skills (Foster and Lemus, 2015), paying less attention to students' thinking ability in developing medical talent (Knowles and Gray, 2011; Foster and Lemus, 2015). Therefore, a relevant suggestion is to identify the key factors and intervention measures of critical thinking to cultivate medical students' critical thinking, such as assessment and evaluation on critical thinking ability.

The association between proactive personality and critical thinking

The results verified that the medical students' proactive personality is correlated with critical thinking. These results are

consistent with those reported in other researcher and is exactly as expected. In research on the relationship between personality, cognition, and behavioral style (Curry, 1983), critical thinking ability belongs to the tendency toward information processing at the cognitive level, which is not only restricted by the external environment but also regulated by internal personality (Curry, 1983). This study also confirmed that psychological safety and academic self-efficacy play a moderating role in the relationship between proactive personality and critical thinking.

Proactive personality has a greater impact on critical thinking with lower psychological safety

The simple slope analysis indicated that the slope of low psychological safety was significantly higher than that of high psychological safety. Thus, the proactive personality of medical students with low psychological safety has greater influence on critical thinking. This study attempted to interpret this result from the perspective of cultural differences between Eastern and Western countries. Unlike Western culture, Eastern culture is based on social orientation rather than individual standards (Luomala et al., 2015). Since ancient times, Westerners have liked to take risks and explore, while the people in China have placed more emphasis on stability and security instead of adventure and exploration (Luomala et al., 2015). This is because, in China, medical students with low psychological safety find it easy to break through their own psychological defense line and have the courage to pursue changes in themselves and the external environment (Thau et al., 2009). However, those with high psychological safety pursue more stability and are not prone to active change (Thau et al., 2009). Therefore, such a tendency may interfere with the effect of proactive personality and reduce its influence on critical thinking. The present results suggest that interventions for medical students with low psychological safety is beneficial to better cultivate their critical thinking ability in China. A safe and attractive learning environment should be built within Chinese medical education to improve the psychological safety of medical students, thus promoting their critical thinking (Roh et al., 2020). In addition, peer mentoring might be an effective solution for building psychological safety (Dokal et al., 2020). Hence, teachers and medical students should actively build good peer relationships.

Proactive personality has a greater impact on critical thinking with lower academic self-efficacy

The simple slope analysis indicated that high academic self-efficacy weakens the impact of proactive personality on critical thinking. According to the self-determination theory, medical students with proactive personality, under the action of internal and external motivation, they will choose to reflect and question to obtain more initiative (Sheldon and Krieger, 2007). The process of producing critical thinking can also be regarded as an individual initiative (Bandura, 1977, 2001). Academic self-efficacy is the product of social cognition, a comprehensive understanding and effective evaluation of the individual, and the basis of individual initiative. For medical students with high academic self-efficacy, positive psychological state (such as positive emotions, active knowledge sharing, etc.) would be more conducive to the generation of individual proactive behaviors. Considering critical thinking is typical active behavior, medical students with high academic self-efficacy will constantly reflect on and improve their behavior in the process of learning because they have great enthusiasm and confidence to complete their studies. On the contrary, when medical students have low academic self-efficacy, their negative psychological state will not be conducive to the generation of individual initiative behavior. At this time, the active personality factors of medical students will have greater influence on critical thinking. According to the simple slope plot, compared with students with high academic self-efficacy, students with low academic self-efficacy have a stronger positive relationship between proactive personality and critical thinking. As shown in Figure 2, the slope of high academic self-efficacy is smaller, and the effect of high academic self-efficacy still exists, and its growth rate is slower. The slope of low academic self-efficacy is larger and more skewed, increasing at a faster rate. Therefore, interventions for medical students with low academic self-efficacy should have a more visible intervention effect on critical thinking (Chen et al., 2021). This study suggests that teaching strategies can be appropriately adjusted to stimulate medical students' enthusiasm for learning and improve their learning interest in the process of teaching, such as problem-based learning, flipped classrooms, and other teaching modes (Khoiriyah et al., 2015; O'Flaherty and Costabile, 2020). Moreover, teachers should pay considerable attention to improving students' learning confidence through encouragement and support (Tsuei et al., 2019; Zhen et al., 2020). Teachers should guide medical students to learn appropriate self-attribution and establish appropriate learning objectives to improve their sense of academic self-efficacy and further cultivate critical thinking (Perry and Perry, 1983).

Limitations

Although this study has produced some valuable findings regarding the moderating effects of proactive personality on critical thinking, some limitations still must be addressed. First, a stratified multi-stage sampling method was used to collect data from four regions in China, which may limit the generalizability of this study to other regions. Second, as a cross-sectional study, only correlation, rather than causality, can be obtained. Third, although a series of quality control measures were adopted, there may have been uncertain deviations in the online data collection. Therefore, more rigorous sampling

techniques and larger sample sizes from different cultural regions are needed in the future.

Conclusion

In summary, this study found the critical thinking tendency of Chinese medical students to be above average. Moreover, our findings indicated that proactive personality, psychological safety and academic self-efficacy were protective factors for critical thinking. Psychological safety and academic self-efficacy play moderating roles between proactive personality and critical thinking. Furthermore, relatively high psychological safety and relatively high academic self-efficacy weaken the influence of proactive personality on critical thinking. These findings suggest that policymakers and managers in medical universities should pay close attention to the psychological factors of Chinese medical students. It emphasizes the importance of intervening these psychological factors to improve the critical thinking of Chinese medical students. Such as, educators need to incorporate formative evaluation involved critical thinking ability into performance evaluation to make up for the shortcomings of final assessment. Potential interventions might include (but are not limited to) strengthening psychological safety and academic self-efficacy to improve critical thinking among Chinese medical students.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

Y-pW, C-xZ, and S-eZ came up with the idea and designed the study with the help of D-pC. Acquisition of data was done by Q-lL and JT with help from M-lY and H-cG. JY and S-yZ entered the data into SPSS with the help from MW. Y-pW analyzed and interpreted the data with the help from C-xZ. Y-pW, S-eZ, and D-pC conducted the focus group discussion. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Does a cooperative training design influence pre-service teachers' perceived quality of life?

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Purpose: One of the main challenges of teacher education is to prepare pre-service teachers (PSTs) to implement various instructional models that promote the quality of learning at school. Beyond individualistic efforts and competition, cooperative learning (CL) environments provide PSTs with opportunities to experience positive interpersonal relationships and support. However, both instructional content knowledge acquisition and motivation for serenely implementing learning environments later in classrooms depend on PSTs being trained to make links between theory, research, and practice. The purpose of this study is to explore the effects of CL instructional programs on PSTs' quality of life in light of their motivation and competencies for teaching in comparison with traditional direct instruction in the physical education (PE) setting.

Method: After a pre-test, 69 PE-PSTs were randomly assigned to one of the following three training conditions comprising a theoretical presentation of CL designs coupled with (a) a Learning Jigsaw experience (LJE), (b) a Teaching Jigsaw experience focused on instructional acts (TJE), and (c) a Direct Instruction experience (DI).

Results: Although integrating CL into the PE-PST training program positively influenced instructional content knowledge acquisition, unexpected results related to participants' motivation were obtained when the instructor made links between theory, research, and practice focusing on the teaching activity during Jigsaw training sessions.

Discussion: Recommendations for planning innovative conditions in PE-PSTs' training with respect to CL instruction and quality of life are discussed.

KEYWORDS

Jigsaw approach, direct instruction, novice teachers training, self-determination, instructional knowledge

1. Introduction

Students' quality of life at school partly depends on the opportunity to escape from a "dog-eat-dog world" where competition is the only means to succeed (Johnson et al., 2007). This requires that teacher training provides early content and instructional models focused on students' competencies to share a variety of experiences considered vital for productive members of society in the 21st century (e.g., Csanadi et al., 2020; Legrain et al., 2021). This challenge concerns pre-service teachers (PSTs) training and whether they can be taught to serenely implement fruitful learning environments at school under the supervision of an instructor (Reeve and Cheon, 2021). Among the wide array of instructional models, direct instruction is one of the most traditional training procedures used during training sessions involving an unambiguous presentation of the curriculum through demonstration, and guided and independent practice in activities directly related to the newly learned material (Jayantilal and O'Leary, 2016). As a consequence, PSTs mainly use the direct instruction model during teaching sessions and internship periods. Cooperative Learning (CL, Johnson et al., 1989) is also presented as a suitable environment fostering critical pedagogy to create an inclusive learning environment positively influencing the quality of life at school (Dyson et al., 2010). Nevertheless, in teacher training, content knowledge related to CL consists primarily of formal lectures and is often restricted to the presentation of the social cognitive bases of CL through its five main group work characteristics: (1) positive interdependence of goals, (2) face-to-face interaction, (3) individual accountability, (4) interpersonal and small group working skills, (5) group processing. Thus, despite its relevance for creating fruitful social conditions for learning (Deci et al., 1991), CL designs are rarely put into practice during PST practical training sessions, and obviously less implemented at school. Because novice teacher training needs to drop the assumption that the instruction of PSTs will only be based on what they have learned theoretically, narrowing the gap between theory, research and practice is still a challenge (Adamakis and Zounhia, 2015; Hemphill et al., 2015; Ward et al., 2021). With regard to the development of the professional experiences, giving PSTs the opportunity to experience CL configurations during their training would be the first option. However, this option does not ensure that the link between theoretical bases and pedagogical practices will be preserved in a reflection centered on instructional practices that take into account the students' well-being (Cornish and Jenkins, 2011). Furthermore, there is no guarantee that these peer teaching and peer analyzing conditions will help PSTs to have a quality instructional experience that will help them to manage the various social cognitive consequences of small group figurations serenely. The aim of the present study was to consider the characteristics of two CL training programs oriented through learning vs. teaching experience to test their potential effects on PSTs' professional competencies and motivation to teach a new physical activity in comparison to a DI training condition in the physical education (PE) setting.

2. Experiencing Jigsaw making theoretical and practical links

The Jigsaw procedure, one of the group-based instructional methods, is grounded in a peer-learning method designed to optimize the benefits of working groups. With reference to Aronson's historical account (Aronson and Patnoe, 2011), Jigsaw is a CL environment in which students are arranged in heterogeneous groups in terms of gender, race, and personal academic performance considerations to reach a common goal. First, the instructor divides up the material to be learned asking team members to endorse individual accountability and an engagement to learn one piece of the puzzle at a specific station (Expert Group). Then, expert group members are invited to return to their team to teach partners in Jigsaw groups the knowledge and skills they have learned and to prepare for a test on all of the material.

Jigsaw has become one of the classic peer-learning designs in education to such an extent that it has recently been introduced in university-based educator preparation programs. Nevertheless, Jigsaw does not always provide the expected positive learning outcomes, and empirical research that examined its effect on learning remains relatively scarce and debated (Stanczak et al., 2022). This statement stresses this importance of focusing on the teachers' competencies to implement CL in classrooms. Specifically, with regard to Jigsaw which elicits both cooperative, competitive, and individualistic goals (Roseth et al., 2019), little is known about the best arrangements to be made within the framework of training for equipping PSTs with strong pedagogical knowledge. In this respect, it could be expected that beginning teachers' training helps them to develop skills in gathering information about their own attitudes and teaching practices when experiencing Jigsaw. These instructional skills (i.e., observing students' tutoring behaviors when demonstrating the task and focusing students' attention on dominant characteristics of the movement, planning verbal instruction providing a rationale, asking questions rather than giving answers to problems, and distributing feedback specifically to some students or to the whole group to help them endorse their role) would be useful for coping with the social and cognitive characteristics of Jigsaw considering its constraints and levers to be activated (e.g., Crone and Portillo, 2013; Roseth et al., 2019; Legrain et al., 2021).

2.1. Social characteristics of Jigsaw

Given its main social psychology foundations, the Jigsaw configuration is considered to be an opportune way to foster social interdependence within learning groups. According to the social interdependence theory (Deutsch, 1949, 1985), the Jigsaw method is based on constructive social interactions built on the interdependence of positive means (sharing resources, tasks and

roles) and outcomes (sharing goals and rewards). In the first stage, students join a temporary expert group and are assigned the same subset of materials. This initial breakdown is designed to help each participant to develop life skills comprised in the future tutor role in heterogeneous groups. The success of this first stage depends not only on the individual effort made by each member to attain the personal goal of being a competent tutor but also on the rationale the instructor provides when presenting the task to elicit cooperation in line with the common goal (helping each other to gain tutor expertise). In the second stage, when returning to the Jigsaw group, it is expected that independent effort to acquire knowledge and skills will nurture the cooperative dynamic contributing to teammates' performance. The success of this second stage depends on the personal accountability each tutor invests in using pedagogical techniques discovered during the previous stage under the instructor's supervision and not considering that this jeopardizes the time he/she needs for personal progress (Johnson et al., 1989; Ortiz et al., 1996).

2.2. Cognitive characteristics of Jigsaw

Another theoretical perspective emphasized that PSTs would be confronted with pedagogical problems considered in terms of social cognitive conflict theory (Doise and Mugny, 1984). Given that social interactions among groups may be regulated in different ways, the task design is expected to provide opportunities for exchanges of viewpoints and controversial ideas, nurturing students' experience and development. Traditionally, the Jigsaw setting is built to engage students in epistemic processes (i.e., taking into account other viewpoints and providing further information necessary to tackle the problem). Nevertheless, it may also push students to defend personal competence while facing peer pressure and share disagreement with another individual viewpoint (Butera et al., 2011). These cognitive processes lead to the recognition that "simply distributing resources among jigsaw group members does not result in optimal outcomes" (Roseth et al., 2019, p. 149).

Because the quality of life in a teaching-learning setting is more than just a concept, implementing a fruitful interpersonal environment implies thoroughly preparing PSTs to cope with social cognitive Jigsaw characteristics making links between theory, research, and practice. For the instructor, this implies selecting and enacting common and specialized content knowledge (Ward et al., 2021) for creating congruence in instruction and learning that would improve not only PSTs' professional competencies, but also motivation to acquire new skills.

3. PSTs' motivation for improving teaching skills under CL conditions in physical education

Self-determined motivation theory-based interventions are a recent area of inquiry to examine whether teachers might demonstrate more instructional behaviors favoring student motivation (Aelterman et al., 2013; Perlman, 2015). However, according to Fletcher and Casey's (2014) conclusions, this line of research has more rarely taken into consideration PST and instructor relationships when the different types of knowledge required to teach the "hows" and "whys" of a model-based approach are considered in physical education (PE). Similar to other instructional approaches, the social psychological benefits of CL may partly depend on the perceived autonomy support provided by the instructor (Leroy et al., 2007; Deci and Ryan, 2008) that nurtures the PE-PSTs' basic psychological needs which in turn may influence the highest level of self-determined motivation for teaching (Ryan and Deci, 2000). Since novice teachers' quality of life could depend on the instructional climate, the influence of the instructor's choices for providing detailed content knowledge focused on teaching skills on the three basic needs (autonomy, competence, and relatedness) is of interest.

The need for autonomy refers to an individual's disposition to feel responsible for their own behavior (deCharms, 1968). For PE-PSTs, this need can be satisfied when the instructor explicitly provides a meaningful rationale for performing the instructional tasks, emphasizing choice rather than control, and acknowledging student teachers' feelings and perspectives (Lavigne et al., 2007). The need for competence is the individual's inclination to interact effectively with the environment. For PE-PSTs, this need could be satisfied when the instructional procedure gives them the opportunity to teach the contents focusing on instructional task management nurtured by personal and vicarious experiences (Bandura, 1997). The need for relatedness concerns the degree to which an individual feels accepted by others and connected with peers while working in a small group (Baumeister and Leary, 1995). For PE-PSTs, the satisfaction of this need may depend on the clarity of responsibilities related to the roles they endorse, generating epistemic conflict regulations in the expert group based on the validity of different answers (Butera et al., 2011). In the physical education (PE) setting, it is possible that satisfaction of the three needs could be strengthened by the positive resource interdependence (Johnson et al., 1989; Ortiz et al., 1996) generated by the instructor's guidance. Nevertheless, focusing on teaching practices, Ntoumanis (2001, p. 236) underlined that "*PE teachers are not well trained or do not feel comfortable to experiment with teaching styles which reduce their control over the class, and provide a great degree of student involvement*."

Since professional training brings up the recurring questions of novice teachers' autonomy-guidance needs to gain pedagogical knowledge and skills (Tessier et al., 2010; Reeve and Cheon, 2021), light needs to be shed on the specific question of the conditions required to integrate Jigsaw into the PE-PST training. Beyond the results of a range of studies underlining the inadequacy of PST training (Sacli and Demirhan, 2011; Ward et al., 2021), the development of PE training programs refers to whether the CL environment should be reshaped to explicitly emphasize instructional acts involved in Jigsaw implementation.

Considering that self-determination is a predictor of perceived quality of life, the conditions under which PE-PSTs are trained to build knowledge and skills during training sessions should impact their motivation depending on opportunities to become informed causal agents in their teaching activity (Wehmeyer and Little, 2009). Starting from this assumption, we examined the effects of three training programs—a theoretical presentation of CL designs coupled with (a) a learning Jigsaw experience (LJE), (b) a teaching Jigsaw experience (TJE), and (c) a direct instruction experience (DI)—on PE-PSTs' motivation and knowledge for instruction. From a motivational standpoint, provided with additional rationales focused on the instructors' pedagogical acts, it was expected that the TJE participants would express higher: (a) perceived autonomy support, (b) basic needs satisfaction for autonomy, competence and relatedness, and (c) intrinsic motivation to teach a new physical activity, in comparison to participants in LJE and DI conditions. From a pedagogical standpoint, both LJE and TJE participants were expected to express higher knowledge related to instruction than DI participants.

4. Materials and methods

4.1. Participants and design

Sixty-nine PSTs (46 males and 23 females, mean age = 21 years ±1.5) enrolled in the third year of training in the "Education and motor skills" specialization at the same university and volunteered to participate in the study. The experiment occurred during a training program comprising sports activities they had never done. French boxing was institutionally part of the PE curriculum in French secondary schools, and not taught in the first years of basic PST training. No expertise bias would occur with regard to the participants' novice level in this physical practice while they were asked to express their motivation for teaching. This sports practice was also chosen because it entails tutoring guidance involving many demonstrations and instructions in the early phases of the motor skill acquisition (e.g., Schmidt and Lee, 1999; Legrain et al., 2003). Participants were informed they would be filmed for the purpose of this experiment, but that confidentiality would be respected. Prior to the study, ethical permission was attained from the University Institutional Review Board, and all participants provided their informed consent.

4.2. Procedure

The procedure included in this order: (a) an 8-h presentation of the theoretical basis of group work learning conditions (i.e., cooperative learning, peer tutoring) and an illustration of French-boxing practice at school, (b) a pre-test, (c) three 2-h physical practice sessions in dyads (DI) or small groups (LJE and TJE), (d) a provision of instructional knowledge for TJE participants only, and (e) a post-test.

4.2.1. Presentation of the theoretical basis of group work learning conditions

During the first semester, a full Professor in the sports faculty presented to all participants the theoretical frameworks of cognitive and social-cognitive theories (Piaget, 1985; Vygotsky, 2012). During a 4-h presentation, he emphasized the foundation of peer-assisted learning strategies and the importance of taking care to train pupils to interact when integrating cooperative learning designs in PE lessons (Dyson and Casey, 2012). During the same semester, an Associate Professor expert in French boxing introduced a 4-h lecture centered on historical and technical standpoints of physical practice. The instructor presented in detail the various techniques (i.e., punching, foot kicks) and explained safe conditions for school practice for pupils (assault).

Then, participants were randomly assigned to one of the three conditions. In the LJE condition, 21 participants (14 males and 7 females) experienced the Jigsaw design. In the TJE condition, 28 participants (20 males and 8 females) were provided with instructional knowledge while experiencing the same Jigsaw configuration. In the DI condition, 20 participants (12 males and 8 females) only theoretically instructed about CL designs discovered the physical activity under direct instruction. Participants were ensured that they will not be subject to penalty for not taking part and were free to withdraw from the research at any time without giving a reason and without a prejudice.

4.2.2. Pre-test

At the beginning of the session, participants' skills in French boxing were pre-tested. Participants were paired in dyads to alternate the boxer and sparring-partner roles to be pre-tested in two basic French-boxing situations asking them to carry out 10 times in succession: (a) a combination of three straight punching actions maintaining the distance and protection, and (b) a combination of two actions of a foot-technique (fouetté) keeping balance and protection. The instructor both described and demonstrated each exercise twice, specifying the target placements for the sparring partner. Motor performance was scored by two raters both qualified physical education teachers and blind to the study purposes and experimental conditions. For the punching and kicking technique combinations, they used a 5-point scale ranging from perfect stable performance (5 points) to imperfect stable performance (1 point) to assess: (a) general balance; (b) distance for execution, (c) precision on targets, (d) execution speed, (e) power control, and (f) full recovery. The motor performance was calculated meaning the six assessed elements, respectively. Interrater reliability was calculated and is presented in the Results section.

The participants also completed two questionnaires assessing: (a) the psychological needs satisfaction (Gillet et al., 2008) relative to previous physical practice sessions under the supervision of

instructors, and (b) their motivation to teach a new physical activity at school (Tessier et al., 2010).

4.2.3. Physical practice sessions

Participants of the three conditions practiced physical activity over 3 weeks as follows. Whereas DI participants practiced the physical activity in dyads under the instructor's explanation and demonstration, LJE and TJE participants were split into four mixed-sex teams of four to seven members respecting the traditional group size concerns for cooperative learning (Johnson and Johnson, 2005). Following a Jigsaw procedure (Aronson and Patnoe, 2011), each team was asked to freely distribute the members over four specific fit-out stations in order to practice exercises they would have to teach to teammates later, according to the following instructions: "During the first period, you will practice a task in order to perform a movement with ease and be able to explain and model this movement to your team members. During the second period, you will come back to your team to instruct teammates, in turn, using relevant technical comments and incentives in order to help them to perform. When your group-mates come to instruct, you will also become a tutee."

Following the Legrain et al. (2019) procedure, JE participants received a one-hour period of training students in the Jigsaw cooperative learning environment. The instructor focused on: (a) the procedure for mixed group composition, (b) the most effective way of allocating roles and responsibilities in small groups, and (c) the specific timing necessary to ensure equity for individuals doing the instructional task. At the end of the expert-group session, LJE participants were asked to prepare autonomously their teaching intervention for 5 min before returning to their Jigsaw group. However, no precision was provided to emphasize how the instruction was embedded in this cooperative learning environment.

4.2.4. Instructional training within cooperative learning conditions

According to the structured Jigsaw condition, TJE participants received additional knowledge related to the instructional activity. Prior to the first session, PE-PSTs observed videos describing how the instructor took precautions to demonstrate and explain a task in expert groups. Focusing on the validity of different viewpoints, the instructor asked participants to comment on the video clips giving significance to several pedagogical choices when: (a) presenting a situation verbally (i.e., instructions relative to goals, operations, and environmental constraints), (b) demonstrating a movement (i.e., changing the placement into two demonstrations, breaking the movements down into elements), (c) observing learners' behaviors (i.e., examining the situation from a number of perspectives before deciding to break up the learners motor experience, questioning instead of giving advice in a directive way), and (d) regulating the situation (i.e., only selecting several learners or deciding to interrupt all the classroom to attract the attention on one important element to improve the motor realization). Prior to the second session, observing audio-video recording of teaching sequences recorded the year before with other groups, the participants had access to confidential feedback the instructor provided to tutors. For higher both individual accountability and perceived interdependence, the instructor asked the participants to identify the instructional abilities comprised in the tutor's role: (a) stressing the most important features when explaining and demonstrating the task, (b) attentively observing peers identifying the nature of specific characteristics of incorrect behavior (i.e., lack of attention, misinterpretation of an instruction, deficiency in the body-preparation, uncontrolled speed), and (c) advising peers to help them make progress (i.e., reminding them of the sparring partner's responsibility in clearly presenting targets to be touched). Finally, to favor epistemic conflict regulations during the period of transition expert-group and Jigsaw periods (5 min), participants were asked to share instructional knowledge relative to the selection, the implementation of contents taught, and the regulation of teammates' behaviors. These three distributed periods made a total of 2 h for the explicit instructional scaffolding session.

4.2.5. Post-test

Participants completed the Perceived Autonomy Support Scale for Sport Settings (Gillet et al., 2010). Furthermore, they completed again two questionnaires assessing: (a) the psychological needs satisfaction (Gillet et al., 2008), and (b) their motivation to teach new physical activities at school (Tessier et al., 2010). Finally, they were tested on knowledge for instruction referring to the precautions to be taken when demonstrating and presenting verbally a motor task in small groups. For this purpose, participants were asked to provide a written answer to the following PE context: "In a PE lesson for novice secondary school pupils, you will have to present a French-boxing situation comprising a combination of a middle straight foot-technique from the front leg and a low circular foot-technique from the rear leg." They were asked to precisely indicate the precautions they would take when demonstrating the movement and explaining the task to be learned.

4.3. Measures

4.3.1. Perceived autonomy support

The Gillet et al.'s (2010) questionnaire, adapted to the PE-PST training was used to assess perceptions of the autonomy support provided by the instructor (e.g., "I feel that my instructor provides me with choices, options, and opportunities regarding how to do this sports activity"). Answers to the 12 items given on a 7-point scale ranging from 1 (Strongly disagree) to 7 (Strongly agree) were summed to obtain the perceived autonomy support score. Internal validity was satisfactory ($\alpha = 0.87$), consistent with previous research that found this scale to have acceptable convergent validity, temporal stability, and internal consistency reliability ($\alpha = 0.91$; e.g., Gillet et al., 2010).

4.3.2. Psychological needs satisfaction

Needs Satisfaction was measured using the Basic Psychological Needs in Sport Scale (Gillet et al., 2008) adapted to the PE-PST training context, assessing the need satisfaction for competence (5 items, α = 0.93; e.g., "I often feel very competent"), autonomy (5 items, α = 0.74; e.g., "I have the opportunity to make decisions"), and relatedness (5 items, α = 0.85, e.g., "I have a lot of sympathy for the other learners"). Gillet et al. (2008) reported adequate factorial validity of the questionnaire as well as good internal consistencies for its subscales (α = 0.72; α = 0.80; and α = 0.83, respectively). Participants were asked to rate how true each of the statements was on a scale ranging from 1 (Not at all true) to 7 (Completely true). After controlling the internal consistencies for the three needs ($\alpha = 0.69$; $\alpha = 0.74$; and $\alpha = 0.91$, respectively), three scores were calculated by summing each item referring to competence, autonomy, and relatedness, respectively.

4.3.3. Intrinsic motivation

Participants completed the six items extracted from the Self-Determination of the Physical Education Motivation Scale (Tessier et al., 2010) that referred to the intrinsic aspect of the motivation to teach a new physical activity. Each item followed the stem "Why do you engage in this training session?" The participants had to provide responses with items reflecting intrinsic motivation to experience stimulation (e.g., for the excitement I feel when I am really involved in the activity"), toward knowledge (e.g., "for the pleasure it gives me to know more about this sport"), and accomplishment (e.g., "for the satisfaction I experience while I am perfecting my abilities"). The score was calculated by summing the participant's responses provided on a 7-point scale ranging from 1 (Never) to 7 (Always). Consistent with previous validation efforts (e.g., Boiché et al., 2008), this scale provided scores with acceptable reliability ($\alpha = 0.76$; $\alpha = 0.82$, respectively).

4.3.4. Knowledge for instruction

The participants' responses were analyzed using a grid comprising a 10-point scale for demonstration (i.e., changing the orientation to help each pupil to observe the demonstration from different angles, using several demonstrations at different rates beginning by breaking down the technique into separate sub-skills finishing with a real execution), and explanation (i.e., indicating the goal with respect to open skills, stressing the displacement between the two techniques to stay at an appropriate distance). This measure was assessed, meaning the ratings of the two independent judges involved in the pre-test motor performance assessment who drafted the grid.

5. Results

5.1. Preliminary analyses

The results of the Kolmogorov–Smirnov test indicated that for each dependent variable the data follow a normal distribution (p-value >0.05). A one-way ANOVA was computed to assess whether the three groups did not differ as regards the criteria used to select the participants. No significant differences between the three groups were found on scores at the motor pre-test, $F(2, 66) = 0.18$, $p = 0.83$. Interrater reliability analyses yielded satisfactory results and good intra-class correlation coefficients for punching and kicking techniques ($r = 0.79$, 0.75, respectively).

5.2. Main analyses

To examine the difference between the three training conditions on the perceived autonomy support and the knowledge for instruction, one-way ANOVAs were computed on these two variables (see Table 1). Furthermore, although no significant difference between the three conditions was found in the pre-test on basic needs satisfaction ($p = 0.17$) and intrinsic motivation ($p = 0.90$), repeated-measures multivariate analyses of variance (RM-MANOVAs) were computed on these variables to examine the variation of participants' scores (see Table 2). Effect sizes (d) were also calculated using polled standard deviations (Hedges and Olkin, 1985).

5.2.1. Perceived autonomy support

The one-way ANOVA computed at post-test indicated a significant difference between the three training conditions, $F(2, 66) = 6.42$, $p < 0.01$, $d = 0.16$. Results showed that LJE participants scored higher than TJE ($p < 0.001$), and DI ($p < 0.01$) participants.

5.2.2. Psychological needs satisfaction

The results of the RM-ANOVAS revealed a significant training condition X time effect only for satisfaction of the autonomy need, $F(2, 66) = 5.60$, $p < 0.01$, $d = 0.15$, The LJE participants' score improved between pre and post-test in comparison to TJE and the DI participants. No training condition X time interaction effect was observed on the two other basic needs satisfaction: relatedness, $F(2, 66) = 1.13$, $p = 0.33$, and competence, $F(2, 66) = 0.58$, $p = 0.56$.

5.2.3. Intrinsic motivation

The results of the RM-ANOVA revealed a training condition X time interaction effect, $F(2, 66) = 8.28$, $p < 0.001$, $d = 0.20$, showing that LJE and TJE participants' motivation score increased from pre-test to post-test ($p = 0.001$), whereas it remained stable over time for DI participants ($p = 0.64$). Further post-hoc analyses indicated that LJE and TJE participants scored significantly higher at the post-test than DI participants ($p < 0.001$; $p < 0.05$, respectively). No difference was observed between LJE and TJE training conditions ($p = 0.14$).

5.2.4. Knowledge for instruction

The one-way ANOVA computed on knowledge for instruction indicated a difference between the three training conditions, $F(2, 66) = 9.45$, $p < 0.001$, $d = 0.22$. The results showed that both LJE and

TABLE 1 Means (and standard deviations) for perceived autonomy support, and knowledge for instruction by training type conditions (N=69).

	Teaching Jigsaw experience (TJE; n=28)	Learning Jigsaw experience (LJE; n=21)	Direct instruction (DI; n=20)
	M (SD)	M (SD)	M (SD)
Perceived autonomy support**	61.87 (10.47)	71.24 (6.12)	63.55 (10.55)
Knowledge for instruction***	6.46 (2.09)	6.57 (2.09)	4.25 (1.58)

*p < 0.05; **p < 0.01; ***p < 0.001.

TABLE 2 Means (and standard deviations) for psychological needs satisfaction, and intrinsic motivation, by training type conditions and time (N=69).

	Teaching Jigsaw experience (TJE; n=28)		Learning Jigsaw experience (LJE; n=21)		Direct instruction (DI; n=20)	
	T1	T2	T1	T2	T1	T2
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Psychological needs satisfaction for						
Autonomy**	23.89 (4.24)	21.61 (5.37)	25.71 (2.88)	27.00 (4.55)	25.50 (4.49)	21.90 (5.49)
Competence	23.96 (3.16)	24.36 (4.07)	22.71 (3.68)	24.14 (4.80)	23.10 (4.49)	23.00 (6.18)
Relatedness	28.75 (2.43)	31.11 (2.57)	29.52 (2.54)	31.00 (4.15)	30.25 (2.59)	31.15 (3.31)
Self-determined motivation***	32.43 (4.35)	35.07 (3.84)	32.09 (4.66)	37.14 (3.72)	32.75 (5.00)	32.30 (7.01)

*p < 0.05; **p < 0.01; ***p < 0.001.

TJE participants expressed higher detailed knowledge than DI participants when presenting the instructional precautions needed for instructing a movement. No difference was observed between the LJE and TJE conditions (p = 0.85).

5.3. Correlations

Consistent with the SDT theory, the results of post-test correlation analysis revealed positive correlations between participants' perceptions of autonomy support and satisfaction of autonomy (r = 0.62, p = 0.001), competence (r = 0.26, p = 0.03), and relatedness (r = 0.35, p = 0.003) needs. Additionally, the three needs were positively correlated to the intrinsic motivation (r = 0.34, p = 0.004; r = 0.26, p = 0.03; r = 0.32, p = 0.008, respectively). Nevertheless, no significant correlation was found between intrinsic motivation and knowledge for instruction (r = 0.17, p = 0.16).

6. Discussion

Evaluating whether PSTs will contribute toward nurturing the quality of life of students at school within a more inclusive society through education requires an active interest in teacher training. Beyond the objective of connecting various models in a school curriculum, helping novice teachers to address the complexity of the cooperative learning (CL) model remains a major instructional challenge to motivate them to effectively implement CL later in real classrooms (Dyson et al., 2010). The purpose of the present study was to examine whether PSTs' training would impact their perceived quality of life through instructional knowledge and motivation to teach a new physical activity. The results confirm previous studies showing that integrating a CL training condition within the professional socialization stage (Lawson, 1986) required mastery of requisite knowledge when discovering new content involved in a future teaching function (Roseth et al., 2019; Legrain et al., 2021).

On the instructional knowledge, the results confirmed that just providing theoretical information on innovative pedagogical designs in a lecture is insufficient to encourage novice teachers to diversify their teaching practice. Although the effect size on PE-PSTs' knowledge for instruction is small, this result is interesting with regard to the level of expertise novice teachers need to build new motor tasks preserving clear instructions for safe learning conditions. Nevertheless, the results also emphasized that by massaging various information, the TJE condition did not help the participants to score higher compared to the LJE condition. We acknowledge that the structured training TJE condition led to exposing the PE-PSTs to three novelties (physical activity, instructional design, and teaching knowledge). In accordance with the Legrain et al. (2019) conclusion, it can be advanced that participants were probably more concerned about acquiring enough responses to then teach the motor

technique to their team than sharing knowledge in a positive interdependent way during the expert phase. Consequently, such a structured CL training condition needs to be reconsidered in order to better nurture a professional dialog based on epistemic conflict regulations expected in the transition of the two phases of the Jigsaw configuration under the provision of instructional alternatives.

From a motivational standpoint, we also examined whether a structured Jigsaw instructional condition would be more relevant to motivate PE-PSTs to teach a new physical activity than experiencing the Jigsaw environment with a focus on group organization. This second assumption was supported by empirical studies based both on resource interdependence (Johnson et al., 1989) and epistemic conflict regulations (Butera et al., 2011) specifically generated when the instructor gave a rationale emphasizing the instructional skills comprised in the tutor's role. Partly consistent with previous research in education conducted on the basis of the self-determined theory (e.g., Ryan and Deci, 2000; Deci and Ryan, 2002; Reeve and Cheon, 2021), the results are not in agreement with this last assumption. On the contrary, the participants who experienced the Jigsaw procedure without being focused on the instructional activity perceived that the instructor gave them more opportunities to lead their next teaching activity autonomously when returning to their team. Thus, they probably felt freer (Lavigne et al., 2007) in deciding whether they would help teammates to develop new skills under their instruction. Contrary to our hypothesis, the structured Jigsaw training condition partly dedicated to attracting the attention of PSTs to instructional acts did not help novice teachers to perceive the instructor as more autonomy supportive. Given that choice-making opportunities are part of the quality of life perceptions, it could even be argued that TJE participants perceived the instructional precautions modeled by this instructor as promoting control rather than autonomy. This result suggests that it would be useful to examine in greater depth whether the instruction would have thwarted TJE participants' psychological needs (Reeve and Cheon, 2021). Although the instruction design was built to foster PE-PSTs' participation, it also probably stressed the difference in expertise between the instructor and the participants rather than masking it, thus attenuating the expected vicarious effect of the training experience (Bandura, 1997). In fact, as beginners in physical practice, PE-PSTs viewed the pedagogical procedures used by the instructor more as models to reproduce rather than options to consider. Whether or not this difference remained at a motor skill level in the Jigsaw and direct instruction conditions, it might be suggested that the TJE condition explicitly highlighted this difference also in instructional skills by increasing dependence on the instructor. Finally, although LJE and TJE participants were better than DI participants at providing detailed precautions for instruction and expressed a higher level of intrinsic motivation, these two variables were not related. These separate benefits are questionable with regard to the quality of life provided by the instructional context.

There were several limitations to our study. First, the small sample size means that caution needs to be exercised in drawing conclusions. Additional research may be warranted with a larger sample size. A second limitation concerns the lack of peer modeling conditions that could have served as reminders of the instructional procedure for various movements. Future research could examine whether giving participants the opportunity to lead an observation on a peer model would nurture a relevant second training phase introducing peer-questioning based on epistemic conflicts (Butera et al., 2011). Third, a longer formal period would be required to study the effects of the instructional program from a longitudinal perspective (Roseth et al., 2019). The fourth limitation is related to the lack of analysis of instructional strategies used by novice teachers during Jigsaw instruction. According to recent recommendations with respect both to self-determination (Vansteenkiste et al., 2020) and epistemic conflict regulation (Csanadi et al., 2020) theories, relevant qualitative data should be added in order to examine the finer details of whether PE-PSTs perceived their behavior as self-directed.

7. Conclusion

Teachers' perceptions of quality of life are the result of a dynamic and evolving process that begins in their initial training. Further research is needed to highlight PE-PSTs' knowledge acquisition from peers at this stage of their career (Ward et al., 2021), especially when the training concerns the future implementation of CL designs at school. From a teacher's professional development point of view, the results of this study confirm that the PE-PST's quality of life depends on well-structured training in CL. Nevertheless, they also question the institutional conditions under which the instructors are frequently asked to seek to do better in less time. In particular, this suggests progressively planning the instruction through different stages, taking into consideration that spontaneously experiencing the Jigsaw design would be the best choice in an initial training period. While the instructional rationale was relevant for involving the participants in the teaching role, the distribution of information related to pedagogical precautions would be given at appropriate times to help them perceive the instructional climate as autonomy supportive. In the present case, it would have been more appropriate to help PE-PSTs feel personally accountable for their teaching as a first instance, rather than prematurely providing justifications for instructional choices perceived as work pressures that damage autonomy support (Leroy et al., 2007). This may explain why motivational and instructional benefits do not coexist in this study. Mixed methods, collecting qualitative data to assess whether PSTs are collaboratively involved in the training sessions would be useful for better access to the expected supportive climate based on fruitful conflict regulations (Perlman, 2015). These new recommendations need to be taken into consideration in future research to better illuminate the conditions under which CL training could be tailored, step by step, to favor both PE-PSTs' professional competencies and motivational needs which could contribute additionally to teachers' and students' well-being.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by University Institutional Review Board. The patients/participants provided their written informed consent to participate in this study.

Author contributions

JL and SS-L contributed to the conception and design of the study. GE wrote sections of the manuscript and contributed to the final version of the submitted manuscript. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Psychometric evaluation of the academic involution scale for college students in China: An application of Rasch analysis

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Recent academic attention on educational involution in China underpins the need for a valid and reliable instrument to precisely measure college students' academic involution behaviors. Seeing the scarcity of a proper instrument, the current study attempted to analyze the item-level psychometric properties of the newly developed Academic Involution Scale for College Students (AISCS) in China by using a Rasch model. A total of 637 college students in a public university in northern China participated in the study. Data were examined with respect to unidimensionality, rating scale functioning, item fit statistics, item polarity, item- and person-level reliability and separation, item hierarchy and invariance across educational background with Winsteps. The results show that AISCS was a single unidimensional construct with good psychometric properties. Although two items demonstrated differential item functioning, it is plausible given the differences between assessment methods for undergraduates and postgraduates. Limitations and future research directions with regard to sample selection, inclusion of more validity evidence and adding prospective additional academic involution were discussed.

KEYWORDS

academic involution, Rasch analysis, scale development, scale validation, college students

1. Introduction

The concept of involution was originally coined by Geertz in the agricultural industry and it was defined as cultural patterns that do not stabilize or improve toward a new pattern and continue to evolve by becoming more internally complex after reaching a seemingly definitive form Geertz (1963). Now, the term "involution" has been widely used in diverse fields across agriculture, politics, economics, education and so on (Li, 2021). What's more, a close look at the literature on involution indicated that the concept has been mainly researched in Asian countries, such as in Japan (Mihara, 2020), and China (Li, 2021; Xue, 2021; Cai, 2022; Chen et al., 2022; Li, 2022; Si, 2022; Yu et al., 2022). With the research focus of Mihara (2020) on Japanese animation industry, the majority of prior studies on involution in China concentrate on education. Currently, in a higher education setting, educational involution or academic involution denotes a type of behavior that shows increasing negativity, excessive competition, and low productivity among college students in an irrationally competitive environment (Zheng et al., 2022).

Prior studies on educational involution in China mainly focus on the theoretical rationales (Yi et al., 2022), the features (Guo, 2022), reasons and the detrimental effects (Li, 2021) as well as its relationship with other variables (Yan et al., 2022). What's more, the target participants for educational involution research varies from the perspectives of parents (Yu et al., 2022), students (Liu et al., 2022; Yan et al., 2022; Yi et al., 2022) and young academics (Si, 2022). Specifically, Yi et al. (2022) attempted to analyze the rationale for educational involution from the perspectives of Classical Social Comparison Theory, Achievement Motivation Theory, and Cognitive Evaluation Theory. They proposed that when facing peer pressure or extrinsic motivation, students tended to engage themselves in educational involution either in an active or submissive manner for limited social resources. Furthermore, educational involution is characterized by instrumentalist academic situations, overly competitive interpersonal relationships, anxious psychological states, and limited employment opportunities (Guo, 2022). In addition, the reasons for educational involution were listed as unequal distribution of education resources and the benefits of education in Chinese society (Li, 2021). The influences were cited as homogeneity in society, entrenched education inequity and self-flagellation (Li, 2021). Furthermore, as for the relationship with other variable, the results of the study by Yan et al. (2022) showed that there was a significant and positive correlation between educational involution behaviors and anxiety as well as stress.

However, a close look at the measurement of educational involution reveals the scarcity of reliable and valid instrument. Although an instrument specifically measuring academic involution behavior was proposes by Yan et al. (2022), it did not to provide the validity evidence. In addition, the College Student Involution Behavior Scale (Yi et al., 2022) attempted to cover students' involution behaviors from three theoretical aspects, but failed to include social relations with their classmates and roommates as one element given the important role that peer appraisal plays in scholarship assessment. To present valid and reliable results for policies, scales with sound psychometric properties are required (Andrich, 1988). Therefore, the current study attempted to examine the item-level psychometric properties of the newly designed academic involution scale in the Chinese higher education context. Specifical research questions (RQ) were proposed as follows:

- RQ1: Does the academic involution scale exhibit item-level psychometric properties to effectively assess Chinese college students' academic involution behaviors as a single unidimensional construct?
- RQ 2: Does the five-point Likert scale function appropriately?
- RQ 3: Do the 16 items demonstrate acceptable item fit statistics?
- RQ 4: Is the item difficulty hierarchy consistent with our expectation?
- RQ 5: Are the person- and item-level separation and reliability acceptable?
- RQ 6: Does the scale measure invariantly across demographic factors, such as educational background (undergraduates versus postgraduates)?

2. Methods

2.1. Participants

A total of 637 college students in a provincial-level key university in Hebei, China participated in the current study. Convenience sampling was adopted because of most of the authors have been working in that university for more than 6 years. To reduce social desirability bias, the respondents remained anonymous during the data collection, and only educational background information was obtained. Most of participants (84%) were undergraduates. Detailed information was shown in Table 1.

2.2. Instrument

The 16-item questionnaire, AISCS, was developed to measure college students' involution behaviors. The scale is designed to measure the following three aspects: (1) learning (Items L1 to L7, for instance, *I will attend a tutorial class privately to improve myself so as not to be left behind by others*), (2) activity (Items A1to A5, for instance, *Although I do not like it very much, I will attend various lectures so that my comprehensive evaluation results will not be left behind by others.*) and (3) social relations (Items, SR1- SR4, for instance, *I will actively interact with teachers and strive to achieve no lower grades than others*). The three aspects were summarized based on interviews with college students. The items were generated informed by the 2 features of academic involution of increasing negativity, excessive competition (Zheng et al., 2022). For instance, phrases such as "so as to avoid being left behind by others," "in order to get better results" reflected the nature of "excessive competition." In addition, expression such as "Although I do not like it very much" corresponded to the nature of "increasing negativity." All 16 items were measured on a 5-point rating scale from 1 (Strongly disagree) to 5 (Strongly agree). It was administered to the participants with the help of the third author *via* Wenjuanxing, which is a widely used online questionnaire website. Before the administration, ethical approval was granted and consent was sought from the college students.

2.3. Data analytical procedure

Respondents need to distinguish each category when responding to a Likert scale with several categories. In the current study, participants need to carefully interpret the distance between neighboring category, for instance between 5 (totally disagree) and 4 (disagree), and so forth. If this distance measured in logits between neighboring categories varies across the items, this corresponds to a Partial Credit Model (Wright and Masters, 1982). However, if the distance measured in logits between neighboring categories across items is interpreted as equivalent, this corresponds to a Rating Scale Model (Andrich, 1978; Bond and Fox, 2015). In the current study, all 16 items share the same response pattern, therefore, after data were gathered, Rasch Rating Scale Model with Winsteps software (Linacre, 2012) was adopted.

Next, six aspects of Rasch model fit statistics were examined, specially, unidimensionality, rating scale functioning (monotonicity), item fit with infit and outfit MNSQ and item polarity, item- and person-level reliability and separation, targeting examined by Wright Map and the difference between mean of the person ability and that of the item endorseability, and differential item functioning (DIF). The six aspects and their criteria were explained in the following analytical procedure.

First one of the basic assumptions of the Rasch model, unidimensionality, was examined. Unidimensionality refers to the existence of a primary construct that explains the variance in sample response. The variance explained by the primary construct

TABLE 1 General information of the participants.

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Undergraduate	535	84.0	84.0	84.0
	Postgraduate	102	16.0	16.0	100.0
	Total	637	100.0	100.0	

corresponds to the Rasch dimension, while the unexplained variance refers to all other dimensions and random noise. In the current study, principal component analysis of residuals (PCAR) was used to examine the unidimensionality (Smith, 2002). PCAR attempts to partition the unexplained variance based on factors representing other dimensions (Linacre, 2006). The following criteria were adopted (1) Rasch dimension should explain the variance by at least 40% (Linacre, 2006), (2) the first contrast (the largest secondary dimension after the Rasch dimension is removed) should account for the variance by <15%, (3) the unexplained variance of the eigenvalue for the first contrast should be <3.0 (Galli et al., 2008; Linacre, 2019) with a minimum ratio of 3:1 between the variance explained by the Rasch dimension and that by first contrast (Embretson and Reise, 2000).

Second, another assumption of Rasch model, monotonicity, was then investigated. The monotonicity assumption indicates that the probability of endorsing an item increase as the trait level increases. In other words, the probability of more extreme or greater responses on an item corresponds with a greater amount of the latent trait being measured. In the current study, it was analyzed with regards to the following criteria (Linacre, 2002; Bond and Fox, 2015): (1) there should be at least 10 cases per category (Smith et al., 2003), (2) the average measures increases monotonically across categories (Linacre, 2002), (3) the values for category outfit mean square (MNSQ) should be <2.0 (Bond and Fox, 2015), and (4) the difficulty of endorsement for rating scale categories increases by at least 1.4 logits but not more than 5 logits between categories (Linacre, 1999).

Third, Rasch item fit statistics demonstrate how well the data fit the Rasch measurement model (Linacre, 2002), which could be used to identify 'mis-fitting' items. In the current study, item statistics were investigated by examining the Infit and outfit Mean square fit statistics (MNSQ) and item polarity. Infit MNSQ, which is more sensitive to unexpected response of persons whose abilities are near item difficulty, is an information-weighted mean square residual, while outfit MNSQ, which is more sensitive to unexpected outlying observations, is unweighted mean square residual (Tennant and Conaghan, 2007). Generally, the recommended cut-off value for MNSQ is between 0.75 and 1.33 (Wilson, 2004). In addition, the item polarity, displayed by point measure correlation (PTMEA CORR) coefficient, was also examined. Items with high PTMEA CORR values are expected to distinguish respondents' ability properly. The cut-off value between +0.4 logit and +0.8 logit ($0.4 < x < 0.8$) was adopted (Fisher, 2007; Linacre, 2012).

Fourth, person- and item-level reliability and separation were investigated. The Rasch person reliability index indicates the replicability of subject ordering if the sample of persons was given another set of items that measured the same construct and the item reliability index indicates the internal consistency reliability of multi-item scales. Both of these reliability estimates have a threshold of 0.70 to be regarded as acceptable, of 0.80 to be considered satisfactory and of 0.90 deemed as excellent (Bond and Fox, 2015). The person separation can be used to identify the number of statistically distinct ability strata of the individuals in the sample (Bond and Fox, 2015), and item separation is used to verify the item hierarchy. The cut-off value for person separation is above 2 and for item separation is at least 4 (Malec et al., 2007).

Fifth, item hierarchy was further examined by referring to the Wright map, which displays person ability and item endorsability measured on the same logit scale. Wright map was adopted to identify whether the endorsability of instrument items is consistent with person abilities. In order for the items of the instrument to precisely measure person abilities, the endorsability of the instrument should accurately match person ability (Boone, 2016). A difference of more than 1 logit between item endorsability and person ability indicates mistargeting (Mallinson et al., 2004; Pesudovs et al., 2007; McAlinden et al., 2012; Planinic et al., 2019; Cantó-Cerdán et al., 2021).

Finally, the generalizability aspect of scale validity was inspected *via* testing the differential item functioning (DIF) of items across demographic variables. Rasch model requires that subgroups of participants who share equivalent levels of the underlying construct, should respond similarly to the items that measure that construct (Tennant and Conaghan, 2007). The existence of DIF negatively impacts the quality of measure instrument. In the current study, a conservative cut-off DIF contrast value of ≥0.5 logit difference was used (Wang, 2008). If the items are identified as DIF-biased across different groups, some measures can be recommended such as deleting items, adding new ones, or developing separate measures for specific subgroups. In the current study, DIF was examined in reference to the participants' educational background (undergraduate versus postgraduate) since other demographic information was not available.

3. Results

3.1. Unidimensionality

PCAR results in Table 2 revealed that 47.3% of total variance was explained by the Rasch dimension, exceeding the recommended 40% (Linacre, 2006). In addition, the variance explained by the first contrast is 12.8%, less than the recommended cut-off value, 15%. What's more, the unexplained variance of the eigenvalue for the first contrast is 3.9, a slightly larger than the recommended cut-off value, 3.0 (Galli et al., 2008; Linacre, 2019). However, the ratio between variance in the measurement dimension compared to the variance of the first contrast is about 3.7 (47.3%/12.8% = 3.7), larger than the 3:1 ratio recommend by Embretson and Reise (2000). Therefore, the results indicated that the AISCS fits the Rasch model, offering some statistical evidence of a unidimensionality measurement of AISCS.

3.2. Rating scale functioning

The results in Table 3 indicated that the 5-point AISCS functioned well. The observed count ranged from 618 to 4,143, exceeding the

TABLE 2 Standardized residual variance (in eigenvalue units).

		Empirical			Modeled
Total raw variance in observations	=	30.4	100.00%		100.00%
Raw variance explained by measures	=	14.4	47.30%		47.20%
Raw variance explained by persons	=	7.7	25.40%		25.30%
Raw Variance explained by items	=	6.7	22.00%		21.90%
Raw unexplained variance (total)	=	16.0	52.70%	100.00%	52.80%
Unexplained variance in 1st contrast	=	3.9	12.80%	24.30%	
Unexplained variance in 2nd contrast	=	3.0	9.90%	18.90%	
Unexplained variance in 3rd contrast	=	1.2	4.10%	7.80%	
Unexplained variance in 4th contrast	=	1.1	3.70%	7.10%	
Unexplained variance in 5th contrast	=	1.0	3.40%	6.40%	

recommended cut-off value 10 for each rating category and the Outfit MNSQ (ranging from 0.82 to 1.28) were less than recommended cut-off value 2, displaying adequate fit (Linacre, 2002). What's more, the average measure ranging from −2.17 to 1.70 increased with the category level. Furthermore, the category thresholds advanced with the category level. In addition, the shape of each rating scale distribution as shown in Figure 1 also provided that the scale functioned well. For instance, each category had a distinct pick, suggesting that participants reliably distinguished response categories.

3.3. Item fit and item polarity

The item statistics displayed in Table 4 indicated no misfitting items. The infit MNSQ values, ranging from 0.77 to 1.34, and outfit MNSQ values, ranging from 0.77 to 1.32 displayed that the data adequately fitted to the Rasch model. Furthermore, the PTMEA CORR coefficient in Table 3 was more than 0.38, indicating the 16 items contributed to the measurement of academic involution behaviors.

3.4. Reliability and separation

The results in Table 5 indicated that AISCS was highly reliable with Rasch item reliability of 0.99 and person reliability of.90. The item separation of 8.32 and person separation of 3.05 were also satisfactory. The index of item separation of 4 or greater and the index of person separation of 2 or greater are desirable (Malec et al., 2007). Therefore, the results indicated that AISCS was sensitive to differences between respondents with varying levels of involution for college students.

3.5. Targeting

The results indicated the items were well targeted. The item endorsability ranged from −0.55 to +1.46 logits. Overall, the levels of item endorsability matched well with our expectations that involution in learning aspects is more common for college students. As shown in Wright map in Figure 2, L1 was estimated to be the most difficult item for students, followed by L7, both of which are Learning-related. R1 was estimated to be the easiest one since dorm-mates play a less decisive role for students' involution. It is plausible in some cases students from different classes or majors will live together and some students choose to live alone. Therefore, it will be less likely for students to endorse this item to represent involution.

In addition, the mean of the person ability was very close to that of the item endorseability with a logit difference of.14. The mean for both respondent ability and item endorseability are approximately around the same location, thus indicating that the items for this sample are well targeted.

3.6. DIF

We also analyzed DIF to identify potential item bias across particular groups of participants. Specifically, we would like to ensure that items are invariant for both undergraduates and postgraduate students. However, the results in Table 6 indicated that of the 16 items, 2 items (L3 *In order to get better results, I will consult with the senior students about the relevant knowledge of the courses I have registered such as the past exam questions, test materials, and teacher's notes* and L4 *in order to achieve excellent results on the final exam, I will purchase some learning resources such as PPT templates, reference books, past exam questions,* etc.) were extracted as biased items that showed statistically significant DIF based on educational background. The two items are both related to expectation in final examination. For undergraduates, examination is a major assessment tool. For postgraduates, assessments will be conducted in a more diverse manner, such as presentation and thesis writing. The two items are therefore expected to be considered bias in reference to educational background.

4. Discussion

The results of the current study supported the unidimensionality of AISCS, indicating that a single underlying construct, i.e., academic involution could account for the majority of the variance. Therefore, the results provided evidence for the construct validity for the scale. What's more, regarding the rating scale properties, the recommend 4 criteria proposed by Linacre (2002) for rating scale functioning were all satisfied. There were enough observed frequencies for each

TABLE 3 Summary of rating scale function.

Category	Observed count	Average measure	Infit MNSQ	Outfit MNSQ	Category thresholds
1	920	−2.17	1.08	1.12	NONE
2	2,163	−0.99	0.85	0.82	−2.46
3	4,143	−0.06	0.87	0.90	−1.15
4	2,348	0.74	1.00	1.02	0.86
5	618	1.70	1.30	1.28	2.75

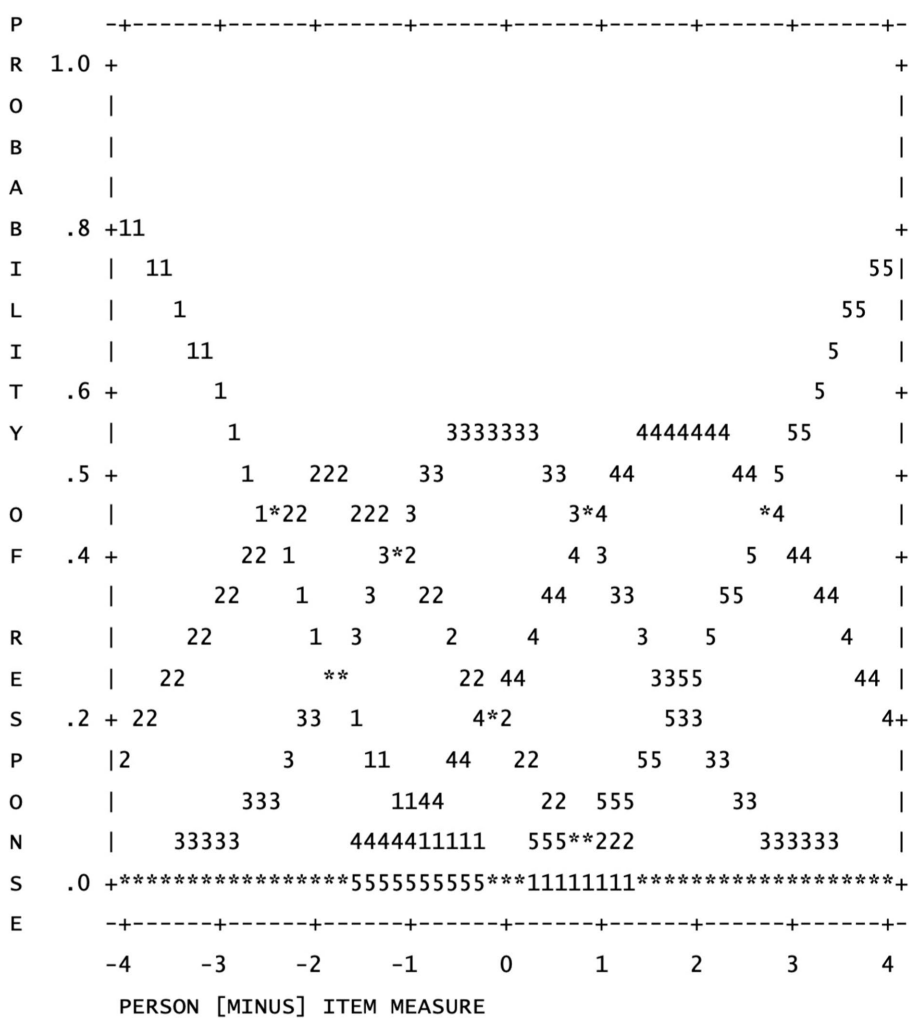

FIGURE 1
Category probabilities: Modes - structure measures at intersections.

category, the average measure increased monotonically along the categories, outfit for all categories were well below 2.0 and close to 1.0, and the thresholds also increased monotonically indicating that each category is the most probable for a specific range on the construct continuum. Furthermore, the psychometric results of the scale were satisfactory with no misfitting item and high reliability and separation for both item and person. In other words, the current AISCS had a capability to differentiate between different levels of responding person sample (Linacre, 2019). In addition, the item-person person map indicated the items for this sample were well targeted. Finally, the 16-item AISCS was examined for DIF based on educational background (undergraduates versus postgraduates). It was found that 2 items related to examination exhibited DIF, which is consistent with our expectation.

5. Implications

A reliable and valid instrument can help stakeholders accurately measure specific construct, because reliability and validity are the

TABLE 4 Item statistics: misfit order.

Item	Measure	INFIT MNSQ	OUTFIT MNSQ	PTMEA CORR
L2	−0.25	1.34	1.32	0.61
L5	−0.29	1.24	1.30	0.64
L3	−0.43	1.24	1.25	0.61
L4	−0.01	1.16	1.17	0.64
L1	1.46	1.13	1.12	0.60
L6	−0.29	1.07	1.05	0.65
SR3	−0.38	0.95	0.97	0.66
SR1	−0.55	0.93	0.97	0.65
A2	0.3	0.93	0.94	0.72
L7	0.37	0.92	0.93	0.67
A3	0.10	0.92	0.91	0.73
SR4	−0.43	0.89	0.88	0.68
A1	0.20	0.85	0.89	0.73
A5	0.18	0.83	0.81	0.75
SR2	−0.35	0.79	0.78	0.71
A4	0.34	0.77	0.77	0.75

TABLE 5 Item- and person-level reliability and separation.

	Item	Person
Separation	8.32	3.05
Reliability	0.99	0.90

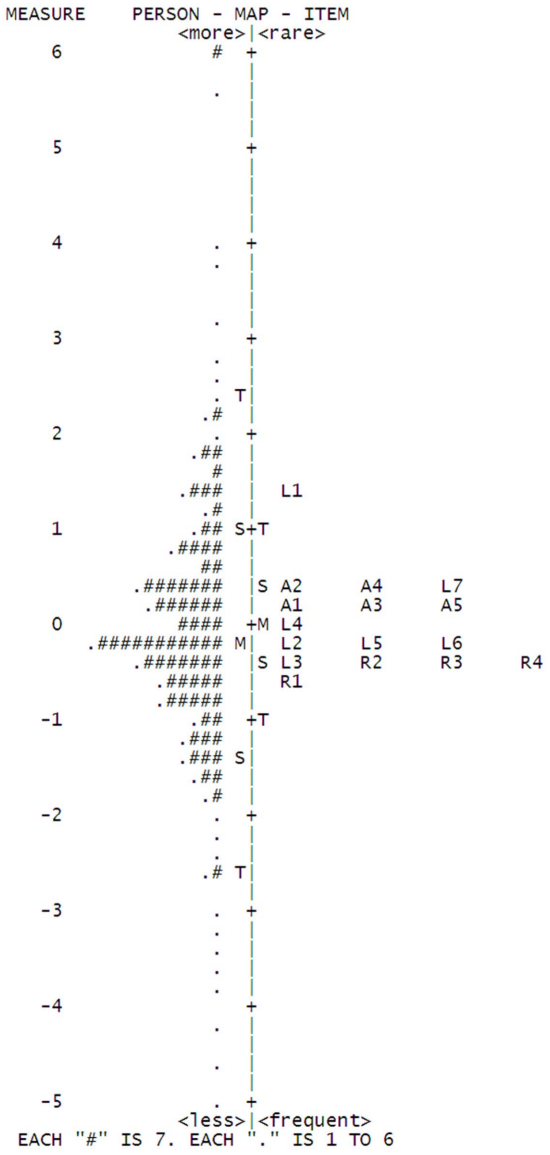

FIGURE 2
Wright map.

prerequisites of an instrument to guarantee the subsequent measurement integrity and quality. The AISCS in the current study verified through Rasch analysis may assist teachers to identify students' academic involution behaviors and help stakeholders adopt precautionary strategies to prevent students from engaging in irrationally and excessively competitive activities.

In addition, a reliable and valid instrument on academic involution behaviors for college students can help researchers conduct quantitative research to identify antecedents and consequences through path analysis. This is especially of significance for Chinese students who face the fiercest academic competition and shrinking employment opportunities.

6. Limitation and future direction

There are a few potential limitations to this study. First, the study sample was comprised only of college students conveniently selected from a public college in northern China. It is also noteworthy that given the role of researchers in the process of students' scholarship assessment, participants may tend to respond in ways according to how they think their responses will be viewed by others, instead of answering truthfully. In future studies, participants, hopefully from other universities, should be included to reduce social desirability bias.

Second, in the current study, to reduce social desirability bias, only one kind of demographic data (educational background) was collected. Therefore, DIF was merely examined across educational background. To examine whether scale is invariant across other demographic variables, future studies are suggested to include more diverse demographic variables, such as gender, grade level, school level, school location and school type.

Third, the current study provided several aspects of validity by using Rasch analysis, such as structural validity (Rasch dimensionality analyses), generalizability (differential item functioning and person separation reliability), and substantive validity (rating scale functioning, and item difficulty hierarchy). More aspects of validity such as evidence of external validity should be conducted in future studies using Classical Test Theory by correlating the responses to other theoretically related variables with response collected by the current scale.

Fourth, the items were generated based two features of involution, increasing negativity, excessive competition (Zheng et al., 2022). Another feature, low productivity was not covered. One limitation of

TABLE 6 DIF across educational background.

	Undergraduates			Postgraduates			
Item	Observations average	DIF measure	DIF S.E.	Observations average	DIF measure	DIF S.E.	DIF contrast
L1	−0.03	1.51	0.06	0.14	1.17	0.14	0.35
L2	−0.03	−0.19	0.06	0.17	−0.57	0.14	0.38
L3	−0.05	−0.32	0.06	0.30	−1.02	0.14	**0.69**
L4	−0.05	0.09	0.06	0.28	−0.55	0.14	**0.64**
L5	0.01	−0.29	0.06	−0.05	−0.19	0.14	−0.09
L6	0.00	−0.29	0.06	−0.01	−0.29	0.14	0.00
L7	−0.03	0.43	0.06	0.17	0.05	0.14	0.39
A1	0.02	0.17	0.06	−0.09	0.38	0.14	−0.21
A2	0.01	0.28	0.06	−0.08	0.46	0.14	−0.19
A3	0.04	0.03	0.06	−0.19	0.48	0.14	−0.45
A4	0.00	0.34	0.06	−0.02	0.38	0.14	−0.04
A5	0.02	0.15	0.06	−0.11	0.4	0.14	−0.26
SR1	0.03	−0.61	0.06	−0.17	−0.21	0.14	−0.4
SR2	0.02	−0.38	0.06	−0.08	−0.19	0.14	−0.19
SR3	0.01	−0.4	0.06	−0.07	−0.25	0.14	−0.15
SR4	0.03	−0.49	0.06	−0.18	−0.07	0.14	−0.42

the scale could be less attention to the fact that some students tended to engage themselves in educational involution in either an active manner or submissive manner (Yi et al., 2022). Low productivity may apply to students who engage in involution in a submissive manner. Therefore, in future studies, items or dimensions focusing on low productivity should be added to provide a holistic picture of students' academic involution behaviors.

Fifth, although the results of the current study in relation to monotonicity meet the minimal criteria for model fit based on Rasch Rating Scale Model, the observed counts for extreme options (strongly agree and strongly disagree) were comparatively lower than that for other three options. This might be explained by the homogeneity of the participants most of whom are facing the moderate level of academic pressure in a provincial-level university. Future studies may involve participants from universities of different levels in one study, for instance, inviting participants from municipal-level colleges, provincial-level universities and national-level universities. In addition, other Rasch models may be adopted to provide more robust and defensible results, such as Partial Credit Model, which also applies to Liker-type questionnaires whose response categories are adequately not observed.

Finally, considering the multiple aspects of the scale (learning, activities and social relations) and evidence for the unidimensionality supported by the PCAR results, future studies are suggested to test the structure of the scale by using Exploratory Factor Analysis and Confirmatory Factor Analysis, especially a second-order Confirmatory Factor Analysis to test whether the theorized academic involution in the current study loads into certain number of underlying sub-constructs or components. In addition, although the scale includes three aspects, more prospective aspects such as research and employment should be included to provide a more comprehensive picture about the educational involution for college students.

In summary, our findings provided support for the psychometric properties of the newly developed AISCS. Although further revision and validation of the scale is needed to determine its utility with more diverse samples, the scale fills a void for researchers and educators who need to assess educational involution, based on the strength of the results presented.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by North China University of Science and Technology. The patients/participants provided their written informed consent to participate in this study.

Author contributions

YY conceived of the presented idea and completed the draft. WL helped collect data and provided insightful comments on implication section. YP, SL, CW, SC, and JZ contributed to the final version of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1135658/full#supplementary-material

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Emotional regulation, attachment style, and assertiveness as determinants of well-being in emerging adults

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Introduction: The emerging adult stage of life is a time of many positive changes, as well as stress and uncertainty. Certain psychological characteristics - such as emotional regulation, attachment style, or assertiveness – could help these adults thrive and maintain positive mental health. This study aimed to explore the influence of these variables on the well-being of emerging adults.

Methods: The sample included 360 French emerging adults, with a mean age of 21.3years. Well-being was assessed with the Mental Health Continuum, emotional regulation with the Emotional Regulation Difficulties Scale, assertiveness with the Assertiveness Scale, and attachment styles with the Relationship Scales Questionnaire.

Results: Results showed that judgment toward one's own emotional experience and shyness (as part of assertiveness) predicted emerging adults' well-being. This study also highlighted the role of substance use and experiences of violence on emerging adults' emotional regulation and well-being.

Discussion: Results support the importance of in-person and distance education and prevention to support emerging adults' well-being, especially in higher education institutions and in times of the COVID pandemic.

KEYWORDS

well-being, emerging adults, emotional regulation, assertiveness, attachment style

1. Introduction

1.1. Emerging adults' well-being

Studies show that emerging adults face many daily stressors of psychological (personal problems, lack of emotional security) and social nature (financial problems, time management, and household chores; Martin-Krumm and Tarquinio, 2019). Many also experience pressure related to the transition to higher education, the development of professional activity, and the beginning of more stable intimate relationships (Arnett, 2016). Among students, assessed stress rates vary between 18 and 90%, depending on the country and the measurement instruments used (Zebdi et al., 2021, in Romo and Fouques, 2021). The French National Survey of Student Living Conditions (2016) showed that, among 15 to 25-year-olds, 60% of youth reported feeling stressed.

The well-being of emerging adults is therefore a societal issue. Moreover, understanding the well-being of emerging adults in France is important for various reasons. It can help researchers, policymakers, and practitioners better understand the challenges and opportunities faced by the next generation of the country and identify ways to support their positive development. Additionally, studying the well-being of emerging adults in France can inform the development of policies and interventions that support the well-being of emerging adults around the world, as many of the issues faced by French emerging adults may be close to those faced by young people in other countries (see "Discussion"). However, it is important to consider potential constraints, such as cultural, economic, and institutional barriers, that may affect the effectiveness of these interventions, as well as the need of the targeted population.

Several areas of daily functioning are concerned with well-being: physical, mental, social, financial, occupational, environmental, spiritual, and personal. Well-being can be defined as a subjective evaluation of life (Diener, 1984), in which feelings of satisfaction and balance are found, especially between positive and negative emotions. The individual feels fulfilled, secure, satisfied, in harmony, engaged, and focused on the existential challenges of life (Csikszentmihalyi, 1990; Keyes et al., 2002). Well-being would therefore imply positive emotions, engagement in life, satisfying interpersonal relationships, and feelings of meaning and achievement (Seligman, 2011).

1.2. Determinants of emerging adults' well-being

Several factors can determine the well-being of emerging adults, especially that of students: support from family, and loved ones (Qi et al., 2020), resilience, self-efficacy, and mindfulness disposition (Harding et al., 2019). Other factors of well-being include optimism (Seligman, 1991), hope (Delas et al., 2015), positive emotions, the ability to find meaning (Seligman, 2011; Noemic, 2018), positive relationships, self-acceptance (Ryff, 1995), self-esteem, autonomy, and a sense of control (Bandura, 1997). Emotional regulation (Guassi Moreira et al., 2022), assertiveness (Sarkova et al., 2013), and attachment styles (Mikulincer and Shaver, 2007) have also been considered variables influencing well-being, especially among youth. The effect of these three variables on emerging adults' well-being will be the focus of the present study, as they seemed to have attracted less attention from researchers than the others listed above.

1.2.1. Emotional regulation in emerging adults

Emotion regulation is the adaptative influence one has on its own emotions and those of others, in various and changing situations (Gross, 1999; McRae and Gross, 2020). It supports better coping and well-being (Gross, 2014). It involves understanding and managing emotions through strategies for modulation and constructive expression (McRae and Gross, 2020).

The ability to regulate emotions influences stress and mental health at all ages (De France and Hollenstein, 2019), as well as the quality of life (Manju and Basavarajappa, 2017). Emotional regulation problems are associated with the development of various mental disorders (Gratz and Gunderson, 2006; Berking and Wupperman, 2012), such as depression (Hong et al., 2019), anxiety (O'Toole et al., 2019), borderline personality disorder, substance and social media abuse (White-Gosselin and Poulin, 2022), etc.

In adolescents, emotional dysregulation is also related to psychological inflexibility Cobos-Sánchez et al., 2020. In emerging adults, emotional dysregulation is associated with regular and heavy cannabis use, among other things (Brook et al., 2016). The ability to regulate emotions helps cope with stress and predicts fulfillment and positive mental health (Gross and Muñoz, 1995). In emerging adults, feeling able to regulate their emotions is associated with well-being (Guassi Moreira et al., 2022). Enhancing emotional regulation abilities is considered likely to psychologically improve the individual (McMain et al., 2010), reduce stress, and support mindfulness (Prakash et al., 2015). In the general population, emotional clarity, i.e., the ability to identify, understand and distinguish one's emotions, is associated with emotion regulation (Vine and Aldao, 2014).

1.2.2. The emerging adult's attachment style

The attachment style may be considered an important variable to understand the well-being of a variety of age categories (e.g., see Platts et al., 2022, for a longitudinal study on attachment styles). As individuals from other age groups, the emerging adult is a social animal. Emerging adults interact with actors who make up their environment (peers, romantic relationships, families, colleagues, or teachers). Attachment theory describes beliefs and patterns in the way we relate to others. These develop from the positive and/or negative interactions of the child and the attachment to the caregiver (the parent or any other caregiver). The former transfers these experiences to the patterns of interpersonal relationships developed throughout their life (Bowlby, 1969; Fraley and Waller, 1998; Fraley and Shaver, 2021). Therefore, attachment styles are patterns of interpersonal relationships that tend to continue throughout life and have a significant impact on the individual's personal (Bowlby, 1988) and professional functioning (Ronen and Zuroff, 2017). Moreover, attachment styles in adulthood are associated with intrapersonal and interpersonal factors, including personality traits, emotional capacities, emotional regulation, attitudes, beliefs, and expectations of others (Kobak and Sceery, 1988; Shaver and Brennan, 1992; Wearden et al., 2008; Fraley and Shaver, 2021).

To study attachment styles, individuals can be divided along a dual continuum of abandonment anxiety and proximity avoidance (Fraley and Waller, 1998). Abandonment anxiety refers to the representation of the self in a relationship. It is the degree to which the individual worries and broods about being abandoned or rejected. Proximity avoidance refers to one's mental representation of the other. It manifests in discomfort with emotional intimacy and dependence in a relationship. The avoidant individual invests less in the relationship and values psychological and emotional independence. In Bartholomew's model of adult attachment, there are four adult attachment styles: secure, preoccupied, fearful, and dismissing (Bartholomew, 1990, in Griffin and Bartholomew, 1994). These four styles also position according to the two dimensions previously described: (1) the secure attachment style (low anxiety and avoidance); (2) the insecure-anxious attachment style (high anxiety and low avoidance); (3) the insecure-avoidant attachment style (low anxiety and high avoidance); and (4) the insecure fearful attachment style (high anxiety and avoidance; Bowlby, 1958; Ainsworth and Bell, 1970).

The studies on the topic show that a secure attachment style is a predictor of better-perceived health, emotional regulation, and well-being than insecure styles (Bruno et al., 2018; Machado et al., 2019; Marrero-Quevedo et al., 2019; Fraley and Shaver, 2021; Moreira et al., 2021). The attachment styles also predict the quality of mental health. For example, Zhang et al. (2022) showed that insecure attachment style highly increased the risk of poor mental health. Therefore, this variable seems likely to be a determinant of well-being in emerging adults.

1.2.3. The emerging adult's assertiveness

Assertiveness is about expressing ideas, opinions, feelings, and limits, confidently, while respecting those of others and considering the potential consequences of what was expressed. It includes both positive and negative expressions and aims at achieving personal, instrumental, or organizational goals (Pfafman, 2017). In a world that some authors call VUCA (Millar et al., 2018) for Volatility, Uncertainty, Complexity, and Ambiguity, developing communication skills such as assertiveness seems necessary for emerging adults. It serves an adaptive aim. Assertiveness can be characterized by aspects such as confidence, respect, clarity of communication, self-control, and empathy (Pfafman, 2017).

Data collected from two independent samples of middle school students in an urban environment provided evidence that assertiveness significantly increased specific types of social relationships and predict psychological symptoms under stressful conditions (Elliott and Gramling, 1990). Several studies on assertiveness development programs have shown the positive impact of this variable on individuals' stress (Tavakoli et al., 2009; Eslami et al., 2016; Noh and Kim, 2021). In addition, a study showed that in American students, an anxious or avoidant attachment style led to a lack of assertiveness (Ling, 2020). Therefore, attachment styles and assertiveness are related. As previously underlined, an insecure attachment style leads emerging adults to develop poorer perceived health, poorer emotional regulation, and lower well-being.

Attachment style is a rather stable variable difficult to modulate in the short term. However, by acting on the emotional regulation and assertiveness of emerging adults, it may be possible to support their well-being.

1.3. Present study hypotheses

To summarize, several variables can impact emerging adults' well-being, such as support from family and loved ones, resilience, self-efficacy, mindfulness disposition, optimism, hope, positive emotions, the ability to find meaning, positive relationships, self-acceptance, self-esteem, autonomy, and a sense of control. In particular, the present study focused on the effect of emotional regulation, assertiveness, and attachment style on the well-being of emerging adults. These variables may impact their well-being, as they face daily stressors of psychological and social nature, as well as pressure related to education, professional development, and intimate relationships.

Therefore, in this study, it was hypothesized that emerging adults' well-being would be related to their emotional regulation, attachment style, and assertiveness, and would be predicted by these three variables. It was also assumed that emerging adults' lack of emotional awareness and emotional clarity would be negatively related to their well-being. Moreover, it was hypothesized that a secure attachment style would lead to better well-being than insecure styles. Finally, it was assumed that emerging adults who regularly use cannabis would show stronger emotional dysregulation than those who use it occasionally or do not use it at all.

2. Materials and methods

2.1. Participants

This exploratory study was conducted with 360 emerging adults aged 18–25, mainly in the Paris region and the Grand Est region of France. The recruitment period lasted 3 weeks, in February 2022. Table 1 presents the socio-demographic data of the participants (see "Tables").

To summarize, most participants were in their very early adulthood ($M = 21.2$, SD = 2.2), with a majority of women (77.6%). A large proportion of the participants were students in a higher education institution ($n = 300$), particularly in the private field ($n = 228$). The sample of participants was randomly coming from three sources. The students at the higher education institution received oral information about the research during the welcoming week (September) and an email to solicit participation in February. The Grand Est participants received an email to solicit participation through a list of emerging adults formerly involved in the boy and girl scouts. Some of the participants also read the information on Internet forums dedicated to French emerging adults. Half had a part-time job (53.8%), and a quarter had a full-time job (25.2%). The parents were mostly executives or employees. A large proportion of the participants did not smoke cigarettes (72.8%), or cannabis (86.9%). Many participants believed that they had not been victims of violence or neglect (43.9%), but 32% thought they had been victims of psychological violence and 15.3% of sexual violence. Half of the participants perceived to have been moderately or strongly affected by the COVID pandemic (49.6%).

The initial research design used was quantitative and correlational. However, to ensure the fidelity and validity of the measures, the analyses have been extended to take into account the factorial dimension. There was one dependent variable: emerging adults' well-being. The independent variables were emotional regulation, attachment style, and assertiveness. Using cluster analysis, we created three attachment groups (secure, anxious, and avoidant). There were 97 participants with an anxious attachment, 134 with an avoidant attachment, and 122 with a secure attachment. The socio-demographic data collected were gender, age, the institution of study, professional activity, socio-professional categories of parents, consumption (cigarettes, cannabis, alcohol, online money gambling, or video games), perceived abuse or neglect, and the effect of the COVID-19 pandemic.

2.2. Measures

Participants completed the Mental Health Continuum–Abbreviated Questionnaire (CSM-QA). This assessment tool is easy to understand for researchers, and to insert in a long research form, reducing participants' fatigue during the administration. The

TABLE 1 Description of the socio-demographic data of the participants.

	Participants, *N*=353
Age (M, ET)	21.23 (2.16)
Gender	
Women	274 (77.62%)
Men	79 (22.38%)
Activity	
Private higher education	202 (57.22%)
University	72 (20.4%)
Public higher school	26 (7.37%)
Work	51 (14.45%)
High school	1 (0.28%)
With no activity	1 (0.28%)
Work	
Full time	89 (25.2%)
Part-time	190 (53.8%)
Not working	74 (21%)
Socio-professional category: father	
Executive	177 (50.14%)
Employee	62 (17.56%)
Retired	31 (8.78%)
Craftsman/tradesman	29 (8.21%)
Liberal profession	22 (6.23%)
Workman	22 (6.23%)
With no activity	10 (2.83%)
Socio-professional category: mother	
Executive	102 (28.89%)
Employee	133 (37.68%)
Retired	12 (3.4%)
Craftsman/tradesman	16 (4.53%)
Liberal profession	45 (12.75%)
Workwoman	5 (1.42%)
With no activity	40 (11.33%)
Smoking (cigarettes)	
No	257 (72.81)
Regular	47 (13.31%)
Occasional	49 (13.88%)
Smoking (cannabis)	
No	307 (86.97%)
Regular	12 (3.4%)
Occasional	34 (9.63%)
Perception of max alcohol/day (M, ET)	2.07 (1.36)
Cash games, over 12months	
Yes	84 (23.8%)
No	269 (76.2%)
Hours of online or video games/day	0.98 (1.52)
Acts of Violence or neglects suffered	
No	155 (43.9%)
Sexual	54 (15.3%)
Psychological	113 (32.01%)
Physical	26 (7.4%)
Social or humanitarian	3 (0.9%)
Deprivation of basic care	2 (0.57%)
Perception of COVID impact	
No impact	41 (11.62%)
Little impact	137 (38.81%)
Moderate impact	128 (36.26%)
Important impact	47 (13.31%)

CSM-QA (short form) has three dimensions: emotional well-being (3 items: positive emotions, interest in life, satisfaction), psychological well-being (6 items: self-acceptance, environmental mastery, positive relationships, personal growth, autonomy, purpose in life), and social well-being [5 items: social contribution, social integration, social actualization, self-acceptance, social coherence (Orpana et al., 2017)].

The CSM-QA is a self-reported scale, of 14 items, rated on a Likert scale of 1 to 6, ranging from "every day" to "never." Higher scores indicate a higher level of well-being. The French version was validated by 68.4% of respondents aged 15 and over, out of 25,113 Canadians asked to participate in a health survey (2012, Canadian Community Health Survey - Mental Health). It has good psychometric qualities. The emotional, psychological, and social well-being subscales have good internal consistency, with Cronbach's alpha coefficients of $\alpha = 0.82$ for the first two, and $\alpha = 0.77$ for the social subscale (Orpana et al., 2017). The three-factor model also presented an acceptable fit across different samples. The psychological and emotional subscales of well-being significantly and positively correlated with life satisfaction (0.57) and perceived mental health (0.47), and negatively correlated with psychological distress, negative social interactions, and the WHO disability assessment scale. The social well-being subscale weakly correlated with related concepts, such as social dispositions and negative social interactions. The researchers underlined the weakness of the social subscale, as other studies have Petrillo et al. (2015).

Participants also completed the Difficulties in Emotion Regulation Scale (DERS) (Gratz and Roemer, 2004). This scale is one of the most widely used self-reported tools to assess emotion regulation strategies, especially in clinical practice (Gratz and Gunderson, 2006). It assesses difficulties in regulating emotions using 36 items and includes six subscales: non-acceptance of one's emotional response, difficulty in adopting goal-oriented behaviors in a negative emotional context, lack of emotional awareness, difficulty in identifying one's own emotions, difficulty in controlling oneself in a negative emotional context (impulsivity), difficulty implementing emotion regulation strategies in a negative emotional context (Gross, 2014). Each item is rated on a

scale of 0 to 5, ranging from "rarely" to "seldom." The scores obtained on the subscales can be added together to obtain an overall score. The higher the overall scale score, the more difficulties the subjects have in regulating their emotions. The French version of the scale, tested on 455 healthy students, has very good psychometric qualities, with a Cronbach's alpha coefficient $\alpha = 0.92$. The tool was validated with a student population similar to the one in the present study. The French version has strong compatibility with the English version, i.e., 94%. On a period of 9 weeks, the test–retest reliability was good, with the scores being highly correlated [0.88 ($p < 0.01$) (Dan-Glauser and Scherer, 2013].

Participants filled out the French version of the Relationship Scales Questionnaire (RSQ, Griffin and Bartholomew, 1994; Wongpakaran et al., 2021; French version: Guédeney et al. 2010). This scale has 30 items and was developed from the Relationship Questionnaire, (RQ, 2) and the Adult Attachment Scale (AAS). Only 17 items are specific to the RSQ. Subjects answer to the items on a scale ranging from 1 "not at all like me" to 5 "completely like me." Despite Bartholomew's four adult attachment styles model, validation studies tend to suggest that the RSQ contains three factors (Griffin and Bartholomew, 1994). In their validation study with 136 adults, Guédeney et al. (2010) found a three-factor structure: Avoidance (7 items), Anxiety in the relationships (5 items), and Security (5 items). They uncovered Cronbach's alpha coefficient between $0.60 < \alpha < 0.69$ for the factors, indicating an average consistency. More recently, Kpelly et al. (2020) also found a similar three-factor structure for a sample of 130 Togolese participants: Relationship safety, Avoidance, and Anxiety. However, the consistency was better, with the following Cronbach's alpha coefficients: 0.81 for the Relationship safety factor, 0.77 for the Avoidance factor, and 0.69 for the Anxiety factor. The French version of the scale appeared to have quite good psychometric qualities. Therefore, the three-factor model seemed interesting, keeping in mind that its reliability may vary according to the sample used.

Participants filled out the French version of the Rathus assertiveness scale (RAS, Rathus, 1973; Bouvard et al., 1986). The questionnaire assessed the abilities for self-assertion across 30 social interactions. Seventeen items are reversed (1, 2, 4, 5, 9, 11, 12, 13, 14, 15, 16, 17, 19, 23, 24, 26, and 30). Each item is rated on a scale of 1 to 6, ranging from "very characteristic of me "to "very uncharacteristic ". The higher the total score, the more the subject experiences difficulties in self-assertion. The French version of the scale showed good psychometric qualities with 180 participants (125 suffering from psychopathology, and 55 in the control group), but the authors of the validation did not include the Cronbach alpha coefficient (Bouvard et al., 1986; see Table 2 for the characteristics of the measurement instruments). After one month, the test–retest score was high for the control group ($r = 0.85$; $p < 0.01$). Rathus (1973) initially showed that the scale had moderate to high test–retest reliability ($r = 0.78$; $p < 0.01$) and split-half reliability ($r = 0.77$; $p < 0.01$). Gustafson (1992) also found the English version of the scale reliable in a sample of 144 Swedish college students, with a Cronbach's Alpha of 0.82. Finally, Suzuki et al. (2007) uncovered that the scale was reliable for a sample of 989 Japanese novice nurses (Suzuki et al., 2007) with a Cronbach's Alpha of 0.84.

2.3. Procedure

An email was sent to solicit voluntary participation in the study. Announcements were also posted on social media. The measures were administered once. The participants completed the four measures through online mode, as well as a socio-demographic questionnaire.

TABLE 2 Characteristics of the measurement instruments.

Tool	Number of items	Psychometric Characteristics	Cronbach's Alpha	Origin	Adoption	Language	Justifications for calibration
CSM-QA	14	Good internal consistency for:	0.82	Canada	Widely used	English	Standardized test of well-being
		Psychological: and emotional: well-being	0.77				
			Orpana et al. (2017)				
DERS	36	Good internal consistency	0.92	USA	Widely used	English	Standardized test of emotional regulation
			Dan-Glauser and Scherer (2013)				
RSQ	17	Acceptable internal consistency:	Guédeney et al. 2010	USA	Widely used	English	Standardized test of attachment styles
		0,60 < α < 0,69	0.81				
		Relationship safety	0.77				
		Avoidance:	0.69				
		Anxiety:	Kpelly et al. (2020)				
RAS	30	Good internal consistency	0.82	USA	Widely used	English	Standardized test of assertiveness
			Gustafson (1992)				
			0.84				
			Suzuki et al. (2007)				

TABLE 3 Mean scores, standard deviations of participant scores.

Variables	Factors	Mean (SD)
Global scores of well-being	Emotional well-being	12.46 (3.44)
	Social well-being	14.59 (4.77)
	Psychological well-being	23.53 (6.13)
Scores of emotional regulation	Conscience	16.25 (5.25)
	Clarity	12.40 (4.82)
	Non-acceptance	14.81 (6.82)
	Impulsivity	12.67 (5.91)
	Goals	17.06 (5.34)
	Strategies	21.97 (6.38)
Scores of attachment style	Anxious	11.82 (2.55)
	Avoidant	25.09 (3.60)
	Security	17.07 (2.63)
Scores of assertiveness	None	111.68 (18.82)

$N = 353$.

TABLE 4 Reliability analysis of the scales (well-being, assertiveness, attachment, and emotional regulation) before and after the items dropped procedure.

Variables	Cronbach's α
Well-being	0.89
Emotional	0.82
Social	0.70
Psychological	0.80
Assertiveness	**0.53**
Assertiveness items dropped	0.82
Attachment	**0.70**
Avoidant	**0.37**
Anxious	**0.56**
Security	**0.51**
Attachment items dropped	0.85
Avoidant items dropped	0.71
Anxious items dropped	**0.65**
Security items dropped	**0.55**
Emotional regulation	0.86
Awareness	0.81
Clarity	0.88
Non-acceptance	0.91
Impulse	0.90
Goals	0.91
Strategies	0.89

Values in bold do not meet the thresholds to ensure reliability (see "Discussion").

2.4. Data analysis

Regarding the data analyses, correlations were made between the dimensions of well-being, emotion regulation, attachment style, and assertiveness. Multiple linear regressions were performed to better understand the weight of emotional regulation, attachment style, and assertiveness on the well-being of emerging adults. With the three attachment groups resulting from the cluster analysis, ANOVAs were performed to compare the means of attachment styles. Post-hoc ANOVAs were performed, considering some socio-demographic variables (level of professional activity, feeling of having been impacted or not by COVID, cigarette and cannabis consumption), as well as emotional regulation. We also performed an *a posteriori* comparison of our sample with a clinical sample regarding emotional regulation.

3. Results

Of the 360 participants, 7 were not retained because of missing data on the scales. Therefore, 353 subjects were kept for the analysis of the results. The participants' scores are described in Table 3.

3.1. Normality and fidelity consistency analysis

The statistical analyses were performed using the *Jasp* software. Given the sample size, it was possible to consider using parametric statistics. The Kurtosis and Skewness indices were between −2 and 2 for most variables. Therefore, they followed a normal distribution. It was then possible to produce parametric statistics, except for cannabis consumption. Fidelity analysis showed that three scales had good internal consistency, with Cronbach's alpha ranging from 0.70 to 0.95 (well-being: $\alpha = 0.89$; attachment: $\alpha = 0.70$; emotional regulation: $\alpha = 0.86$; Tavakol and Dennick, 2011).

However, the assertiveness scale and the attachment subscales had a Cronbach's alpha of less than 0.70 (assertiveness: $\alpha = 0.53$; avoidant attachment style: $\alpha = 0.37$, anxious attachment style: $\alpha = 0.56$; secure attachment style: $\alpha = 0.51$), which signals low internal consistency and will be discussed later (see Table 4). Therefore, a procedure of dropped items was applied to both assertiveness (RAS) and attachment scales (RSQ). After the procedure, Cronbach's alpha met the threshold with $\alpha = 0.82$ for the RAS, $\alpha = 0.85$ for the RSQ, and $\alpha = 0.71$ for the avoidant attachment style (RSQ). For the anxious attachment style and the security in relationships, Cronbach's alpha did not meet the threshold after the procedure (Table 4).

3.2. Exploratory and confirmatory factorial analysis

To ensure the validity of our scales, we conducted exploratory (EFA) and confirmatory (CFA) analyses. For the EFA, the number of factors was determined according to the Kaiser-Guttman criterion (E.I., eigenvalues greater than 1) and the elbow method (i.e., graphically, from the break inertia gain curve). Only factors accounting for at least 5% of the variance were retained. For the CFA, several statistics were used to assess the fit of a suggested factor structure to the collected data: the Khi^2, the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root-Mean-Square Error of Approximation (RMSEA). Expected values should be less than 0.06 for the RMSEA, and greater than 0.95 for the CFI/TLI to consider that the model fits the data (Hu and Bentler, 1999). Values

close to the standards (e.g., RMSEA<0.10 or CFI/TLI >0.90) can still be accepted in light of the overall indices obtained (Kenny et al., 2015).

The CMS-QA seemed fairly reliable and valid to measure well-being. With an EFA analysis, we found that two factors only were measured in our sample: (1) the theme of psychological well-being, and (2) the social well-being, respectively accounting for 37 and 5% of the variance ($p < 0.001$). The item-reduced scale was fairly reliable and valid for our sample with this two-factor structure (Table 5).

The DERS seemed fairly reliable and valid to measure emotional regulation. With an EFA analysis, we found that there were only two factors measured in our sample: (1) the theme of self-criticism, guilt, and shame in emotional situations, and (2) the difficulties concentrating on work/studies in emotional situations, respectively accounting for 34 and 11% of the variance. The item-reduced scale was fairly reliable and valid for our sample in this two-factor structure (Table 5).

Even though the assertiveness scale did not seem reliable for our sample, scientific literature exists about its reliability and validity. The scale is ancient but seemed more appropriate than other recent scales. We wanted to measure assertiveness in emerging adults and not connected constructs (such as social anxiety, e.g., Liebowitz Social Anxiety Scale). With an EFA analysis, we found two factors measured in our sample: (1) the theme of shyness and hesitation in social interactions, and (2) the tendency to repress emotions to avoid conflicts, respectively accounting for 23 and 5% of the variance ($p < 0.001$). The item-reduced scale was fairly reliable and valid for our sample in this two-factor structure (Table 5).

The anxiety and security dimensions of the attachment style scales did not meet the threshold for consistency, even with the items dropped. The EFA and the CFA on the remaining items (avoidance) did not allow us to confirm that the item-reduced scale was reliable and valid for our sample ($p = 0.09$; Table 5).

The Kurtosis and Skewness of the new factors were tested and followed a normal distribution.

TABLE 5 Confirmatory factor analysis (psychological and social well-being, self-criticism and concentration when faced with difficult emotions, shyness, and conflict avoidance, need for independence).

Scales	χ^2 value	*df*	*p*	CFI	TLI	RMSEA value
CSM-QA	78.24	34	<0.001	0.96	0.95	0.06
DERS	111.42	34	<0.001	0.97	0.96	0.08
RSQ	4.79	2	<0.001	0.99	0.97	0.06
RAS	90.16	34	<0.001	0.92	0.90	0.07

CFI, Comparative Fit Index; TLI, Tucker-Lewis Index; RMSEA, Root mean square error of approximation.

3.3. Correlations and multiple linear regressions between the variables under study

In this study, we supposed that emerging adults' well-being would be related to their emotional regulation, attachment style, and assertiveness, and would be predicted by these three variables. The results showed that psychological well-being is negatively correlated with self-criticism when experiencing emotions ($r = -0.39$, $p < 0.001$), positively correlated with shyness ($r = 0.31$, $p < 0.001$), negatively correlated with difficulties concentrating when experiencing emotions ($r = -0.28$, $p < 0.001$), and positively correlated with repression of emotions to avoid conflicts ($r = 0.14$, $p = 0.01$; Table 6).

There was a moderate negative correlation between self-criticism and difficulties concentrating when experiencing emotions ($r = -0.52$, $p < 0.001$), as well as a moderate negative correlation between self-criticism when experiencing emotions and shyness ($r = -0.27$, $p < 0.001$), and repression of emotions to avoid conflict ($r = -0.23$, $p < 0.001$). Additionally, there was a moderate correlation between shyness and repression of emotions to avoid conflict ($r = 0.23$, $p < 0.001$), and a moderate negative correlation between shyness and self-criticism when experiencing emotions ($r = -0.27$, $p < 0.001$).

Linear regressions were performed to predict emerging adults' psychological and social well-being. The results showed that self-criticism when experiencing emotions and shyness significantly predicted psychological well-being [$F(2, 352) = 42.40$, $p < 0.001$, $R^2 = 0.20$]. The results also showed that self-criticism when experiencing emotions and shyness predicted social well-being [$F(2, 352) = 39.60$, $p < 0.001$, $R^2 = 0.05$], and that difficulties concentrating when experiencing emotions and shyness predicted social well-being [$F(2, 352) = 43.70$, $p < 0.001$, $R^2 = 0.05$] (Table 7).

As it is well known, correlations are interesting to understand phenomena but do not allow to establish causality effects.

TABLE 6 Correlations and *p* values for well-being, self-criticism, concentration, shyness, and repressed emotions.

Factors	Psychological well-being (CMS-QA)	Social well-being (CMS-QA)	Self-criticism (DERS)	Concentration (DERS)	Shyness (RAS)	Repress to avoid conflict (RAS)
Self-criticism (DERS)	**−0.39***	**−0.17****	NR	**0.52***	**−0.27***	**−0.23***
Concentration (DERS)	**−0.28***	**−0.17***	**NS***	NR	**−0.13****	−0.04
Shyness	**0.31***	**0.17***	**−0.27***	**−0.13****	NR	**0.23***
Repress to avoid conflict	**0.13****	**0.09****	**−0.23***	**−0.24***	**0.23***	NR

Values in bold are statistically significant. *$p < 0.001$, **$p < 0.05$. NR, Not relevant.

TABLE 7 Linear regressions and *p* value for the impact of self-criticism when experiencing difficult emotions, and shyness on psychological well-being.

Variables	Standardized	Std. Error	*t*-value	*p* value
Self-criticism	−0.33	0.07	−6.64	**<0.001**
Shyness	0.22	0.10	4.37	**<0.001**

Values in bold are statistically significant.

TABLE 8 Means and standard deviations for each dimension of emotional regulation in the clinical sample (*n*=427) and the present study (*n*=360).

Factors	Mean (SD) Hallion	Mean (SD) Present study
Global regulation	89.33 (22.64)	96.58 (25.37)
Awareness	15.55 (4.92)	16.25 (5.25)
Clarity	12.01 (4.04)	12.40 (4.85)
Non-acceptance	14.67 (5.92)	14.81 (6.81)
Impulse	12.58 (4.97)	12.67 (5.92)
Goals	15.42 (4.22)	17.06 (5.35)
Strategies	19.67 (7.31)	21.97 (8.31)

3.4. *A posteriori* comparison of emotional regulation with the threshold values of a clinical population

In this study, it was assumed that emerging adults' lack of emotional awareness and emotional clarity would be negatively related to their well-being. Hallion et al. (2018) conducted a validation study of the Difficulties in Emotion Regulation Scale (DERS) with adults suffering from emotional disorders. Compared to this clinical sample of 427 adults diagnosed with one or more DSM-5 disorders (Hallion et al., 2018), our sample of emerging adults had high emotional regulation scores, possibly signaling a dysregulation, as well as high scores for lack of emotional awareness, difficulty with goal orientation, and limited access to emotion regulation strategies (see Table 8). As the database of Hallion and colleagues' research was not available, it was unfortunately not possible to compare the score of the two independent populations (the population of the present study and that of Hallion et al.) using Student's *t*-tests.

3.5. Relationship between attachment styles and psychological well-being

The study attempted to find a relationship between attachment style and well-being in emerging adults, but the results were inconclusive due to difficulty in measuring attachment styles in the specific sample.

3.6. *A posteriori* variance analysis

Because a significant number of participants reported working, being affected by COVID, smoking cigarettes or marijuana, or having experienced violence, we conducted ANOVAs on emotional regulation (with the two-factor structure) and these variables. The results showed no significant differences in emotional regulation scores based on employment status ($p=0.95$), cigarette use ($p=0.27$), or cannabis use ($p=0.26$).

However, the study found that the emotion regulation of participants who reported being affected by COVID-19 significantly differed, at a 95% confidence interval, [$F(3, 349)=10.95$, $p<0.001$, $\eta^2_p=0.09$] from those who were not ($p=0.01$), or from those who felt slightly impacted ($p=0.04$), with a moderate effect size[1] (Table 9).

The study also found that the emotion regulation of participants who reported having undergone physical abuse significantly differed, at a 95% confidence interval, [$F(5, 349)=3.90$, $p=0.002$, $\eta^2_p=0.05$] from those having experienced sexual violence ($p=0.003$), or from those having experienced psychological ($p=0.02$), with a moderate effect size.[2]

4. Discussion

4.1. Present study

This study found that psychological well-being was negatively related to self-criticism and difficulty concentrating when experiencing emotions. Self-criticism and shyness together predicted 20% of emerging adults' psychological well-being.

Compared to a clinical sample, the participants were emotionally dysregulated with a lack of emotional awareness, difficulty with goal-directedness in an emotional context, and limited access to emotion regulation strategies.

Additionally, the study found that emerging adults who felt highly impacted by COVID and those who experienced sexual or psychological violence had a stronger sense of emotional dysregulation compared to those who did not feel as impacted by COVID or who experienced physical violence.

4.2. Predictors of psychological well-being

This study used parametric statistics, allowing for solid conclusions to be drawn about a larger population. Important work has also been done to ensure that the scales were coherent and to identify what they measured in our sample. Thus, it can be assumed that the conclusions drawn can be relatively humble but robust.

This study suggested that self-criticism when experiencing emotions, and shyness may play a significant role in determining emerging adults' well-being. More specifically, the variables explained a fifth of psychological well-being. Therefore, helping emerging adults develop a knowledge of their emotions, manage arousal and thoughts (Gross, 2014), influence their feelings, and modulate their expression (Gross, 1999) would be likely to foster the development of their

1 Reference values for the partial eta-square (η^2p) are as follows: around 0.01: small effect size; around 0.06: moderate effect size; around 0.14 and above: large effect size.

2 Reference values for Kendall's *W* are as follows: around 0.1: small effect size; around 0.3: moderate effect size; 0.5 and above: large effect size.

TABLE 9 Result of the analysis of variance (ANOVA), with self-criticism and difficulty concentrating when experiencing emotions as the dependent variable.

Variation source	Sum of squares	*df*	Mean Square	*F*	*p* value
Impact of COVID	2,170.64	3 (349)	723.55	10.95	**<0.001**
Violence	1,342.70	5 (347)	268.54	3.90	**0.002**

well-being. The more emerging adults will be able to identify and regulate their emotions, the more they will probably be able to concentrate, feel accepting of themselves, and feel autonomous, fulfilled, and oriented in their life. The results of the current study are consistent with the study by Guassi Moreira et al. (2022), which showed that emerging adults felt more fulfilled when they sensed that they could regulate their emotions. The results of our study on emotional regulation and well-being thus align with American studies, suggesting that the interventions that we will suggest could potentially be extended to emerging adults in other locations around the world.

Also, helping emerging adults overcome shyness, gaining in confidence in social situations, and be able to express their opinions and feeling in front of others may sustain their well-being. Therefore, it may be possible, by emotional regulation, and assertiveness-building interventions, to strengthen emerging adults' psychological well-being. But let us not forget there are many other variables contributing to understanding emerging adults' well-being, such as support from loved ones, resiliency, optimism, positive emotions, self-efficacy, etc. It would be interesting to investigate how they interact with self-criticism when experiencing emotions, and with shyness to explain emerging adults' well-being.

Shyness occurs during certain times of childhood and adolescence. It can also be a more durable personality characteristic. It is frequently associated with anxiety and stress (Crozier, 2001). It is often considered to hinder engagement in studies, and even promote avoidance of academic work and participation (Chen et al., 2018). However, in adverse situations, shyness may ironically be adaptative, in the sense that it allows one to avoid situations that are too stressful or avoid conflicts. This may be why we observed a moderate positive relationship between shyness and psychological well-being in emerging adults. For example, the COVID pandemic constituted a threat that people tried to avoid. As our study took place during COVID, adaptative avoidant behaviors of emerging adults may have contributed to successfully circumventing the threat.

This seems especially relevant considering that half of the participants in our sample felt dysregulated by the COVID pandemic. Our study provided information on predictors of well-being, but it also likely helped us capture the experience of emotional adversity of emerging adults during the COVID pandemic. In France and around the world, mental health issues increased among emerging adults since the COVID pandemic (Zerhouni et al., 2021), which was a lonely time for many emerging adults.

This study showed that psychological well-being was negatively associated with shyness and self-criticism in emotional situations. The less the emerging adults were shy, hesitating in social interaction, and judgmental about their subjective reactions, the more autonomous, fulfilled, life-oriented, and self-accepting they felt.

4.3. Comparison with a clinical sample

The comparison by the eye of our sample with a clinical sample of patients confirmed that participants in the present study had difficulty regulating their emotions, to goal-directedness in a negative emotional context, and had limited access to emotion regulation strategies. In our sample, emerging adults also appeared to lack emotional awareness and clarity (see Table 8), which seems consistent with the difficulties concentrating when experiencing emotions that we found as a predictor of psychological well-being.

Vine and Aldao (2014) showed the importance of clearly perceiving one's emotions for being able to regulate them. Emotional clarity may be hindered by stress and relational problems. Moreover, this study showed that the more the emerging adults (mean age of 18.7 years) had the feeling that they could regulate their emotions and act on their emotions once upset, the more they felt autonomous, fulfilled, oriented in their life, and accepting of themselves. The study also showed that emotional clarity deficits were associated with mental health issues, such as depression, social anxiety, and alcohol abuse – psychological conditions that may hinder one's capacity to find effective emotion regulation strategies. Therefore, suggesting intervention to support emotional regulation in emerging adults is also likely to enhance the prevention of mental health problems. Vine and Aldao (2014) even suggest that deficits in emotional clarity and emotional regulation may be transdiagnostic factors in psychopathology, as they are present in different mental disorders and are not specific to a single disorder.

4.4. COVID pandemic, experienced violence, and emotional dysregulation

The *a posteriori* results of the study showed that specific interventions could have been beneficial to the participants after the COVID pandemic to help them regulate their emotions. Especially for youth, the COVID pandemic led to stress and feeling of uncertainty due to lockdowns, social distancing, and student job loss. The isolation and lack of social support have also taken a toll on emerging adults' well-being. Additionally, the pandemic disrupted access to education, healthcare, and other essential services, exacerbating existing inequalities and making it more difficult for youth to access the resources they need to maintain their well-being.

Additionally, we found a stronger subjective effect on the well-being of the participants of sexual and psychological violence compared to physical violence. Sexual violence can have a significant impact on an individual's well-being because it can cause physical and emotional harm, feelings of shame, guilt, and powerlessness. It can also impair the sense of self-worth, the ability to trust others, to form healthy relationships, and to feel safe. It is also associated with risks of depression, anxiety, and post-traumatic stress disorder.

4.5. Validation of the hypotheses

The first research hypothesis was partially validated. Emerging adults' well-being was associated with their self-criticism in emotional situations (a dimension of emotional regulation), and shyness (a dimension of assertiveness), and was predicted by these variables. The

second hypothesis was partially validated: the difficulties concentrating when experiencing emotions (close to the lack of emotional clarity) were negatively related to well-being. The third hypothesis regarding well-being and attachment style was not validated. Finally, the results did not validate the fourth research hypothesis that emerging adults who regularly used cannabis had stronger emotional dysregulation than others.

4.6. Implications for prevention

The results of the study give the impression that remote education and prevention modules could have been offered during and after the COVID pandemic to help emerging adults regulate their emotions. Several in-person programs have been scientifically validated and positively impact emotional regulation and well-being. Some enhance psychological resources (Marais et al., 2018; Shankland et al., 2022, i.e., hope, optimism, resiliency, self-efficacy, and self-esteem), reduce depression, anxiety, substance abuse, stress (Hayes et al., 2006, i.e., psychological flexibility), or cognitive fusion, and experiential avoidance (Gagnon, 2018, i.e., mindfulness, MBSR). These programs could be adapted and validated for emerging adults, in person and remotely, in France, and other countries around the world. In addition, the need for education and prevention of the effects of violence on emerging adults' emotional regulation appeared in our study, but also in other countries. The same programs as those mentioned above could be used, probably in several countries. Also, reducing the impacts of violence, especially sexual and psychological ones, should be addressed in higher education institutions.

McMain et al. (2010) think that it is possible to psychologically enhance people, by helping them improve their emotional regulation abilities. This study highlighted certain dimensions of emotional regulation that could be worked on with emerging adults, namely the judgment toward their own emotional experience and the ability to know to be aware and understand one's emotions.

Mindfulness sessions could be used to strengthen emotional regulation, help develop the ability to observe and let go of inner states and outer events, develop concentration on goals when experiencing negative emotions (Kabat-Zinn, 2003), a better ability to feel engaged by information from the body and to notice subtle changes (Lefranc et al., 2020), and improve well-being (Orzech et al., 2009). For example, the 'Mindful Emotional Intelligence Program' was tested on 136 college students for 2 months and helped them regulate their emotions (Enríquez et al., 2017). Moreover, in a study conducted on emerging adults, mindfulness was associated with greater emotion differentiation and less emotional dysregulation and lability (Hill and Updergraff, 2012). Moreover, the 'Mindfulness Based Coping with University Life' can be used to help students develop psychosocial competencies like stress management, learning, communication, and relationships (Lynch et al., 2011).

Moreover, developing strategies to enhance cognitive reappraisal could help emerging adults manage arousal and influence their emotions. Cognitive reappraisal refers to identifying how rational one's emotional response was and determining the accurate importance of a stressor. Studies have shown that cognitive reappraisal was positively correlated with well-being and negatively with psychological symptoms (Gross and John, 2003; Aldao et al., 2010). It also helped feel and express positive emotions, and reduce negative emotions (John and Gross, 2004). Also, 'Brief Emotion Regulation Training' (BERT) has been used to strengthen emotional regulation in emerging adults. It is a 5-week program inspired by Gross' model. It was tested by Gatto et al. (2022) on 42 emerging adults. Important improvements in emotional regulation, psychological distress, and negative affectivity were shown. The program also exists in a brief electronic format, reducing the barriers of distance.

From a global health perspective also considering the development of remote tools, our college counselors' colleagues may suggest the use of certain free access applications to students, especially the ones helping develop mindfulness, cognitive defusion, and psychological resources, but these may not be scientifically validated. Consequently, to ensure efficiency, we suggest that they complement this suggestion with scientifically based interventions. For instance, their institution may enter into agreements with the organizations broadcasting mindfulness, and emotional regulation training such as the one cited before. This way, they will be able to direct students to these resources.

The present study also showed the role of shyness in predicting emerging adults' capacity to grow (psychological well-being). Therefore, it was assumed that there might be an interest in improving emerging adults' self-confidence to strengthen their emotional regulation capacity and foster their well-being. Moreover, Lin et al. (2004) found an improvement in assertiveness, self-esteem, and interpersonal communication satisfaction after nursing and medical students attended eight 2 sessions of assertiveness training once a week.

The internal consistency of the subscales 'anxious' and 'security' of the attachment scale did not reach the thresholds to ensure that the attachment styles were well measured, even when items were dropped. It was therefore not possible to assess the effects of attachment styles on emerging adults' well-being. In addition, the value of the standard deviation of each dimension of emotional regulation appeared to be high in comparison to the respective mean value. However, the validation study of Dan-Glauser and Scherer (2013), and our analysis of reliability showed the good psychometric qualities of the DERS scale (consistency and validity), including for our sample. Also, the exploratory and confirmatory factorial analysis showed the validity of the scale for measuring emotional regulation with two factors. Finally, it would have been interesting to look at the housing conditions (co-housing, living with parents, living alone, with a partner) of the participants to better understand the impact of the support received (or not received) on the variables studied.

Moreover, at the conceptual level, it sometimes seemed difficult to delineate emotional regulation from mindfulness. Perhaps, these concepts overlap and could gain by being replaced by the notion of reflexivity (Plantade-Gipch et al., 2021). Also, this study was conducted after the confinement related to the COVID decreed by the President of the French Republic in 2021. Since then, studies indicate increased distress among emerging adults (i.e., depression, anxiety; Zerhouni et al., 2021), which may have tended to increase certain results of this research, particularly in terms of difficulties in emotional regulation. Also, an important part of the participants in this study came from private higher education institutions, which could have had incidences on the results of the study. A

better-balanced sample would be required. Finally, as all the scales were administered at the same time, in a transversal perspective, it would be delicate to infer causality relationships between the variables. It would be interesting to replicate the study with a longitudinal research plan.

5. Conclusion

The study highlighted the role of one's judgment on emotional experience, and shyness, as predictors of emerging adults' well-being, especially in times of the COVID pandemic. Self-criticism when experiencing emotions, and shyness, predicted 20% of emerging adults' psychological well-being. The study also suggests that emerging adults who experienced high levels of impact from COVID-19 or reported experiencing sexual and psychological violence in their lives had higher levels of emotional dysregulation than those who did not experience those situations. Finally, the study seemed to show that emerging adults who had limited emotional awareness and clarity felt less psychological well-being.

The study has several limitations related, in particular, to measurement instruments, especially those assessing assertiveness, and attachment styles. However, the consistency analysis and the EFA and CFA analyses helped us maintain solid results. The lack of information on the housing conditions of the participants may have limited the ability to fully understand the impact of support on the studied variables. Given that there are interesting results in this study, several programs associated with developing mindfulness, cognitive reappraisal, and assertiveness-building interventions were explored to develop emerging adults' well-being. It would be interesting to create an integrative program and assess it with emerging adults in further research. Emerging adults could then benefit from this validation, and eventually the use of this composite program, to foster their well-being, especially in higher education institutions.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the direction of Ecole de Psychologues Praticiens. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Precarity in the lives of contract teachers: A qualitative study from Odisha, India

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School enrollment rates in developing countries have increased substantially over the past few decades. However, due largely to budget constraints, hiring contract teachers has become an *ad hoc*, yet a popular solution to teacher shortages in Asia, Africa, and Latin America. Studies concerning contract teachers have primarily focused on their performance, efficiency, and cost-effectiveness. In light of the literature on precarity associated with contractual employment, this article seeks to explore how contractual employment affects teachers in India. The study analyzes narrative data obtained through semistructured interviews with 17 contract teachers employed in government-run schools in Odisha, a state in eastern India. According to thematic analysis of the data, participants experience precarity in six dimensions: prioritisation of non-teaching work over teaching, financial hardships, sense of inferiority, anxiety about transfer, experiences of discrimination and desire for course correction. We argue that these six dimensions contribute to the demoralization and disempowerment of teachers. We also explore possible explanations for why Odisha continues to employ contract teachers despite criticism. It is recommended that policymakers be sensitized to the plight of contract teachers and reconsider the policy of contractual employment.

KEYWORDS

contract teacher, India, precarity, teacher recruitment, thematic analysis

1. Introduction

In recent decades, the term precarity has been widely used to describe adverse changes in employment conditions. Precarity usually refers to a situation of "generalized insecurity" resulting from the disappearance of "full-time, predictable, unionized, and stable livelihoods" (Means, 2022, p. 1,360). As evident from a number of studies, teaching has not remained immune to the process of casualization (Ivancheva, 2015; Cuervo and Chesters, 2019; Melville et al., 2019; Rey et al., 2020; Stacey et al., 2022), In countries such as Finland, where teachers are highly valued professionals, the appeal of teaching career seems to be declining (Mankki and Kyrö-Ämmälä, 2022). The precarity of teachers in developing countries is, however, not well studied. A probable explanation is that the dominant discourse about teachers in these countries, which Tao (2016) calls the "third world teacher" discourse, attributes poor education quality to teachers. Due to this, much of the literature surrounding teachers in developing countries often focuses on their deficiencies, such as high absenteeism rates, lack of accountability, and ineffective teaching practices. The purpose of this article is to draw attention to the issue of precarity in the lives of teachers in developing countries.

During the last two decades, school enrolment rates have increased at an unprecedented rate in the developing world. Many countries in Asia, Africa, and Latin America have resorted to hiring contract teachers due to severe teacher shortages and perceived financial constraints (Fyfe, 2007; Chudgar et al., 2014). There is a wide range of recruitment policies for contract teachers within and across countries. In most cases, contract teachers have lower educational requirements and are paid a fraction of the salary of regular or civil service teachers. As opposed to regular teachers, contract teachers are usually hired for a period of 1 or 2 years with the possibility of renewal. International organizations like the World Bank and the International Monetary Fund (IMF) have actively promoted the policy of hiring contract teachers as the solution to a range of problems affecting the educational system in developing countries (Klees, 2008). A majority of studies on contract teachers have examined whether they are as effective as regular teachers in improving student outcomes (Atherton and Kingdon, 2010; Goyal and Pandey, 2013; Muralidharan and Sundararaman, 2013; Duflo et al., 2015). In general, the research findings are positive (Kingdon et al., 2013), which has led researchers to advocate for the widespread use of contract teachers, with strict enforcement of their contracts.

It is estimated that approximately 12.7% of all teachers in India are contract teachers (Mukhopadhyay and Ali, 2021). In some states, the practice of hiring contract teachers has been discontinued, whereas in other states, such as Odisha, hiring policies have evolved over time. Except for teachers in state-run model schools, all teachers in Odisha are recruited as contract teachers (Ramachandran et al., 2018). However, unlike the initial years of hiring contract teachers when untrained local youth could be recruited, now candidates with proper educational qualifications and training are eligible to apply. Contract teachers are eligible to become regular teachers after 6 years of service (School and Mass Education Department, 2019). Recently, Odisha's government has made minor changes to employment norms for the first 6 years of employment, which will be discussed in greater detail later in this article. In addition to changing the designations, the need for contract renewal has been waived after 3 years of service (School and Mass Education Department, 2019). Even so, the first 6 years of a teacher's career remain to be the period characterized by insecurity in many ways. During this period, teachers receive about one-third of a regular teacher's salary (Ramachandran et al., 2018). Most importantly, these 6 years are not included in the service record of a teacher. In view of the significant difference in employment terms between the first 6 years of service and subsequent years of service, we consider the first 6 years of service to be the teachers' contract period.

The critics of contract teacher policies assert that hiring untrained youth as teachers on contract with poor pay contributes to the degradation of the professional status of teachers and, therefore, in the long run, will have a detrimental effect on education (Kaushik et al., 2009; Steiner-Khamsi, 2012; Mukhopadhyay and Ali, 2021). Bourdieu (1998) writes, "[T]he salary granted is an unequivocal index of the value placed on the work and the corresponding workers. Contempt for a job is shown first of all in the more or less derisory remuneration it is given" (p. 3). While most studies examined the impact of contract teachers on student learning, in this article, we pose a rather different question: how contractual employment affects teachers' personal and professional lives. Thematic analysis of narrative data collected from 17 participants indicates that contract teachers experience precarity in six dimensions: non-teaching work takes precedence over teaching, worries over salaries that barely allow them to survive, sense of inferiority, anxiety about transfer, fractured solidarity among teachers, and devising plans for course correction.

The implications of the findings have been discussed, as well as possible reasons for the continuation of the use of contract teachers in spite of criticism. The practical implication of this research includes a reconsideration of contract teacher hiring policy. Our position is that teacher hiring and management practices should ensure that the dignity and wellbeing of teachers are protected. In order to gain a better understanding of the relationship between contractual employment of teachers, precarity in their lives, and their effectiveness, further research is needed in other contexts in developing countries, as this field is understudied. It is also necessary to explore how teachers exercise agency and resist the disciplinary power of governance that is based on precarisation.

2. The emergence of contract teacher recruitment policy

The policy of recruiting contract teachers emerged at the intersection of two global movements in the 1980s and 1990s. On the one hand, the internationalization of the Education for All (EFA) campaign compelled developing countries to expand their education systems for universal accessibility. The positive impact of primary education on a country's socio-economic development and competitiveness in the international market was one of the main justifications for this global objective (Welmond, 2002). The EFA campaign was soon followed by the adoption of the Millennium Development Goals (MDGs), one of which was to achieve universal primary education. On the other hand, in this period, neoliberal thought emerged as the dominant paradigm, replacing development economics and the idea of a welfare state. As leading global agents of neoliberalism, the World Bank and IMF enforced policies and conditions known as adjustment programs (SAPs) on developing countries in exchange for loans. SAPs required countries to "liberalize trade barriers, eliminate subsidies, dismantle public services, privatize, deregulate, and promote markets as extensively as possible while "shrinking" the state' (Kamat, 2012, p. 35).

Meeting the financial resources to expand and improve the quality of the school systems was a major challenge for many countries. Many international financial institutions stepped in to offer financial assistance to health care and education programs in the developing world. The pressure to quickly expand educational access, the neoliberal ethos and external aid, together affected the education systems and the teacher management policies of many countries in numerous ways (Klees, 2008; Connell, 2009; Kablay, 2012). Both the issues of education systems and their solutions were framed in terms of economic costs and benefits. Each investment was to be weighed against others (primary vs. higher education, salaries vs. materials) to decide which would have the greatest impact on outcome and efficiency. Certain types of education expenditures (such as primary education) were considered more effective and thus, legitimate than others (like higher education). The apparently contradictory objectives of expanding access to education while reducing expenditure were to be achieved through the pursuit of efficiency (Welmond, 2002).

Neoliberal policies imagined teachers as "one-dimensional economic beings" who were "governable *via* the metrics of the market,

each serving primarily her own self-interests while working to maximize personal value in the market" (Attick, 2017, p. 38). In light of this, it is not surprising that for all teacher-related issues, such as teacher shortages, a lack of accountability, and ineffectiveness, typical policy solutions took the form of incentives, and disincentives for teachers. It was argued that hiring teachers with renewable contracts rather than as permanent civil servants would provide the correct balance of incentives and disincentives. From an incentive standpoint, the absence of job stability could be expected to make contract teachers more accountable for performance (Bruns et al., 2011).

Rapidly expanding educational opportunities meant a sharp rise in student enrolment and teacher shortage. In 1993, the World Bank published a book titled "Teachers in Developing Countries: Improving Effectiveness and Managing Costs". The book focused on improving the effectiveness of teachers through remuneration and managerial policies. In one of the chapters of this book, Manuel Zymelman, with Joseph De Stefano, suggested: "delink teachers from other civil servants; find ways to increase qualifications while mitigating budgetary impact, such as instituting different combinations of training and experience to produce the same teaching proficiency at lower levels of the salary scale; improve data collection and salary forecasting capacity (in order to locate inefficiencies); *abolish guaranteed employment for teachers*" (quoted in Welmond, 2002, p. 41, emphasis added).

To address teacher shortages with a limited budget, many countries in South Asia, Africa and Latin America began hiring contract teachers. The Government of India launched the District Primary Education Programme (DPEP) in 1994 with foreign aid. To fulfil one of the conditionalities attached with the fund – that of filling existing teacher vacancies – several states of India resorted to recruiting contract teachers and stopped recruiting full-time permanent teachers (Mehendale and Mukhopadhyay, 2021). In light of the budget constraints facing many state governments, as well as the tremendous pressure to expand the primary education system, the appointment of teachers on lower salaries and contracts seemed an attractive option (Kaushik et al., 2009). Initially, contract teacher recruitment policies differed from state to state in terms of educational requirements, salaries, appointment bodies, and career prospects. Over the past two decades, these policies have also evolved differentially. Several states, such as Uttar Pradesh and Rajasthan, have stopped recruiting contract teachers while others, such as Odisha, Madhya Pradesh, and Punjab recruit contract teachers and regularize their employment after a few years (for details see Ramachandran et al., 2018).

3. The effectiveness of contract teacher recruitment policy

In the majority of studies conducted on contract teachers, the purpose has been to determine whether contract teachers have any effect on student learning outcomes. Based on a review of the most rigorous studies on this topic, Kingdon et al. (2013) conclude that contract teachers are "generally more effective in improving student outcomes than regular teachers" (p. 3). For example, Muralidharan and Sundararaman (2013) estimated that students in schools with an extra contract teacher performed significantly better than those in comparison schools by 0.16 and 0.15 standard deviations, in math and language tests, respectively. The results of similar studies (Atherton and Kingdon, 2010; Kingdon and Sipahimalani-Rao, 2010; Goyal and Pandey, 2013; Duflo et al., 2015) also indicate that contract teachers are less likely to be absent and spend more time in classrooms than regular teachers. Absenteeism is lower among students too when taught by contract teachers. Since all these positive outcomes are achieved at a fraction of the cost of regular teachers, recruiting contract teachers is professed as a cost-effective policy solution.

A better understanding of the above-mentioned research agenda can be gained from the words of Steiner-Khamsi (2012).

> In teacher policy research, for example, the World Bank is enamoured with impact evaluations that show that underpaid contract teachers produce better student outcomes than regular teachers who are not accountable, do not fear losing their jobs, and therefore either do not show up regularly in school, or if they show up, do not teach, or if they teach, do not teach effectively. This complex causal chain of explanations is often simplified and reduced in the end to two variables only: low payment of teachers and job insecurity—both, according to the economists cited in World Bank publications, considered highly desirable for education systems that attempt to improve teacher effectiveness. (Steiner-Khamsi, 2012, p. 11)

It is not that studies have not reported the negative implications of recruiting contract teachers. Kingdon et al.'s (2013) review includes studies that report instances where regular teachers either outperform contract teachers or there is no significant difference between the two cadres. Similarly, absenteeism among contract teachers has been found to be as high as that among regular teachers Kremer et al., 2005. While contract teachers may perform better in their first year of employment, their performance may decline in the second year of employment (Goyal and Pandey, 2013). In addition to these studies, scholars have argued for a long time that the low salary, coupled with the contractual nature of the job, is the main contributor to dissatisfaction and lack of motivation among contract teachers and thus, the policy is at best a stopgap measure (Kaushik et al., 2009; Chudgar et al., 2014; Chandra, 2015).

It is difficult to answer whether the lack of job security and poor compensation of contract teachers make them more effective since there are a variety of opinions on this subject. In this article, however, we attempt to go beyond this question and pose a question that can be more or less definitively answered. The study examines how contractual employment affects teachers themselves. It is argued here that contractual employment contributes to precarity in teachers' lives. In the following section, we discuss the concept of precarity and its relevance to the current study.

4. Contractual employment and precarity

Bourdieu (1963) is credited with the term précarité (Alberti et al., 2018). In his research in Algeria, he used it to distinguish between casual workers and permanent workers. With the worsening of working conditions over the last few decades, the term "precarity" has become increasingly prevalent. Scholars have had difficulty defining precarious work as the concept has been used for a variety of purposes, including

describing employment structures, describing subjective feelings of insecurity among workers, and even referring to a lack of workers' engagement in labourist politics (Alberti et al., 2018). There are four major factors that in certain combinations can lead to different degrees of precarity for individuals (Jonsson and Nyberg, 2009, as cited in McKay et al., 2012, p. 83). The first factor is job insecurity, which depends on the duration of the contract and the uncertainty surrounding the renewal of the contract. The second factor is low pay. This refers to a situation in which a person's earnings are below the minimum or average wage, and there is not much opportunity for further increase. Third, subordinate employment which means exclusion from full social and welfare rights as well as employment protection. The final contributing factor is the lack of rights to representation. In this situation, workers lack the ability to engage in collective bargaining and have difficulty exercising their legal rights.

Thus, those who are employed on a contract basis are subject to precarious circumstances, especially when their salaries are low. Casualization and contractualization of teaching jobs are not limited to developing countries. Governments in North America, Europe and Australia are also hiring teachers on a fixed-term basis in an effort to stimulate flexibility (De Koning, 2013). Based on their study of Australia's fixed-term contract teachers, Stacey et al. (2022) report that the workload of contract teachers is similar to that of permanent teachers. However, the main difference between both groups lies in how they experience their work. Contract teachers work harder as they feel compelled to "prove themselves". As their employment is at the mercy of the principals, they become increasingly silent in school matters and say "yes" to everything. They feel "surveilled", "marginalized" and "othered" in the schools. Outside, they have difficulty obtaining bank loans and finding adequate accommodations. Such findings led the authors to argue that experience of precariousness may have "scarring" effects on contract teachers.

Additionally, precarious employment delays the transition of young people into adulthood (Cuervo and Chesters, 2019). According to the International Labour Organization (ILO), an individual has not transitioned until he or she has been placed in a position that meets the basic criteria of "decency," which is a permanency that provides a sense of security for the worker (Cuervo and Chesters, 2019). The achievement of economic independence has therefore been equated with achieving a successful transition into adulthood. Before making other significant life commitments, such as marriage, parental responsibilities, and home ownership, most young people prefer to obtain a permanent and full-time job. A precarious employment situation not only delays the attainment of milestones of adulthood but also makes it difficult to plan for the future.

As indicated in this section, contractual appointment of teachers is likely to be a form of precarious employment, which can adversely impact their personal and professional lives. The purpose of this study is to examine whether and how contract teachers experience uncertainty and insecurity in their lives during their contract period, as well as how they navigate through it. Is it reasonable to attribute the effectiveness of contract teachers to insecure employment and inadequate compensation?

5. Method

Prior to 2019, contract teachers in Odisha were known as Sikhya Sahayaks (teaching assistants), although their responsibilities were no less than those of regular teachers (Béteille and Ramachandran, 2016; Panda, 2018). They could be absorbed into the regular teacher workforce after 6 years of service. In 2019, the government of Odisha abolished the designation of Sikhya Sahayak and introduced two new cadres- Junior Teacher-Contractual (JTC) and Junior Teacher (JT) (School and Mass Education Department, 2019). In order to become a regular teacher, one must first serve 3 years as a JTC and another 3 years as a JT. Although JTs do not have renewable contracts like JTCs, they do not receive the same benefits as regular teachers. The salary of a JT is slightly higher than that of a JTC, indicating that the promotion is not significant. Rather, this amendment can be viewed as an effort towards concealing the significant differences between JTs and regular teachers. In this study, we consider both JTCs and JTs as contract teachers because they share one major feature of precarious employment - poor pay. Consequently, this study draws participants from both cadres.

The study reported in this article was conducted in the Keonjhar district of Odisha. Using maximum variation purposive sampling (Bryman, 2012), 20 contract teachers were selected for interview. To interview the teachers listed in the sample, permission was obtained from the District Education Officer (DEO) of Keonjhar. Prior to conducting the interviews, participants provided their oral/verbal consent. Among the 20 teachers approached, 17 agreed to participate in the study.

This study drew its data from in-depth, semi-structured interviews and focus group discussions (FGDs). Interviewing is the most effective method of capturing people's life experiences and the meanings they attribute to those experiences (Forsey, 2012). FGDs facilitate interaction among participants who share some common characteristics. In addition to revealing common concerns, the interaction even raises questions that were not considered previously and encourages participants to participate in unexpected ways (Robinson, 2012). The interview schedule included questions pertaining to participants' educational trajectories, career decision-making, experiences as teachers, and future plans, which resulted in rich biographical narrative data. Over the course of 2018 and 2019, each participant was interviewed three times and three FGDs were conducted. The interviews lasted about 50–90 min. The interviews were digitally recorded. All the interviews were conducted in Odia, the vernacular language of Odisha. The interviews were later transcribed and translated into English for computer-assisted analysis.

The data were analyzed following the thematic analysis method elaborated by Braun and Clarke (2006). In order to become familiar with the dataset, we read the transcripts several times and noted our initial thoughts. Data chunks were coded using descriptive codes (Saldana, 2013). These codes were then analyzed and combined into themes and sub-themes. A thematic map was used to clarify the relationship between themes. Finally, the themes and sub-themes were evaluated to ensure they adequately represented the dataset. In this article, we present data relating to the theme of precariousness.

The study was approved by the Institutional Ethics Committee for Human Research at the National Institute of Science Education and Research, Bhubaneswar. The demographic characteristics of the participants have been presented in Table 1. Pseudonyms have been used to protect the anonymity of the participants.

6. Results

As shown in the thematic map below (Figure 1) six sub-themes constitute the theme of precariousness in contract teachers' lives. Before presenting the findings, it is important to shed some light on the reasons why participants decided to become contract teachers. Among the 17 participants, only three had aspirations of becoming teachers while they were growing up. Since their fathers were teachers, they were inspired by the inherent "nobility" of the profession and made a conscious choice to pursue a career in teaching (Ramachandran et al., 2005). The majority of participants chose to pursue teacher training when they realized it was the most accessible and affordable route to becoming a government employee. The findings presented below indicate that contractual employment turned intrinsically motivated teachers towards extrinsic factors such as salary and reputation, and those teachers who had intended to endure 6 years of hardship in order to secure a government job were also revising their life strategies to make the contract period more manageable.

6.1. The burden of non-teaching workload

Along with teaching, teachers in government schools are expected to provide administrative support, organize events, manage mid-day meals, supervise construction work, collect and submit data on students, maintain records, facilitate visits of officials, open bank accounts for students, update their Aadhaar IDs, help them in getting caste certificates and distribute uniforms and books. During the interviews, some participants claimed to have placed a higher priority on non-teaching work than on teaching. They believe that neglecting their non-teaching activities may have greater detrimental effects than neglecting their teaching activities. One explanation for this belief could be that school administrators generally focus on the non-academic aspects of schools on their school visits. The block and district education officers usually review registers and records, observe the operation of the mid-day meal program, and evaluate the cleanliness of school facilities. Furthermore, although regular teachers may experience similar pressures with respect to non-teaching workloads, contract teachers are the ones who feel vulnerable, because their jobs are insecure and administrators can easily take disciplinary action against them. According to some participants, contract teachers are usually assigned most of the non-teaching duties because they are the most junior teachers and are less likely to raise voice for a fair distribution of responsibilities.

Located next to a national highway, Manisha's school received many visiting officials throughout the year. It was, therefore, necessary for the teachers to be ready for unexpected visitors. Being "ready" generally entailed being present in school when one was not on an officially sanctioned leave and maintaining all records and lesson plans, which usually attracted the inspectorial gaze. Manisha was assigned the responsibility of overseeing the preparation of midday meals (MDM). This seemingly simple task was costing Manisha more than an hour every day. She described:

> As children, we used to arrive at school before ten o'clock each morning. Today's children do not arrive on time for school. They keep on coming. We do not get a final count of students present in a day until 11 a.m. Following the final count, the required

TABLE 1 Partcipants' charachteristics (n=17).

	Male	Female	Total
Gender	10	7	17
Age group			
20–29	5	2	7
30–39	4	3	7
40 and above	1	2	3
Social category			
General	1	2	3
Scheduled Caste (SC)	2	0	2
Scheduled Tribe (ST)	3	1	4
Socially and Economically Backward Classes (SEBC)	4	4	8
Education			
Higher secondary and Certificate of Training (CT)	2	0	2
Undergraduate and CT or Bachelor of Education (BEd)	8	4	12
Postgraduate with CT/BEd	0	3	3
Other aspects			
Teaching in urban school	2	2	4
Teaching in rural school	8	5	13
More than 3 years work experience before becoming JTC	3	2	5
Married	6	5	11
Living away from family	2	3	5

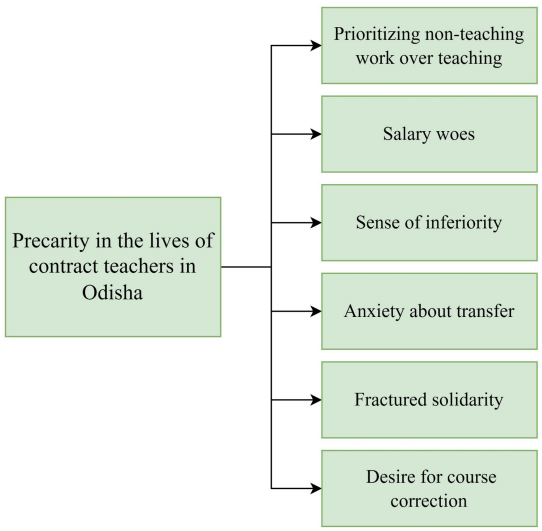

FIGURE 1
Dimensions of precarity in the lives of contract teachers in Odisha.

> amount of MDM ingredients are sourced from the storeroom. The number of eggs being cooked should always match the number of students present in the classroom on any given day. There must be one egg for each student. Inspection personnel will verify this. In the event that he does not find enough eggs for students present that day, we will be charged with theft. The fact that some children have arrived late will not be taken into consideration.

Several participants narrated stories that circulated in the local teacher community concerning contract teachers who had been punished for matters related to non-teaching duties. Typically, the punishment consisted of a suspension of salary for a few months. Some participants even sought to assist their headteachers in non-teaching tasks in order to maintain their goodwill. Even when a headteacher is a Booth Level Officer (BLO), contract teachers perform tasks related to the BLO. The participants who spent most of their time working on non-teaching tasks hoped that once they became regular teachers, their workload would be reduced. At least, as regular teachers, they hope, their position would be secure enough to provide strategic flexibility to cope with the demands of non-teaching work.

6.2. Salary woes

The low salary of contract teachers in Odisha is arguably the most critical factor contributing to their experience of precarity. During the fieldwork, the gross monthly salaries of Junior Teacher-Contractual (JTC) and Junior Teacher (JT) were Rs 7,400 and Rs 9,200, respectively, while the salary of a regular teacher was approximately Rs 25,000 (313 USD). In January 2022, the Government of Odisha increased the salaries of JTCs and JTs by 50% (The Print, 2022). A JTC now receives Rs. 11,000 a month or Rs. 423 per day for 26 working days. According to the latest revision of minimum wage rates, unskilled agricultural workers should receive between Rs. 382 and Rs. 423 per day, depending on location (Government of India, 2022). Poor pay of contract teachers is more than a problem of survival. It is a challenge to their reputation as well.

Sasmita's father was a high school teacher. She always aimed to be a teacher like her father. However, she got a teaching position in a primary school. Her school is approximately 10 km from the nearest town. The regular teachers of her school live in the town and commute to school by scooter. As Sasmita did not know how to drive, and there was no reliable or affordable means of transportation from town to the village, she was forced to find a house within the village. Her monthly rent is Rs. 1,000. Almost every Sunday, she travels to the town to purchase essential items. She spends approximately Rs. 1,000 per visit - Rs. 200 is charged by the auto-rickshaw, and the balance is spent on shopping. Each month, she visits her family, which is also a costly endeavour. Her salary barely allows her to make ends meet.

Ranjan is 42 years old and is married. Before becoming a contract teacher, he was employed by an insurance company for more than a decade, earning more than Rs. 30,000 per month. Having completed his teacher training course, he had attempted to become a teacher in a government school, but had never considered teaching in a private school due to the low salaries offered to teachers in private schools. When he was selected to be a contract teacher, he reluctantly joined due to the low salary, but he was also looking forward to becoming a regular teacher after 6 years of hardship.

Soon after joining, he realized that reducing expenses would not be sufficient, he would need to find a second source of income. So, he began offering private tuition classes after school hours. It is not uncommon for parents living in the nearby town to pay as much as Rs. 2,000 each month per child for private tuition classes. Tuition fees for English medium students are even higher. However, this strategy may not be feasible for all contract teachers. Parents in rural areas do not pay much for private tuition, nor do they pay on a regular basis. Consequently, many participants are unable to earn an additional income from tuition classes. Besides, young teachers such as Manisha and Rajendra, instead of offering private tuition, take advantage of their free time to prepare for competitive examinations that might lead to better employment opportunities.

Not only is the salary low, but it is also paid irregularly. During the interviews, many participants complained that they had not received salaries for more than 3 months. Delayed payments are not a problem for female teachers living with their families. Irregular salaries pose problems for teachers who reside away from their families in rented houses, as well as married male teachers. As much as Prakash dislikes it, he is required to borrow money from his family when the salary is delayed since he is paying an EMI on a motorcycle. The salary Sarojini receives can support her well as she is living alone. However, she keeps her husband's debit card on hand in case she does not receive her salary for long. Together with his wife and child, Mohan lives in a rented house. He said, "I have not received my salary for the last 3 months. I have not paid the rent. The local shopkeepers allow us to purchase items on credit. They are willing to sell us credit because they know that we will eventually receive our salaries. If I need to buy anything from the town, I will have to either borrow or wait." A sense of financial uncertainty is evident in all participants' narratives.

Depending on one's income, one can adjust their standard of living. It is, however, humiliating to compromise one's obligations to others. Rajendra could not refuse his younger brother's request to buy him a smartphone. Prakash's cousin sister was getting married. As a wedding gift, his aunt requested him to buy a necklace for her

daughter which he had to oblige. Sarojini's father-in-law was investing his retirement savings in the construction of a house. As the construction was nearing completion, he ran out of money. So, he abandoned the idea of installing tiles on the floor. Sarojini decided to help her father-in-law as much as she could. It was only through borrowing from colleagues and friends that Rajendra, Prakash, and Sarojini were able to meet their financial obligations. Indebted, they had to further reduce their expenses.

6.3. Sense of inferiority

As mentioned in the sub-theme of salary, contract teachers often struggle to maintain a sense of self-worth. As Ranjan lamented, "the regular teachers treat us as if we were laborers. Our government has enough money to provide our children with books, uniforms, shoes, and cycles, but not for us. In my opinion, the government believes that we do not even deserve what we are receiving. Only a teacher can live with dignity in such circumstances."

Sasmita too echoed this sentiment when she said, "I do not think bright students are interested in becoming teachers. The salary is low. Even though it is increased after 6 years, by that time the damage has already been done. Getting less than a laborer hurts one's self-respect."

A recurrent theme in most participants' narratives was the comparison of contract teachers with laborers. Bijay said, "For 6 years I am occupied with only one concern- survival. For 6 years we are forced to live like laborers. It is a huge amount of mental pressure. They have recruited three teachers with the salary of one. It is easy for them. Is it easy for us?"

Sarojini taught in numerous private schools before joining the government school system as a contractual teacher. She recognizes that her school could be improved in so many areas. She, however, feels powerless in school as she is merely a contractual teacher. She said:

> I am just a JT, not even a permanent teacher. What can I do about these things even though I want to do? I can only contribute physical labour. I don't have money. I can encourage children to work with me for the development of the school. I can take a few tiny steps like a *gunduchi musha (Squirrel)*. But there are people who can make significant changes. The headteacher can work with the cooperation of SMC members and other teachers to develop the school.

Schools are not the only places where participants feel inferior. Many participants, often men, dislike the idea of identifying themselves as contractual teachers in primary schools. According to Mohan, male contractual teachers are not very attractive as marriage prospects. He said, "Many males choose to become contractual teachers as a second option. It is unlikely that anyone will marry them. With their salaries, they are not able to afford a comfortable life for themselves. How can they support families?"

6.4. Anxiety about the possibility of transfer

Before 2012, the Odisha government had a policy of hiring contract teachers through local authorities and from the local pool of applicants. Teachers were able to obtain posts in schools near their homes as a result of this policy. If a teacher wished to transfer to another school within a district, it was possible and, in many cases, it required bribing local officials. In 2012 and all the recruitments after that, applicants were permitted to apply for vacancies in any district of their choice. Due to this change in policy, teachers from coastal Odisha like Sarojini, Mohan, and Ghanshyam got jobs in a northern district. Being posted hundreds of kilometres away from their homes, they wish to be transferred. Sarojini said:

> Teachers who live with their parents or stay somewhere near their homes don't really understand our problem- the problem of teachers who live far away from their homes. The school needs me here and my family needs me there. From both sides, I can sense equal pressure. You might have seen me today calling my son repeatedly and walking around the field while I spoke with him. It is important for me to know how he is doing and what he is doing. Whenever I learn of bad news, I lose control. Suddenly, I am confused. It is unlikely that I will be able to reach my family in time even if I take leave immediately. Recently, my father-in-law passed away. My mother-in-law is now living alone. If she falls ill, I will not be able to get to her as quickly as I would like. If I had been working close to my home, I would have been able to respond to such emergencies much more efficiently. I could have taken care of my job and family at the same time. Since I'm here, I'm not much help in an emergency.

Transfers of teachers during the first 6 years of their employment are not clearly defined by the government. Most contract teachers believe that it is difficult to obtain a transfer to a school of their choice during this period. Upon completion of 6 years, the transfer option is available, but inter-district transfers are unlikely. Therefore, as contract teachers, they must stay put. There is also the option of mutual transfer, wherein teachers with the same educational qualifications and belonging to same social category can exchange positions on a voluntary basis. However, the difficulty lies in finding a teacher with similar characteristics and who is willing to relocate.

6.5. Fractured solidarity

According to several scholars, the creation of multiple cadres of teachers is not only inefficient on the part of the administration, but also undermines the professionalism of the teaching workforce (Kaushik et al., 2009; Jha et al., 2021). It is reasonable to suspect that regular teachers may discriminate against contract teachers owing to the differences in their employment terms. When asked about this, none of the participants shared any first-hand experience of discrimination. However, some participants felt that they were given more non-teaching work since they were new to the school. Also, they shared instances of discrimination experienced by their friends in other schools. Rajendra noted:

> Regular teachers discriminate against us when we attend block-level teacher meetings. They make us feel inferior through their behaviour. Recently, the middle school in the neighbouring village was merged with the high school. Both schools were adjacent to one another and had different head teachers. The head teacher of the high school now supervises everything. All the tedious

> paperwork is assigned to middle school teachers, all of whom are contract teachers. In fact, they sit in two separate staff rooms. When it comes to taking leaves, contract teachers have more difficulties than regular teachers.

6.6. The desire for course correction

As mentioned before, the majority of the participants had decided to take teacher training and join the teaching workforce as contract teachers because they were unable to pursue their preferred career paths. For instance, Prakash achieved a good ranking in the entrance examination for engineering schools. Due to his family's financial difficulties, he was uncertain whether he would be able to arrange funds for 3 years of study in engineering. On the other hand, teacher training was less expensive and shorter in duration. Therefore, he abandoned the idea of studying engineering and enrolled in a teacher training program instead. According to Lortie (1975), this is a case of "constrained entry". For teachers such as Prakash, the position of contract teacher represents a stepping stone. As they work through their contractual service, they study and prepare for better-paying government jobs. If they had been offered regular positions with a decent salary, they might have accepted teaching as their career and strived to improve themselves as teachers.

It is also apparent that the female participants who became teachers out of their passion are rethinking their career choices. The following statement illustrates Sasmita's confusion.

> Nowadays, people prefer to work in banks. A banking career has never been of interest to me. I wanted to become a teacher. But, am I really able to teach here? Most of the time I am engaged in paperwork. And, what do I receive as a salary? Perhaps I should consider joining the administrative services.

However, course correction is not a concern for all participants. Minati began teaching shortly after her marriage. Changing careers is not an option for her because her family considers teaching as the only suitable work for married women. Similarly, Anjali does not want to rock the boat because her husband changed his job to be with her. With regard to course correction, teachers like Minati and Anjali have only one option- to obtain teaching positions in high schools.

7. Discussion

The purpose of this study was to examine how contractual employment affects teachers themselves. The thematic analysis of interview data reveals that the lives of teachers in the contract period are structured around six themes: precedence of non-teaching work over teaching, financial hardships and uncertainties, sense of inferiority, anxiety over transfer, experiences of discrimination and planning for course correction. We argue that these subthemes together signal precarity in the lives of contract teachers. Precarity here is evidently due to "manufactured uncertainty" (Alberti et al., 2018). While it is rare for a teacher's contract to be not renewed, the threat of dismissal is real. Managerial strategies such as withholding salary payments have contributed to the subjective precariousness of teachers. However, following Gilmartin et al. (2021), we can characterize the participant's case as one of "promising precarity" because the opportunity to secure a stable, well-paying position is available after 6 years of precarious contractual employment.

Nevertheless, when teachers are more worried about security and survival, the "lower-order" needs in Maslow's hierarchy of needs, it is difficult for them to progress towards satisfaction of "higher-order" needs such as a sense of efficacy and professional development (Chandra, 2015). It can be demoralizing for teachers to devote a disproportionate amount of time and energy to non-teaching tasks (Tsang and Liu, 2016). Finally, when there are multiple cadres of teachers, a teacher with low pay may view herself as an insignificant member of the larger teaching community, as Sarojini's metaphor of *gunduchi musa* suggests so insightfully. *Gunduchi musa* is the Odia term for squirrel. According to the epic Ramayana, a squirrel contributed to the construction of the bridge through the ocean that allowed Lord Rama's army to travel to Lanka. As the army of monkeys threw large stones into the ocean, the squirrel rolled on the sand while wet and shook it off at the construction site in order to transport a few grains of sand. The squirrel's contribution was apparently inconsequential and unwarranted. Although contract teachers perceive themselves as powerless, they are usually those who bear the most weight in most schools.

There is a connection between contracting and casualizing teaching staff and other policy solutions, including performance-based pay and increased monitoring and surveillance. These reforms are largely grounded in the discourse of new public management (Mukhopadhyay and Ali, 2021) and in recognition of their widespread implementation, they have been termed as Global Managerial Education Reforms (GMERs) (Verger and Altinyelken, 2013). The central principle guiding this package of reforms is that public sector administrators should take advantage of the rules, values, and techniques used in the private sector. As these reforms strive to enhance the efficiency and effectiveness of public education systems, they disempower teachers and deprofessionalize the workforce (Verger and Altinyelken, 2013). Additionally, Mukhopadhyay and Ali (2021) argue that while the new public management discourse constructs a narrow concept of teacher accountability, it rarely engages with the larger institutional context within which teachers operate. It does not address basic resource deficiencies in government schools, the involvement of teachers in numerous non-teaching activities, the low quality of preservice and in-service teacher training programs, and the lack of teacher involvement in policy-making.

The controversial nature of these reforms may cause one to wonder why governments are attracted to these reforms so strongly. First and foremost, these reforms are recommended by large and powerful international organizations, such as the World Bank. In the last decades, the World Bank has positioned itself as a producer and manager of knowledge in the domain of education (Steiner-Khamsi, 2012). Now, as a knowledge bank, it determines what works and what does not in terms of educational development. The World Bank has been criticized for its selective use of "evidence" (Verger and Altinyelken, 2013) and short-sighted policy prescriptions (Klees, 2008). For example, for two decades before 2000, the World Bank argued that higher education had a low social return than primary education. In 2000, it admitted that the externalities of higher education (technology development, better governance, democracy,

etc.) were not taken into account in the calculation. As Klees (2008) points out:

> Thus, the Bank now admits that the returns to society from investment in higher education may be as great as or greater than for primary education. … The Bank is basically saying that it followed incorrect policies for the 1980s and 1990s, caused by a technical error, a miscalculation. How many individuals and countries have been harmed by the Bank's admitted erroneous insistence that higher education investment be curtailed and misdirected? (p. 318)

Secondly, policies such as hiring contract teachers are justified not only based on their effectiveness, but also because they do not have a significant impact on the state budget. Promoted as a "cost-effective" solution, the policy of hiring contract teachers was readily adopted by governments experiencing "budget constraints". Klees (2008) writes, "Perhaps the most disingenuous part of the justification for neoliberal policies in education and elsewhere was the creation of what the World Bank has called the "budget constraint" … The overnight "discovery" of this budget constraint or cap was pure politics" (p. 318). The case of Odisha is illustrative in this regard.

In an investigation of the dire state of health and education at the grassroots level in Odisha, journalist M. Rajshekhar has identified misplaced spending priorities as one of the contributing factors (Rajshekhar, 2015). According to his report, in the late nineties, Odisha had faced a severe financial crisis. The cyclone of 1999 had devastated the state. It was a time of low inflows, high expenditures, and excessive borrowing. The state needed 5 years to engineer a turnaround. It was during this period that the state ceased to appoint regular personnel. Since then, Odisha has maintained a conservative fiscal policy. In recent times, the government of Odisha has taken pride in its ability to consistently generate revenue surpluses (Financial Express, 2022; The New Indian Express, 2022). While the situation of the state exchequer has improved significantly over the past two decades, the situation of its contractual employees remains unchanged. The Odisha Government Contractual Employee Association (OGCEA), as well as the Odisha Junior Teachers Association (OJTA), have been voicing the demand of equal pay for equal work through strikes and social media platforms (The Samikhsya, 2022; Zee Odisha, 2022).

Finally, apart from the appeal of efficiency and cost-effectiveness, contractualisation of teachers is also an instrument of discipline and domination (Pedaci, 2010; Masquelier, 2019). In Bourdieu's (1998) view, precarity serves as a cover for the exercise of power: "Casualization of employment is part of a mode of domination of a new kind, based on the creation of a generalized and permanent state of insecurity aimed at forcing workers into submission, into the acceptance of exploitation" (p. 85). Pedaci (2010) suggests that occupational insecurity produces nonconflicting, if not entirely submissive, attitudes and behaviors. A contract worker is more likely to accept unfavorable conditions and perform tasks that exceed the workload that has been agreed upon. When it comes to education, it means that, as a result of the contractualization of the teaching workforce, governments can and do implement anti-teacher policies without much resistance, thereby intensifying the work of teachers. Sasmita depicted contractual employment as damaging. In addition to the loss of self-esteem, this damage may also imply a loss of agency in the face of state power. Despite teachers' disagreement with educational reforms and everyday management practices, they do not feel empowered to resist them.

8. Limitations and policy implications

This study explored the effect of contractual employment on a small group of teachers working in one of the districts of Odisha. The narrow focus enabled us to gather in-depth data that allowed us to argue that contractual employment has caused precarity in their lives. Researchers must however exercise caution when considering the transferability and generalizability of the findings since many context-specific factors affect participants' experience of precarity. The majority of participants in this study were from lower middle-class families living in small towns and rural areas, and all aspired upward social mobility through government employment. It is possible that a contractual position at a decent salary would not have caused them much concern. Whether and to what extent teachers experience precarity is severely influenced by their family circumstances, aspirations, and nature of contracts. Nevertheless, this study makes a strong case for reconsidering the policy of hiring contract teachers in Odisha and elsewhere. Even as early as in 1966 the ILO/UNESCO recommendation stated that "teaching should be regarded as a profession .. a form of public service which requires of teachers expert knowledge and specialized skills, acquired and maintained through rigorous and continuing study" and their "*salaries should .. reflect the importance to society of the teaching function*" (Quoted in Robertson, 2012, p. 590, emphasis added). The blind pursuit of efficiency, competitiveness, accountability and cost-effectiveness promoted by neoliberal policymakers and researchers has undermined the progressive ideals of education (Mukhopadhyay and Sarangapani, 2018) and specifically the relevance of teachers (Compton and Weiner, 2008). As the findings of the study indicate, contractual employment contributes to teacher demoralization and disempowerment in more than one way. Thus, with Mukhopadhyay and Ali (2021), we advocate educational reform efforts that act "with" teachers rather than "on" teachers (p. 1,302). Addressing the diverse dimensions of precarity in teachers' lives that can augment dignity of and a sense of security among the teachers can be a great step in this regard. Policymakers may be sensitized to the adverse impacts of contractual employment on teachers. In states such as Odisha where financial constraints no longer exist, the policy of hiring contract teachers can be abolished.

9. Conclusion

Taking into account the growing body of research on the effectiveness of contract teachers, this article posed the question of how contractual employment affects teachers themselves. The findings suggest that contractual employment contributes to precarity in the lives of teachers in six dimensions: prioritization of non-teaching work over teaching, financial hardships, sense of inferiority, anxiety about transfer, experiences of discrimination, and desire for course correction. In the face of uncertainties, teachers await the regularization of their employment. However, by that time, as one of the participants said, "the damage has already been done". We also explored why the policy of hiring contract teachers continues despite criticism and proposed that it be reconsidered.

Given the limited amount of research available concerning the effects of contractual employment on teachers, future studies may explore the extent and nature of precarity in the lives of contract teachers in diverse contexts. It is important to know whether strict enforcement of contract norms by dismissing non-performing teachers has the effect of incentivizing them, as the proponents of contract teacher hiring policy claim (Bruns et al., 2011; Kingdon et al., 2013), or it places them in more precarious positions as the present study indicates. Most importantly, as Lorey (2015, pp. 2–4), suggests, we need to investigate the "cracks and potentials for resistance', the "counter-conducts" that subvert the disciplinary power of the mode of governance through precarisation.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

This study involving human participants was reviewed and approved by the Institutional Ethics Committee of NISER Bhubaneswar. The participants provided their written informed consent to participate in this study.

Author contributions

BA is the lead researcher who conceptualized the study and collected the data. PS had a supervisory role initially and contributed to the thematic analysis. Both were involved in writing the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Do college entrance examination admission characteristics influence students' college satisfaction? Evidence from China

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Students' college satisfaction is an important part of measuring the quality of college teaching. The admission of college entrance exam is the first step for college students to enter colleges and corresponding majors. Whether they affect students' college satisfaction after enrollment is related to the formulation and adjustment of college admission strategies and training methods. This paper is based on data from students in colleges in Beijing enrolled in the fall of 2006 and 2008 and adopts propensity score matching to analyze the influence of the admitted characteristics of college entrance exams, such as whether they were accepted by their first choice. We also further explored the heterogeneity. The empirical results show that whether the student was admitted to the first-choice college has a significant positive impact on overall satisfaction and academic and nonacademic satisfaction, while whether the student was admitted to the first-choice major has no significant impact on nonacademic satisfaction. In addition, making an independent major choice has a positive effect on the improvement of overall satisfaction and academic satisfaction, and the impact on overall satisfaction is even greater than that of being admitted to the first-choice major. The impact of the admission characteristics of college entrance examinations on the satisfaction of students in liberal arts and science and students of different types of colleges and universities presents different characteristics.

KEYWORDS

college entrance examination, first choice, admitted characteristics, propensity score matching, students' college satisfaction

1. Introduction

As the main form of college admission and student enrollment in China, as well as an important channel for talent screening and social mobility, college entrance examinations are not only directly related to the applied school level, major type and future development of students but also have extraordinary significance for individuals, families, universities and even the whole higher education system.

The college admission policy is closely related to the application and admission mechanism, both of which will have a vital impact on students' admission results and college satisfaction. However, most students still follow the rule of "score matching first, major selection second" due

to a severe shortage of guidance in application and having no access to professional information before entering college (Zhang and Chen, 2015, 173–174 + 181). Moreover, students make their picks more based on the advice of parents and teachers rather than personal interests. A survey conducted by a third-party data company also shows that current majors for nearly a quarter of fresh students are not their preferred ones, and 29 percent decide to drop out because "their choices of majors do not match their expectations" (Chen, 2017).

In addition, with the continuous development of higher education marketization and the penetration of academic capitalism, the concept of service quality has gradually replaced the traditional concept of product quality and drawn researchers' attention. Similarly, indicators such as functional quality (such as the quality of service process) and technical quality (such as the quality of talent training) are also incorporated in the quality assessment of higher education. In August 2012, the Ministry of Education issued a document requiring that the status quo of students' learning satisfaction be included in the report of undergraduate teaching quality, and satisfaction has gradually become an important factor in evaluating college functions and the reference for college decision-making (Bao, 2014, 22–29 + 55).

Researchers in China have performed preliminary studies on students' college satisfaction since the 1990s, but many findings have shown that students, especially fresh students, are not quite satisfied (Fan, 2011, 43–45 + 106). This will directly or indirectly increase the risk of students developing mental health problems such as anxiety and depression (Gao et al., 2020, 292–300; Liu X.C. et al., 2022, 860–873; Cao and Liu, 2022, 1,287–1,297; Liu A. et al., 2023, 1,442–1,457). At present, studies on factors affecting students' college satisfaction mainly focus on the training process after admission, such as teaching quality and college environment, while little attention is given to the impact of the admitted characteristics of college entrance examinations. Therefore, the underlying reasons and influencing mechanisms of low satisfaction are exciting fields for exploration.

Based on the above analysis, the purpose of this paper is put forward: (1) Investigate the current situation of students' college satisfaction; (2) Investigate the relationship between students' admitted characteristics and students' college satisfaction; (3) Analyze the difference in the influence of different groups of students' admitted characteristics on students' college satisfaction; and (4) Through the statistical analysis of the survey results, the conclusion is drawn, and suggestions are put forward for students' voluntary choice of college entrance examination and universities' improvement of college satisfaction.

2. Theoretical background and literature review

2.1. Theoretical background

The theory of relative deprivation, proposed by American sociologist S.A. Stouffer and developed by R.K. Merton indicates that it is easier for individuals to generate negative cognition and subjective experience by comparing with a given standard or reference object (Xiong and Ye, 2016, 438–453). Relative deprivation consists of two parts, namely, cognition (perceived that one's expectations cannot be met) and affection (resulting in a sense of injustice, anger, and dissatisfaction; Bougie et al., 2011, 726–746). With their first choice unfulfilled and by comparing themselves with others after enrollment, students can easily generate a sense of relative deprivation, thereby reducing their satisfaction. In addition, self-decide theory (SDT) believes that individuals have the potential to make free choices after fully understanding their own needs and the surrounding environment, to stimulate internal motivation and to engage in exciting work (Zhang et al., 2010, 752–759). For students who can choose majors independently, intrinsic motivation for learning is more likely to be triggered, thereby positively affecting students' college satisfaction.

2.2. Literature review

The concept of learning satisfaction has been the focus of study ever since the 1950s. Symonds (1955) explored the influence of learner satisfaction in the field of psychology and education. It is generally defined as a feeling or attitude of learners that their desires and needs can be fulfilled in learning activities or processes (Topala and Tomozii, 2014). Learning satisfaction, as the origin of higher education quality evaluation (Wen, 2015), is increasingly receiving attention from the academic community. Learning satisfaction is an indicator to measure whether learners achieve the expected learning outcomes (Martin, 1994). College students' learning satisfaction is generally influenced at the individual and school levels. From the perspective of individual psychological factors, Liu X. et al. (2023) found that college students' belief in a just world had a positive impact on their learning satisfaction. Chun-Hsiung Huang (2021) also found that dimensions of perceived usefulness, perceived ease of use, and learning motivation are the influencing factors of learning satisfaction. At the school level, learners' satisfaction is affected by teaching mode, course content, and learning environment (Xu, 2018), and even the teaching quality (Adler et al., 2021). Teachers' pre-service preparation affects student achievement and teaching quality (Liu X.Q. et al., 2023, 69). However, there is a lack of discussion of the factors before college students' admission to college, and the key step in college entrance examination admission is selecting majors and voluntary reporting, which is likely to influence students' learning satisfaction.

The literature on college admission mainly focuses on scores and reforms of application mechanisms (Nie, 2007, 23–26), while few studies reflect on college admission itself and subsequent training by comparing the performance of students with different admission characteristics after enrollment. Existing research can be broadly divided into three categories. Therefore, the first type explores the difference between different groups in filling out the college entrance examination. Students from different family backgrounds have different subject selection strategies and college admission opportunities due to differences in social class, culture, resources, and information (Wei et al., 2019, 39–48). In particular, the professional choices of students in rural areas are severely limited and lack freedom of choice and conditions (Qiuxiang et al., 2022, 51–58; Cao et al., 2023, 131), while city students are more willing to take risks than rural students (Qian, 2022, 29–34 + 4). On the other hand, not all students can choose the major they want. Under the strict restrictions of college major admission plans, students' college entrance examination scores directly affect their eligibility for major selection. Students with score advantages have more room for major selection, while students with

score disadvantages often have to accept major adjustments to ensure admission. Thus, when filling out the major application, there is a tendency to "make the most of it," that is, some students view their college entrance examination scores as tools for major selection, not only choosing the subjects with the highest possibility of getting high scores (Chenghuo, 2018, 25–30) but also choosing the "hottest" or "best" major they can enter based on their scores, rather than their most interested major (Liao et al., 2017, 33–39 + 70).

The second type focuses on the performance of students with different admission routes and mainly studies two questions. First, the influence of the first-choice major or college on students' academic prospects and professional interest. Relevant studies have shown that the admitted characteristics profoundly affect students' subsequent development, and nonfirst-choice students (students whose colleges or majors are not their first choices) encounter extremely severe problems concerning academic adaptation, professional commitment, and mental health (Cai and Li, 2016, 66–74 + 2). One of the leading reasons is that students are dissatisfied with nonfirst-choice majors. Lower students' college satisfaction will then influence their academic achievements (Cabrera et al., 1993, 123–139), physical and mental health (Liu, 2012, 22 + 53), etc., and improving students' college satisfaction will promote and contribute to employment attitudes (Wang et al., 2013, 78–84), professional decision-making and prospects (Nauta, 2007, 446–462). However, the results show that its influence on students' future development is gradually declining (Liu and Jiang, 2019, 22–25). For major-adjusted students, their professional interest is gradually increasing, although it is much lower than that of first-choice students in the freshman year (Liu and Jiang, 2018, 53–60). Second, there are subjective matching differences among students with varied admission procedures, such as unified examination and recommended admission. The findings show that admission procedures have a significant impact on the initial state and variation trend of individual subjective matching degree (Nie et al., 2014, 38–47).

The third type focuses on the correlation between the independent selection of majors and professional satisfaction. The findings show that independent selection can promote professional satisfaction by enhancing professional commitment (Ding, 2019, 27–33). Compared with making decisions before enrollment, choosing majors after admission benefits both academic interest (Ma et al., 2017, 131–144 + 190–191) and adaptation (Bartolj and Polanec, 2012, 996–1,016) and further improves students' college satisfaction and enthusiasm. Moreover, students' education investment can be more efficient and profitable (Malamud, 2010, 359–390). Based on SDT, students' perceptions of voluntary autonomy, competence, and relatedness in academic majors fully mediate the relations between perceived faculty and peer support and major satisfaction (Schenkenfelder et al., 2020, 265–273). In addition, autonomous major choice motivation mediates the relation between autonomy-supportive parenting and academic major satisfaction, and controlled major choice motivation mediates the association between controlling parenting and academic major satisfaction (Nerona, 2021, 205–220).

Previous research provides a good foundation for this paper, but most of the analysis focuses on the impact of in-school experiences or training on satisfaction, and the basic and decisive role of the voluntary choice of college entrance examination is neglected. Previous literature has not sufficiently considered the impact of various admission characteristics on student satisfaction with college, such as whether the student is admitted to their first choice, whether it is their own choice, and whether there is an opportunity to choose their major again. Secondly, previous research has not considered the endogeneity problem caused by self-selection bias or omitted variables, which may result in overestimation or underestimation of the impact of admission characteristics on satisfaction. In addition, current research conclusions are difficult to provide specific policy recommendations and guidance for college entrance examination reform or college reform because they only generally analyze the factors affecting student satisfaction and do not specifically analyze which dimensions of student satisfaction are affected by which factors.

2.3. Research questions and hypotheses

Based on the above theory and literature analysis, this paper proposes the research questions and corresponding research hypotheses:

Question 1: How is the relationship between students' admitted characteristics and students' college satisfaction?

> The admission characteristics referred to in this study include "whether admitted to first choice major," "whether admitted to first choice school," "freedom in choosing high school aspirations," and "admission through liberal arts recruitment." Based on the above theoretical foundation and literature review, the paper argues that students who are admitted to their first choice have higher levels of satisfaction and thus higher levels of satisfaction. Similarly, students who choose their own high school aspirations have more autonomy, stick to their own interests in learning, and may also have higher levels of satisfaction. Additionally, students who are admitted through the liberal arts recruitment process may have higher levels of satisfaction due to having more time and opportunities to choose their subsequent major. As a result, this paper proposes corresponding research hypotheses.
>
> *H1.a*: Students' college satisfaction is positively and significantly affected by the first-choice college.
>
> *H1.b*: Students' college satisfaction is positively and significantly affected by the first-choice major.
>
> *H1.c*: Students' college satisfaction is positively and significantly affected by the voluntary autonomy.
>
> *H1.d*: Students' college satisfaction is positively and significantly affected by Classified recruitment.

Question 2: Is there any difference in the influence of the admitted characteristics of different groups of students on students' college satisfaction?

> The impact of admission characteristics on the satisfaction of students in different types of institutions may vary. Students in

"211 project" colleges may have higher satisfaction than those not admitted to their first choice major, as they are provided with better living conditions, academic atmosphere, and professional resources. However, the effect of being admitted to the first choice major on satisfaction may not be as obvious among students in non "211 project" schools. Similarly, the autonomy in choosing admission preferences and the admission method through broad category recruitment also result in higher satisfaction among students in "211 project" colleges. Therefore, the corresponding research hypothesis of this paper is proposed.

H2.a: Students' college satisfaction in "Project 211" colleges is affected more positively and significantly by the first-choice college.

H2.b: Students' college satisfaction in "Project 211" colleges is affected more positively and significantly by the first-choice major.

H2.c: Students' college satisfaction in "Project 211" colleges is affected more positively and significantly by voluntary autonomy.

H2.d: Students' college satisfaction in "Project 211" colleges is affected more positively and significantly by Classified recruitment.

Secondly, there may be differences in the impact of admitted characteristics on students' college satisfaction in sciences and humanities. Since science students are more professional, the level of their major rather than the ranking of their school has a greater impact on their college satisfaction. Therefore, compared with students of humanities, "being admitted by their first-choice major" may have a greater impact on the college satisfaction of science students, while "being admitted by their first-choice college" has a relatively smaller impact on the college satisfaction of science students. In addition, science students have more major categories and more choices, while students of humanities have relatively few categories, so "voluntary autonomy" may have a greater impact on the college satisfaction of science students. However, "Classified recruitment" also enables both students of sciences and humanities. to have the opportunity to choose majors again, so the influence of " Classified recruitment " on their college satisfaction may not be different.

H2.e: Sciences students' college satisfaction is affected less positively and significantly by the first-choice college.

H2.f: Sciences students' college satisfaction is affected more positively and significantly by the first-choice major.

H2.g: Sciences students' college satisfaction is affected more positively and significantly by the voluntary autonomy.

H2.h: There is no significant difference in the impact of Classified recruitment on the college satisfaction of students in sciences and humanities.

2.4. The innovation of this study

The innovation of this study is as follows. First, in terms of the measure of the independent variable, as former studies only take professional preferences into consideration when analyzing the admitted characteristics of college entrance examinations, the paper constructs a more comprehensive index to measure the admitted characteristics of college entrance examinations, including the first choices of colleges, independent selection of majors, and college admission routes. Second, in terms of measures of dependent variables, while overall satisfaction is generally used as the dependent variable in former studies, the paper expands the measurement of students' college satisfaction, which is divided into academic satisfaction and nonacademic satisfaction. The former refers to satisfaction related to teaching, scientific research and courses, and the latter refers to interpersonal relationships. Third, in terms of research methods, there are endogeneity problems in former studies, and the accuracy of empirical estimation needs further improvement. Accordingly, the propensity score matching (PSM) method is adopted partly to solve endogeneity problems and obtain more accurate estimates. Fourth, in terms of heterogeneity analysis, whereas previous studies mainly focus on differences among students in different grades, the paper further explores the heterogeneity in student groups of different types of colleges.

3. Methods

3.1. Data sources and variable selection

All data result from the "Beijing College Student Panel Survey" (BCSPS) project. Respondents are full-time undergraduates enrolled in the fall of 2006 and 2008 and from public colleges under the direct leadership of the Ministry of Education, other central ministries, and the Beijing government. On this basis, provided by the Beijing Municipal Education Commission, the database of students enrolled in the fall of 2006 and 2008 is taken as the sampling frame. Various sampling methods—stratified sampling, multistage sampling, and probability-to-scale (PPS) sampling—are adopted. Eventually, 10,684 students from 15 colleges in Beijing are drawn as samples. This paper deletes samples with singular values and missing key variables such as register changes (withdrawal, extended term suspension, school resumption), admitted characteristics, and parents' education attainment. Finally, 10,111 samples are extracted (Liu et al., 2019; Gao et al., 2022, 292–300; Liu X. et al., 2022, 1,481–1,487; Luo et al., 2022; Zhang et al., 2022).

For variable selection, this paper starts from the three perspectives of theory, science, and feasibility, on the basis of SDT, draws on the experience of previous literature and combines the availability of survey data, and selects "college entrance examination admission characteristic" as the core independent variable. Including the result of admission (whether the current college and major is the first

choice), the process of admission (voluntary autonomy), the way of admission (classified recruitment or non-classified recruitment); "overall satisfaction," "academic satisfaction" and "non-academic satisfaction" were selected as dependent variables. "Individual features," "family background," "experience in colleges," "types of colleges" and other factors that also affect students' college satisfaction are selected as control variables to solve the problem of missing variables.

3.2. Variable measurement and data description

Tables 1, 2, respectively, show the measurement method of specific variables and basic descriptive statistics, respectively. Therein, as for basic descriptive statistics, in terms of admitted characteristics, 16.74% of respondents are studying in colleges that are not their first choices; for 36.90% of respondents, their current majors are not their first choices; 52.18% of the respondents say that they are greatly influenced by parents, teachers and friends when applying for colleges and majors. In terms of individual features, males account for 51.84%; urban respondents account for 55.98%; students in sciences account for 99.24%; and students from "Project 211" colleges and key high schools account for 69.99 and 88.57%, respectively.

Table 3 presents the average satisfaction of different groups on whether the current major is the first choice. Respondents whose current majors are their first choices have higher satisfaction than those who are not. The satisfaction and academic satisfaction of males are higher than those of females, while the nonacademic satisfaction of females is higher than that of males. The satisfaction of rural students whose majors are their first choices is slightly higher than that of urban students, but it is almost the same when current majors are not their first choices. Students from "Project 211" colleges are more satisfied than those who are not, even when current majors are not their first choices. The satisfaction of students from key middle schools is higher than that of those not.

3.3. Advantages and basic steps of propensity score matching

The advantage of PSM is that it can alleviate the problems of self-selection and missing variables and obtain a more accurate estimation. The net causal effect is inaccessible to conventional multiple linear regression. The core independent variable of this paper is college entrance examination admission characteristics. Taking the independent variable "whether the current college is the first choice" as an example, it is not exogenous to a large extent but can be independently chosen, and it may be affected by variables such as family background, parents' educational attainment, types of high school, and reattendance of college entrance examinations, which also affect students' college satisfaction. If differences in satisfaction of student groups between first-choice and nonfirst-choice admission are directly compared, there may be a greater bias due to the endogenous problem caused by self-selection bias and missing variables. Therefore, first, in order to solve the problem of missing variables, we need to control the influence of these factors. The establishment of multiple regression model is one of the commonly used methods, but before setting the multiple regression model, researchers should clarify the functional relationship between X and Y. Otherwise, functional form misspecification (FFM) will occur, resulting in biased estimation coefficients. The advantage of PSM is that it does not rely on explicit model-setting assumptions, thus avoiding estimation bias due to model-setting bias. Second, in order to solve the self-selection problem, PSM will be used in this paper to match each student who is "admitted by the first choice" (intervention group) with a similar student who is "not admitted by the first choice" (control group). At this time, it can be considered that the allocation of "first choice" (intervention variable) among students is random. The difference in satisfaction between the two types of students is mainly caused by the intervention variable "whether they are the first choice or not," thus alleviating the self-selection problem and obtaining a more accurate estimation.

Propensity score matching generally consists of the following four steps. First, propensity score estimation. We identify a number of covariants that can affect both first-choice admission and students' college satisfaction. With "whether the current college and major are first choices" as the dependent variable, a logit/probit model is set to calculate each student's propensity score, namely, the probability of being admitted by their first choices. Second, propensity score matching. We adopt the 1-to-1 nearest neighbor matching method to match the student's propensity score, namely, to match each student who is admitted by his first choice with one who is not. Both have similar propensity scores. Third, balance test. One way is to look at the distribution of propensity scores before and after matching. The closer the distribution of propensity scores between the intervention group and the control group after matching, the smaller the gap between the two types of students. The second method is to estimate the difference between the two groups of students in each covariable. If the difference is not significant, it means that there is no obvious difference between the two groups of students. Finally, causal effect estimation. Because the propensity score matching method is used to eliminate the self-selection problem of "whether to be admitted as the first choice," it can be concluded that the distribution of the intervention variable, that is, "whether the current college and major are first choices," among students is random, and differences in satisfaction mainly result from the intervention variable of "whether it is the first choice."

3.4. Empirical model setting

Therefore, the following empirical model is set, and the weight is adopted for regression analysis. i and f in the model represent individual and fixed effect, respectively:

$$\begin{aligned} Satisfaction_i &= \alpha + \beta_1 * Major\_first_i + \beta_2 * School\_first_i \\ &+ \beta_3 * Autonomy_i + \beta_4 * Enroll_i + \beta_5 * Family_i \\ &+ \beta_6 * Performance_i + Grade_f + Year_f \\ &+ College_f + Track_f + Subject_f + \mu_i \end{aligned}$$

$Satisfaction_i$ represents the overall satisfaction/academic satisfaction/nonacademic satisfaction; the independent variable of $Major\_first_i$ indicates whether the current major is the first choice, which is the major concern of this paper; $School\_first_i$ indicates whether the current college is the first choice; $Autonomy_i$ indicates

TABLE 1 Measurement of specific variables.

Types of variables	Definitions of variables		Measurement of variables
Independent variable	Admitted characteristics		Whether the current college is the first choice?(Yes = 1, No = 0)
			Whether the current major is the first choice? (Yes = 1, no = 0)
			Voluntary autonomy (by oneself = 1, affected by others = 0)
			Admission routes (classified recruitment = 1, non-classified recruitment = 0)
Dependent variables	Overall satisfaction		Overall satisfaction (1-10points, 1 = highly dissatisfied, 10 = highly satisfied)
	Academic satisfaction		Overall satisfaction on academic factors (1–10points, 1 = highly dissatisfied, 10 = highly satisfied)
	Nonacademic satisfaction		Overall satisfaction on nonacademic factors (1–10points, 1 = highly dissatisfied, 10 = highly satisfied)
Controlled variables	Individual features	Gender	(Male = 1, female = 0)
		Registered residence	(Urban =1, rural = 0)
		Grade	(Freshman = 1, sophomore = 2, junior = 3, senior = 4)
		Types of high school	(Key high school = 1, regular high school = 0)
		Division of sciences and humanities in high school	(Humanities = 1, sciences = 0)
		Reattendance of college entrance examination	(Yes = 1, no = 0)
	Family background	Parents' educational attainment	No formal education = 1, primary school = 2, junior high school = 3, high school = 4, vocational/technical school = 5, technical secondary school = 6, junior college = 7, undergraduate = 8, postgraduate and above = 9
		Household income	Logarithm of the annual income
	Experiences in colleges	academic Achievements(scores)	Ranks in class (rank/class size)
		Teacher-student relationship and the relationship with classmates	Intimacy with classmates (1–10points, 1 = highly alienated, 10 = highly intimated)
			Intimacy with roommates (1–10points, 1 = highly alienated, 10 = highly intimated)
			Intimacy with teachers (1–10points, 1 = highly alienated, 10 = highly intimated)
		Academic efficacy	(Academic Efficacy Subscale in PALS， 1–5points)
		learning motivation	Achievement Goal Framework by Elliot and McGregor (2001) (external learning motivation, 1–5points)
			Achievement Goal Framework by Elliot and McGregor (2001) (internal learning motivation, 1–5points)
		Club participation	Hours devoted to club participation per semester
	Types of colleges	"Project 211"colleges = 1, others = 0	

TABLE 2 Basic descriptive statistics (%).

		Total	Choice of college		Choice of major		Voluntary autonomy		Admission routes	
			First-choice	Nonfirst-choice	First-choice	Nonfirst-choice	By oneself	By others	Classified recruitment	Non-classified recruitment
Gender	Female	48.16	39.35	8.81	30.06	18.10	21.25	26.91	0.50	47.65
	Male	51.84	43.92	7.93	33.04	18.80	26.58	25.27	0.25	51.59
Registered residence	Rural	44.02	36.93	7.09	27.72	16.30	21.61	22.41	0.18	43.84
	Urban	55.98	46.34	9.64	35.38	20.60	26.22	29.76	0.58	55.40
Types of colleges	Non "Project 211" colleges	30.01	18.35	11.66	18.50	11.51	13.68	16.33	0.15	29.86
	"Project 211" colleges	69.99	64.92	5.07	44.60	25.39	34.15	35.84	0.61	69.38
Types of high school	Regular high school	11.43	8.96	2.47	7.95	3.48	5.25	6.18	0.13	11.31
	Key high school	88.57	74.31	14.26	55.15	33.42	42.58	45.99	0.63	87.94
Division of sciences and humanities in high school	Humanities	0.76	0.71	0.0	0.45	0.30	0.61	0.15	0.10	0.66
	Sciences	99.24	82.56	16.68	62.65	36.60	51.56	47.68	0.66	98.59

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TABLE 3 Average satisfaction of different groups with the first-choice major.

		The first-choice major			Nonfirst-choice major		
		Overall satisfaction	Academic satisfaction	Nonacademic satisfaction	Overall satisfaction	Academic satisfaction	Nonacademic satisfaction
Gender	Female	6.642	6.666	6.565	6.500	6.512	6.462
	Male	6.700	6.767	6.469	6.510	6.530	6.398
Registered residence	Rural	6.717	6.770	6.540	6.522	6.539	6.467
	Urban	6.638	6.680	6.497	6.510	6.518	6.437
Types of colleges	Non "Project 211" colleges	6.112	6.124	6.074	5.982	5.966	6.044
	"Project 211" colleges	6.906	6.966	6.698	6.734	6.774	6.604
Types of high school	Regular high school	6.256	6.270	6.212	6.135	6.146	6.097
	Key high school	6.866	6.928	6.657	6.646	6.672	6.562
Division of sciences and humanities in high school	Humanities	6.734	6.745	6.699	6.647	6.648	6.662
	Sciences	6.646	6.708	6.438	6.454	6.483	6.358

the student's voluntary autonomy; $Enroll_i$ indicates whether the student's admission route is classified recruitment; $Family_i$ represents variables of family background such as income and parents' educational attainment; $Performance_i$ indicates the student's performance in colleges, such as academic achievements, self-efficacy, learning motivation, teacher-student relationship, etc.; $Grade_f$、$Year_f$、$College_f$、$Track_f$、$Subject_f$ represent the fixed effects of grade, year of enrollment, types of colleges, division of sciences and humanities in high school, and discipline categories in turn. Adding fixed effect mainly plays a role in controlling related missing variables. For example, students in the same grade, the same year of entry, the same college type, the same college entrance examination subject or the same subject category may have similar characteristics. In order to exclude the influence of these characteristics on students' college satisfaction that has not been observed, we use the fixed effect model for estimation.

4. Findings

4.1. Propensity score matching process

The results in Table 4 show that there are significant differences in characteristics before enrollment between first-choice students and nonfirst-choice students, and these variables also affect students' college satisfaction. To account for this, the propensity score matching method is used to alleviate the endogeneity problem. Logit regression results in Table 5 show the significant impact of variables other than "annual household income" and "reattendance of college entrance examination" on the variable of "whether the current college is the first choice." The 1-to-1 nearest neighbor matching method is adopted to match the propensity scores of the experimental group (first-choice admission) with the control group (nonfirst-choice admission) 2. Then, the standard deviation for most covariants between the experimental group and the control group drops to within 10%, and there are no longer significant differences.

Meanwhile, Figure 1 shows that there are differences between the first-choice group and nonfirst-choice group before matching, but there is enough overlap (samples of common value) for matching. The comparability of the two groups was significantly improved after matching.

4.2. Overall impact of the admitted characteristics of college entrance examinations on students' college satisfaction

Table 6 presents the impact of variables of the total sample on overall college satisfaction, academic satisfaction, and nonacademic satisfaction. Meanwhile, the regression results of OLS (Ordinary Least Squares) and PSM are also compared, indicating that OLS overestimates the impact of the first choice on satisfaction promotion, whereas PSM effectively alleviates the estimation bias caused by selection bias to some extent.

The empirical research shows that all three types of satisfaction are affected positively and significantly by the first-choice college (Hypothesis 1.a is tested), while first-choice major has no significant impact on nonacademic satisfaction, indicating that students still

10.3389/fpsyg.2023.1115867

TABLE 4 Differences in characteristics between first-choice students and nonfirst-choice students.

	Nonfirst-choice major	First-choice major	*D*-value	Nonfirst-choice college	First-choice college	*D*-value
	(M/S.D.)	(M/S.D.)	(Coefficient/S.E)	(M/S.D.)	(M/S.D.)	(Coefficient/S.E)
Overall satisfaction	6.466	6.694	−0.227***	6.082	6.716	−0.634***
	(1.739)	(1.808)	(0.037)	(1.616)	(1.800)	(0.047)
Academic satisfaction	6.497	6.740	−0.243***	6.110	6.759	−0.650***
	(1.837)	(1.953)	(0.039)	(1.699)	(1.936)	(0.051)
Nonacademic satisfaction	6.343	6.466	−0.123**	5.974	6.511	−0.537***
	(1.970)	(2.004)	(0.041)	(1.879)	(2.002)	(0.053)
Nation	0.879	0.890	−0.011	0.907	0.881	0.026**
	(0.327)	(0.314)	(0.007)	(0.291)	(0.324)	(0.008)
Registered residence	0.567	0.571	−0.003	0.590	0.565	0.024
	(0.495)	(0.495)	(0.010)	(0.492)	(0.496)	(0.013)
Father's educational attainment	5.491	5.541	−0.050	5.305	5.566	−0.261***
	(2.236)	(2.287)	(0.047)	(2.222)	(2.275)	(0.060)
Mother's educational attainment	5.075	5.025	0.050	4.988	5.054	−0.067
	(2.258)	(2.259)	(0.047)	(2.207)	(2.269)	(0.060)
Types of high school	0.714	0.682	0.032***	0.668	0.699	−0.031*
	(0.452)	(0.466)	(0.009)	(0.471)	(0.459)	(0.012)
Scores of college entrance examination	576.300	577.735	−1.435	538.388	585.067	−46.679***
	(74.220)	(83.713)	(1.660)	(69.842)	(80.009)	(2.093)
Reattendance of college entrance examination	0.165	0.185	−0.020*	0.149	0.183	−0.034***
	(0.371)	(0.388)	(0.008)	(0.356)	(0.387)	(0.010)
	8.928	8.902	0.025	9.014	8.891	0.123
	(3.662)	(3.671)	(0.076)	(3.614)	(3.678)	(0.098)
Logarithm of annual household income	3,743	6,368	10,111	1,696	8,415	10,111

attach great importance to the first-choice college. In contrast, first-choice major has only a minor impact on overall satisfaction and has nonsignificant impact on college nonacademic satisfaction (Hypothesis 1.b is partially verified). In addition, the variable "choosing major independently" also contributes to the promotion of overall satisfaction and academic satisfaction, and its influence on overall satisfaction is even greater than that of the first-choice major (Hypothesis 1.c is tested). Choosing a major according to classified categories (that is, the major is not yet decided at the time of admission and will be determined after enrollment) has no significant effect on satisfaction promotion (Hypothesis 1.d is not tested).

Meanwhile, empirical research also shows that stronger intrinsic learning motivation, higher academic achievements and stronger self-efficacy can greatly promote students' college satisfaction, while extrinsic learning motivation has no notable influence. Moreover, the more intimate the relationship between students and their classmates and roommates, the higher overall satisfaction will be. This effect will even exceed that of the relationship with teachers, which is consistent with research findings by Yuheng et al. (2016). They also found that interpersonal relationships with peers and teachers are key factors in students' college satisfaction.

4.3. Heterogeneous influence of the characteristics of college entrance examinations on students' college satisfaction

Table 7 shows the influence of the characteristics of college entrance examinations on the satisfaction of different student groups. In terms of the heterogeneity of college types, the satisfaction of students in non "Project 211" colleges is significantly and positively affected by the first-choice college, while the first-choice major has no significant effect on students' college satisfaction. However, for students in "Project 211″ colleges, their satisfaction is positively affected by both the first-choice college and the first-choice major, and only nonacademic satisfaction is not affected by the first-choice major (Hypothesis 2.a & 2.b is partially verified). In addition, "voluntary autonomy" can promote the overall satisfaction and academic satisfaction of students in non "Project 211″ colleges and has a positive

TABLE 5 Estimation and matching results of propensity score (taking "whether the current college is the first choice" as an example).

Variable	Logit regression	Before matching	Mean		SD (%)	Deviation reduction (%)	*T*-test	
		After matching	Control group	Experimental group			*t*	*p*>*t*
Nation	−0.147***	U	0.90632	0.88108	8.2	90.5	2.96	0.003
	(0.055)	M	0.90632	0.90871	−0.8		−0.24	0.812
Registered residence	−0.024	U	0.58711	0.5639	4.7	87.1	1.75	0.08
	(0.040)	M	0.58711	0.58413	0.6		0.18	0.861
Father's educational attainment	0.031***	U	5.2977	5.5571	−11.5	94	−4.28	0
	(0.011)	M	5.2977	5.2822	0.7		0.2	0.84
mother's educational attainment	−0.006	U	4.9827	5.0456	−2.8	64	−1.04	0.298
	(0.012)	M	4.9827	4.96	1		0.3	0.766
Types of high school	−0.122***	U	0.66885	0.70059	−6.8	69.9	−2.58	0.01
	(0.039)	M	0.66885	0.6784	−2.1		−0.59	0.556
Reattendance of college entrance examination	0.145***	U	0.14797	0.18361	−9.6	98.3	−3.48	0
	(0.045)	M	0.14797	0.14857	−0.2		−0.05	0.961
Annual household income	0.000	U	62,091	66,642	−1.6	31.9	−0.48	0.629
	(0.000)	M	62,091	58,991	1.1		0.86	0.391

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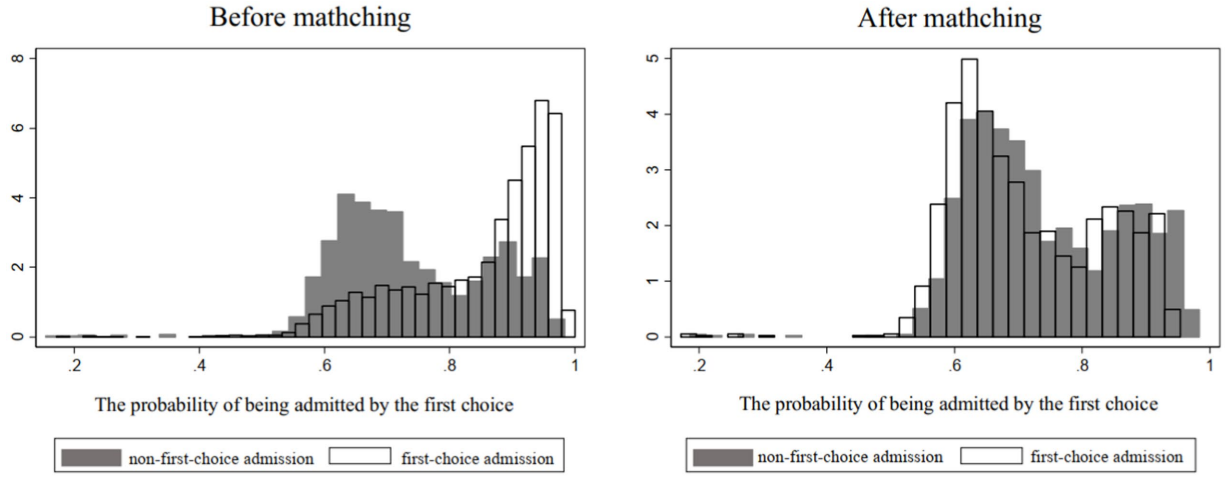

FIGURE 1
Samples before and after matching.

impact on the nonacademic satisfaction of students in "Project 211" colleges (Hypothesis 2.c is not tested). Classified recruitment has a positive effect on all three types of satisfaction in "Project 211" colleges (Hypothesis 2.d is tested) but has a negative impact on the nonacademic satisfaction of students in non "Project 211" colleges.

In terms of the heterogeneity of students in sciences and humanities, it can be found that both the first-choice major and voluntary autonomy have a great and positive impact on science students (Hypothesis 2.f & 2.g is tested), while the first-choice college greatly impacts students of humanities (Hypothesis 2.e is tested). Possible reasons are that sciences students focus more on voluntary autonomy, while students of humanities attach more importance to types of colleges. Additionally, classified recruitment has no significant influence on the students' college satisfaction in sciences and humanities (Hypothesis 2.h is tested).

4.4. The influence of cross-category adjustment on students' college satisfaction

This paper further analyzes the student group whose current majors are not their first choices and divides the students' current majors into corresponding fields of study in two ways. In one way, they are divided into the group of humanities and social sciences and the group of engineering, agriculture, and medical science. In other words, they are divided into seven subcategories: social sciences, liberal arts, sciences, agricultural science, agriculture, medical science, and management. If the first-choice major and the current major of nonfirst-choice students are divided into different categories according to the first sorting technique, they are classified into the cross-category class (cross-category = 1). If they are divided into the same category, then they are classified into the noncross-category class (noncross-category = 0). Similarly, there are cross-category classes and noncross-category classes in the second method. However, the difference is that the first-choice majors and their current majors of students who are classified into the cross-category class in the first method vary greatly, while the first-choice majors and current majors of students who are classified into the cross-category class in the second method actually have minor differences. Hence, the analysis mainly explores the current situation of satisfaction of students whose current majors are not their first choices in the case of different categories of current major and the first-choice major.

The empirical results in Table 8 indicate that both the larger cross-category class and the minor cross-category class have a significant negative impact on the academic satisfaction of the total sample, but the impact on nonacademic satisfaction is not significant. Moreover, the larger cross-category class has a significant negative impact on overall satisfaction, while the minor cross-category class does not. The regression results of the subsamples show that both the larger cross-category class and the minor cross-category class have a significant negative impact on students' college satisfaction in "Project 211" colleges but have no significant impact on students in non "Project 211" colleges. In addition, the minor cross-category class has a significant negative impact on liberal arts students, while the larger cross-category class has a significant negative impact on science students.

5. Conclusion and discussion

Based on the follow-up survey data of undergraduates in 15 colleges in Beijing, this paper adopts the propensity score matching method to analyze the influence of the admitted characteristics of college entrance examinations—whether the current college and major are first choices and whether to make a choice independently—on undergraduates' satisfaction. It further explores differences between student groups at different institutional levels and of different disciplines (liberal arts or sciences) and the impact of the span between the first-choice major and current major on students' college satisfaction of students not admitted by the first choice. According to the empirical findings, the following five conclusions can be drawn:

First, both the first-choice college and voluntary autonomy have a significant impact on students' college satisfaction. Therefore, the first-choice college has a significant and positive impact on all three types of satisfaction, while the first-choice major has no significant

TABLE 6 Regression results of the total sample.

		Overall satisfaction		Academic satisfaction		Nonacademic satisfaction	
		OLS	PSM	OLS	PSM	OLS	PSM
Admitted characteristics	The first-choice major	0.164***	0.108*	0.181***	0.138**	0.066	0.001
		(0.037)	(0.060)	(0.039)	(0.063)	(0.042)	(0.070)
	The first-choice college	0.282***	0.266***	0.275***	0.237***	0.279***	0.360***
		(0.049)	(0.063)	(0.052)	(0.067)	(0.056)	(0.073)
	Choosing major independently	0.071**	0.114**	0.077**	0.121**	0.046	0.100
		(0.034)	(0.057)	(0.037)	(0.060)	(0.039)	(0.066)
	Classified recruitment	0.249	0.117	0.279	0.304	0.202	−0.529
		(0.245)	(0.434)	(0.246)	(0.396)	(0.321)	(0.668)
Individual features	Male	−0.151***	−0.187***	−0.165***	−0.218***	−0.120***	−0.101
		(0.040)	(0.065)	(0.043)	(0.069)	(0.045)	(0.076)
	Han	0.118**	0.093	0.124**	0.087	0.034	0.034
		(0.058)	(0.103)	(0.062)	(0.108)	(0.064)	(0.117)
	Urban area	−0.087**	−0.069	−0.083*	−0.015	−0.123**	−0.200**
		(0.043)	(0.069)	(0.046)	(0.074)	(0.048)	(0.081)
	Key high school	0.166***	0.191**	0.178***	0.198**	0.148**	0.236**
		(0.059)	(0.084)	(0.063)	(0.088)	(0.065)	(0.097)
	Reattendance of college entrance examination	−0.064	−0.071	−0.068	−0.046	−0.065	−0.102
		(0.047)	(0.081)	(0.050)	(0.085)	(0.052)	(0.094)
	Score of college entrance examination	0.003***	0.001**	0.003***	0.002***	0.002***	0.001
		(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
	Father's educational attainment	0.023**	0.016	0.026**	0.020	0.001	0.014
		(0.012)	(0.020)	(0.012)	(0.021)	(0.013)	(0.022)
	Mother's educational attainment	−0.025**	−0.063***	−0.024*	−0.065***	−0.021	−0.055**
		(0.012)	(0.021)	(0.013)	(0.022)	(0.014)	(0.023)
	Annual household income	−0.028	−0.053*	−0.027	−0.049*	−0.031*	−0.062**
		(0.017)	(0.027)	(0.018)	(0.028)	(0.019)	(0.028)
Experience in college	Intrinsic learning motivation	0.041***	0.043***	0.041***	0.044***	0.035***	0.028***
		(0.005)	(0.008)	(0.005)	(0.008)	(0.005)	(0.009)
	Extrinsic learning motivation	−0.004	−0.000	−0.005	−0.002	0.002	0.015
		(0.005)	(0.009)	(0.006)	(0.009)	(0.006)	(0.010)
	Ranks in academic achievements	−0.022***	−0.046***	−0.027***	−0.056***	−0.011	−0.018
		(0.008)	(0.014)	(0.009)	(0.014)	(0.009)	(0.016)
	Self-efficacy	0.142***	0.195***	0.145***	0.218***	0.117***	0.122*
		(0.038)	(0.063)	(0.041)	(0.067)	(0.043)	(0.071)
	Intimacy with classmates	0.538***	0.499***	0.548***	0.529***	0.511***	0.409**
		(0.086)	(0.135)	(0.091)	(0.141)	(0.099)	(0.162)
	Intimacy with roommates	0.413***	0.519***	0.370***	0.469***	0.574***	0.687***
		(0.053)	(0.088)	(0.057)	(0.094)	(0.060)	(0.102)
	Intimacy with teachers	0.390***	0.518***	0.304***	0.442***	0.705***	0.804***
		(0.066)	(0.110)	(0.071)	(0.116)	(0.073)	(0.120)
	Hours devoted to club participation	0.007***	0.008***	0.006***	0.006**	0.009***	0.010***
		(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.004)
Observation		9,788	3,277	9,806	3,281	9,785	3,276
R^2		0.163	0.183	0.154	0.178	0.127	0.148

(1). ***Denotes the significance of 0.01; **denotes the significance of 0.05; *denotes the significance of 0.10. Values in brackets are standard errors. Similarly, hereinafter. (2). All models are set with grades, year of enrollment, types of colleges, discipline categories, and division of sciences and humanities in high school under control.

TABLE 7 The influence of college entrance examination admission characteristics on students'college satisfaction in different groups.

Types of colleges		Non "Project 211" colleges (*N*=2039)			"Project 211" colleges (*N*=1,241)		
		Overall satisfaction	Academic satisfaction	Nonacademic satisfaction	Overall satisfaction	Academic satisfaction	Nonacademic satisfaction
Admitted characteristics	The first-choice major	0.007	0.034	−0.073	0.221**	0.263**	0.062
		(0.076)	(0.079)	(0.090)	(0.101)	(0.109)	(0.117)
	The first-choice college	0.228***	0.188**	0.341***	0.257**	0.250**	0.319***
		(0.081)	(0.085)	(0.093)	(0.104)	(0.114)	(0.122)
	Voluntary autonomy	0.125*	0.142*	0.032	0.151	0.140	0.254**
		(0.072)	(0.075)	(0.086)	(0.099)	(0.106)	(0.113)
	Classified recruitment	−0.687	−0.320	−1.998***	2.117***	1.944***	2.755***
		(0.449)	(0.422)	(0.677)	(0.361)	(0.331)	(0.754)
Sciences/humanities		Humanities (*N* = 838)			Sciences (*N* = 2,443)		
		Overall satisfaction	Academic satisfaction	Nonacademic satisfaction	Overall satisfaction	Academic satisfaction	Nonacademic satisfaction
Admitted characteristics	The first-choice major	0.084	0.091	0.060	0.125*	0.157**	−0.009
		(0.136)	(0.144)	(0.150)	(0.068)	(0.072)	(0.081)
	The first-choice college	0.589***	0.604***	0.544***	0.165**	0.126	0.295***
		(0.135)	(0.142)	(0.150)	(0.073)	(0.079)	(0.086)
	Voluntary autonomy	0.030	0.053	−0.055	0.133**	0.135*	0.150*
		(0.132)	(0.139)	(0.147)	(0.065)	(0.069)	(0.077)
	Classified recruitment	−0.584	−0.617	−0.469	−0.023	0.326	−1.181
		(0.599)	(0.608)	(0.646)	(0.540)	(0.499)	(0.783)

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TABLE 8 Impacts of the characteristics of college entrance examinations on the satisfaction of students whose current majors are not their first choices.

Total sample (*N*=3,607)		Overall satisfaction		Academic satisfaction		Nonacademic satisfaction	
Admitted characteristics	The first-choice college	0.257***	0.255***	0.228***	0.226***	0.313***	0.314***
		(0.074)	(0.074)	(0.078)	(0.078)	(0.087)	(0.087)
	Voluntary autonomy	0.065	0.064	0.037	0.036	0.103	0.104
		(0.057)	(0.057)	(0.060)	(0.060)	(0.065)	(0.065)
	Classified recruitment	1.072**	1.022**	1.288***	1.216**	0.404	0.452
		(0.509)	(0.509)	(0.474)	(0.474)	(0.717)	(0.716)
	Larger cross-category class	−0.123*		−0.174**		0.097	
		(0.070)		(0.074)		(0.081)	
	Minor cross-category class		−0.098		−0.135*		0.052
			(0.067)		(0.071)		(0.077)
Non"Project 211"colleges (*N*=1,108)		Overall satisfaction		Academic satisfaction		Nonacademic satisfaction	
Admitted characteristics	The first-choice major	0.199*	0.199*	0.148	0.149	0.383***	0.381***
		(0.118)	(0.118)	(0.122)	(0.122)	(0.136)	(0.136)
	Voluntary autonomy	0.164	0.164	0.145	0.147	0.221*	0.218*
		(0.108)	(0.108)	(0.113)	(0.113)	(0.125)	(0.125)
	Classified recruitment	−0.312	−0.329	0.020	−0.024	−1.479	−1.404
		(0.727)	(0.724)	(0.681)	(0.678)	(1.030)	(1.029)
	Larger cross-category class	−0.028		−0.074		0.132	
		(0.123)		(0.128)		(0.143)	
	Minor cross-category class		0.015		0.007		0.038
			(0.120)		(0.125)		(0.136)
"Project 211"colleges (*N*=2,499)		Overall satisfaction		Academic satisfaction		Nonacademic satisfaction	
Admitted characteristics	The first-choice college	0.171*	0.165*	0.146	0.139	0.151	0.153
		(0.100)	(0.100)	(0.106)	(0.106)	(0.120)	(0.120)
	Voluntary autonomy	0.051	0.048	0.014	0.009	0.105	0.106
		(0.068)	(0.068)	(0.073)	(0.073)	(0.078)	(0.078)
	Classified recruitment	2.570***	2.514***	2.638***	2.571***	2.533***	2.557***
		(0.244)	(0.238)	(0.259)	(0.255)	(0.280)	(0.280)
	Larger cross-category class	−0.172*		−0.214**		0.065	
		(0.089)		(0.096)		(0.104)	
	Minor cross-category class		−0.127		−0.161*		0.042
			(0.086)		(0.091)		(0.100)
Liberal arts students (*N*=842)		Overall satisfaction		Academic satisfaction		Nonacademic satisfaction	
Admitted characteristics	The first-choice major	0.332*	0.330*	0.339*	0.337*	0.272	0.275
		(0.184)	(0.184)	(0.193)	(0.193)	(0.212)	(0.211)
	Voluntary autonomy	−0.075	−0.071	−0.146	−0.142	0.071	0.074
		(0.135)	(0.134)	(0.144)	(0.144)	(0.154)	(0.154)
	Classified recruitment	4.013***	3.985***	4.146***	4.116***	3.534***	3.491***
		(0.921)	(0.913)	(0.964)	(0.956)	(0.878)	(0.876)
	Larger cross-category class	0.157		0.177		0.357	
		(0.310)		(0.350)		(0.297)	
	Minor cross-category class		−0.315**		−0.297*		−0.267
			(0.151)		(0.163)		(0.170)

(Continued)

TABLE 8 (Continued)

Science students (*N*=2,765)		Overall satisfaction		Academic satisfaction		Nonacademic satisfaction	
Admitted characteristics	The first-choice college	0.190**	0.189**	0.147*	0.144	0.277***	0.279***
		(0.084)	(0.084)	(0.089)	(0.089)	(0.099)	(0.099)
	Voluntary autonomy	0.065	0.064	0.041	0.040	0.099	0.101
		(0.064)	(0.064)	(0.068)	(0.068)	(0.073)	(0.073)
	Classified recruitment	1.120**	1.046*	1.363***	1.272**	0.347	0.351
		(0.558)	(0.557)	(0.521)	(0.522)	(0.775)	(0.770)
	Larger cross-category class	−0.149**		−0.202***		0.067	
		(0.074)		(0.078)		(0.086)	
	Minor cross-category class		−0.057		−0.107		0.111
			(0.078)		(0.083)		(0.089)

impact on nonacademic satisfaction, indicating that students still attach great importance to whether they are admitted by ideal colleges rather than preferred majors. Voluntary autonomy can greatly improve overall satisfaction and academic satisfaction, and its impact on overall satisfaction is even greater than that of the first-choice major, which indicates that students focus more on voluntary autonomy. This indicates that during the voluntary selection process of the entrance exam, students have both the desire for autonomous choice and the aspiration to enter a prestigious university, which is consistent with previous research findings Ding, 2019. In comparison, the impact of being admitted to the first-choice major they selected on their satisfaction is minimal.

Second, peer relations at the undergraduate level will greatly promote students' college satisfaction. The more intimate the relationship between students and their classmates and roommates, the higher the overall satisfaction will be. This effect even exceeds that of intimacy with teachers. This is similar to previous research findings that students are more likely to have deeper communication with their peers who share the same living environment and growth stage. On the other hand, fresh students who are away from their families and in an unfamiliar environment have not yet formed a stable network of relationships, and they mainly engage in learning and social activities with similar peers. When facing adaptive problems such as learning and life, they tend to seek advice from their peers and quickly solve problems. The role of peer interaction even surpasses the influence of teacher-student interaction, and universities should pay attention to and give full play to the important role of student peers in the student development process.

Third, there are differences in students' college satisfaction at the institution level. Students' college satisfaction in non "Project 211" colleges is positively affected by the first-choice college but not by the first-choice major. In contrast, students' college satisfaction in "Project 211" colleges is positively affected by both the first-choice college and the first-choice major. The reason is that, on the one hand, students in non "Project 211" colleges are more concerned about whether they have been admitted to higher-level colleges, and on the other hand, they have more choices due to their higher scores on the college entrance examination. In addition, classified recruitment promotes all three types of satisfaction in "Project 211" colleges, but it negatively impacts nonacademic satisfaction in non"Project 211" colleges, which indicates that classified recruitment is probably not suitable for all colleges and universities.

Fourth, different admitted characteristics have different impacts on the students of liberal arts and sciences. The first-choice major and voluntary autonomy greatly and positively impact science students, while the first-choice college has a greater impact on liberal arts students. It follows then that science students pay more attention to voluntary autonomy and majors, while liberal arts students attach great importance to colleges. The possible reason is that science students are more professional, so they pay more attention to whether the current major is the first choice, while liberal arts students pay more attention to the brands of colleges in employment. The possible reason is that in the labor market, students in liberal arts majors are more replaceable due to their weaker professional skills. However, university rankings can compensate for and mitigate this employment disadvantage to some extent, leading to liberal arts students being more focused on the level of the university rather than the type of major when filling out college entrance examination plans. This also implies that in future policy reforms, universities should both enhance the core competitiveness and professional literacy of liberal arts students from an academic perspective and reduce discrimination against liberal arts majors from an employment perspective.

Fifth, adjustments of both large-span class and small-span class have a significant and negative impact on academic satisfaction but have no significant impact on nonacademic satisfaction. The regression results of subsamples show that both large-span and small-span adjustments have a significant and negative impact on students' college satisfaction in "Project 211" colleges but have no significant impact on students in non "Project 211" colleges. Small-span class adjustment has a significant and negative impact on liberal arts students, while large-span class adjustment has a significant and negative impact on science students.

Based on the findings above, this paper proposes the following three suggestions.

First, students should follow their inner voice when applying for colleges and majors and rationally perceive the "halo" effect of famous colleges. Voluntary autonomy can largely improve students' college satisfaction. College candidates are prone to be influenced by high school teachers and parents when filling out application forms. Blindly following others' advice rather than the inner voice, students will generate persistent dissatisfaction after enrollment and thereafter will affect their academic achievements and physical and psychological health in colleges. Meanwhile, whether the current

college is the first choice is a key factor affecting students' college satisfaction in non "Project 211" colleges. Students should reasonably recognize the "halo" effect of famous colleges and continuously strengthen their professional disciplines and skills to compensate for the dissatisfaction caused by nonfirst-choice colleges.

Second, colleges and universities should emphasize the training and cultivation of students' interpersonal communication with classmates and teachers. Students' college satisfaction is a key indicator to measure the quality of talent training. Colleges and universities should focus on cultivating self-efficacy and intrinsic learning motivation in terms of curriculum setting, teaching methods, and scientific research activities to improve students' college satisfaction. At the same time, colleges and universities should vigorously promote communication and exchanges between students and their classmates, roommates, and teachers and pay attention to peer relationships in club activities and accommodation management. A good peer relationship and teacher-student relationship are beneficial to students' college satisfaction and facilitate academic prospects and career choices.

Finally, the administrative department of education and colleges should fully understand the rationality and limitations of classified recruitment and establish the concept of scientific decision-making in a new scheme of college entrance examination. There is rationality for the implementation of the classified recruitment, but it should not be a "one-size-fits-all" approach. Classified recruitment has a significant positive impact on students' college satisfaction in "Project 211" colleges but has a negative impact on the nonacademic satisfaction of students in non"Project 211" colleges. Therefore, the needs of students at different levels of colleges should be fully recognized when administrative departments of education and universities formulate admissions policies. At the same time, in the new scheme of college entrance examination, there is flexibility and diversity in rules for voluntary admissions, but the scientific nature of policy formulation must also be taken into account. Both large-span and small-span adjustments have a significant negative impact on academic satisfaction, but factors such as institution level and division of liberal arts and sciences will further have different effects on admission results. Therefore, adjustment and admission should further depend on factors of disciplines, colleges, etc.

However, there are deficiencies in this study, which need further improvement and perfection in future research. First, due to sample limitations, that is, research objects are mainly students from colleges in Beijing, the extensibility of research conclusions may need further consideration. Second, the influencing mechanism of whether students are admitted by the first choice on students' college satisfaction needs to be further explored by subsequent quantitative research or qualitative interviews. Third, it should be noted that since students from "project 211" colleges account for a large proportion in the sample, the phenomenon reflected in this paper and the law revealed may be mainly the growth process of students in key universities, and its extensibility remains to be discussed.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary materials, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by The Ethics Committee of Tianjin University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

YH and XL designed the study; YH, MH, HW, ZC, and XL wrote the manuscript and managed the literature analyses. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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Tutors' chronological age and characteristics as predictors of creative nurturing behavior in the 21st-century classroom

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Introduction: The study examined tutors' characteristics and chronological age as they influenced their creativity nurturing behaviors.

Methods: The descriptive cross-sectional design was used to survey 340 tutors (male = 220, female = 120) from 16 colleges of education. The data for the study were gathered using adapted versions of teachers' characteristics and creativity nurturing behaviors scales. The data were analyzed inferentially.

Results: The study revealed that tutors' characteristics influenced their creativity nurturing behaviors and teachers with 30 years and above of teaching could influence their creativity nurturing behaviors. Differences were established in tutors' creativity nurturing behaviors based on their experience but such were not found in tutors' characteristics.

Discussion: It was concluded that tutors' characteristics and age are two key drivers of their creative abilities in the 21st century classroom. Therefore, management of teacher training institutions must cultivate an appreciable and appropriate tutor characteristics and dispositions so that they can use them to nurture trainee-teachers.

KEYWORDS

chronological age, creativity, tutor, characteristics, behavior, 21st century

1. Introduction

Just as "actions speak louder than words," tutors' practical actions have a profound effect on those they teach. The contribution of tutors' teaching to the lives of those they teach stands unabated (Soh, 2015; Chen and Yuan, 2021). The 21st-century classroom demands a shift from the traditional way of teaching because it has outlived its essence and effectiveness given the diversity and varied needs among learners in the learning environment. To cater for this diversity in the classroom and to meet the demands of contemporary classroom engagement, there is a need for tutors to engage in creativity nurturing behaviors. According to Hu et al. (2016) and Chen and Yuan (2021), tutors' creativity nurturing behaviors are important skills that can be applied effectively to improve student's learning through the development of necessary mental and affective skills. According to Davis (2013) and Sharma (2017), educational institutions nurture learners' future competitive advantage by promoting creative teaching. Similarly, Karpudewan and Chong Keat (2017) argue that the educational system must facilitate the transition process of producing a future workforce equipped with the knowledge and creative skills to meet the challenges of the 21st century. In this

context, tutors' creativity nurturing behavior is an integral component in the educational development of learners. Creative nurturing behavior is about teachers themselves being creative to cultivate students' creative potential (Apak et al., 2021). Literature shows that the creativity nurturing behavior of tutors is an important characteristic that helps young people to develop a level of adaptability so that they can become part of an effective future workforce (Fazelian and Azimi, 2013). According to Göncz (2017), several research areas in education examine various facets of the teaching profession and the characteristics of tutors. For example, according to Rosić (2011), deontology and pedeutology focus specifically on pedagogy. While deontology is concerned with tutors' responsibilities and rights in relation to their students, pedeutology deals with the characteristics of tutors as defined by their roles. Even though it is generally agreed that tutors' characteristics are the most important and complicated factors in education (Walker, 2008; Göncz, 2017; Apak et al., 2021), and because studying tutors' characteristics is the sole responsibility of psychological research, there are no research fields in education that are specifically focused on the teaching profession. Even in educational psychology, the role of tutors' characteristics is typically emphasized only in research addressing their classroom management styles (Djigic and Stojiljkovic, 2011; Barni et al., 2018; Debbag and Fidan, 2020) and school docimology (the study of how knowledge is assessed and measured in the classroom) (Lee and Liu, 2010; Kersting et al., 2012; Bailey et al., 2014).

Sternberg (2003) indicates that though several learning and developmental theories position learners' development as an aspect of creativity, they lose their focus on creativity and eventually learners are not nurtured in it because of insufficient encouragement and lack of school system support (Hui et al., 2015; Asih, 2019). Meanwhile, irrespective of the global acclamation and interest in nurturing creativity through teaching, some researchers argue that the learning environment does not appear to be conducive and stimulating enough for nurturing creativity in learners (Plucker et al., 2004; Beghetto and Kaufman, 2014; Richardson and Mishra, 2018; Asih, 2019). This situation is attributed to several factors including teacher-focused approaches and the exactness of students' feedback at the expense of competencies and abilities (Stojanova, 2010; Hui et al., 2015). Such findings have led to the re-focus of research on creativity among tutors in the process of nurturing creative abilities in their learners (Bocconi et al., 2012; Daskolia et al., 2012). Tutors spend a considerable amount of their occupational time with their learners, and therefore they play a critical role in enabling or impeding the creative abilities of their learners in teaching and learning engagements (Asih, 2019). Furthermore, creativity nurturing behaviors of tutors depend on their characteristics and their understanding of what creativity entails, and their age (Bramwell et al., 2011; Cropley and Cropley, 2013; Chan, 2015; Runco, 2015).

According to Hanushek (2010), teacher characteristics include personality traits, knowledge, abilities, experience, values, and beliefs in executing their professional mandate. These characteristics are very important to the success and otherwise of the teaching profession. According to Orlando (2013), to be a great teacher, one must constantly work very hard to provide a nurturing and challenging environment to their students to foster maximum learning. This is because teaching is not an easy occupation, and some tutors can never be excellent and stay at a medium level of competency in teaching. For any positive progress to be made in every educational landscape, tutors must possess the characteristics discussed above. Rosemarin (2009, p.195) states, "In order to initiate and implement a major paradigm shift from a traditional school to an effective learning community, the tutors should take the position of leaders who possess the characteristics such as creativity, efficiency, flexibility, being lifelong learners, having a sense of humor, willing to take responsible risks, and having good intrapersonal and interpersonal sense and skills."

1.1. Tutors' characteristics and creativity nurturing behaviors

Being a teacher goes beyond mastery of content, planning the teaching process, and imparting knowledge to the learners. Teaching involves the manifestation of professional attitudes, improvisation of strategies, modeling students in a novel way, and imparting knowledge in a unique and creative manner. These abilities combined are termed teacher characteristics. They are at the core of every teacher and serve enormous functions as teachers interact with students, families, community members, and professional colleagues. The teachers' role in the 21st-century classroom is unabated as they are the most effective agents for change and nurturing creativity in the classroom (Sellars, 2012; Ibrahim and Don, 2014). They are fundamental to the 21st-century education system that needs to facilitate the transition process of producing a future workforce that is equipped with innovative ideas, knowledge, and skills to face the ever-expanding challenges of the current century (Karpudewan and Chong Keat, 2017). There is a demand for the improvement of students' academic achievement, which is positively linked with teachers' characteristics and age. This demand is based on credible evidence that supports teachers' professional growth and practice in nurturing creativity and could lead to the improvement of academic and behavioral outcomes for all learners (Darling-Hammond et al., 2009; Wong and Wong, 2009; Algozzine et al., 2011). It is important to note that creative nurturing behaviors are not documented like other observed abilities because they are latent in nature. Several efforts have been made previously to understand how these undistinguishable creative abilities of teachers relate to their characteristics and dispositional factors for effective instruction in the classroom (Byers-Kirsch and Bartel, 2015).

Tutors' characteristics can stimulate their attribution processes, which can serve as a driver for the development of creative mindsets. In a study, McNatt and Judge (2004) emphasized that the expectations of others can reshape and validate individuals' views about themselves. In a similar vein, Craft and Chappell (2016) argued that tutors' creative nurturing behaviors could be influenced by their attitudes. Farmer' et al. (2003) found that individual characteristics could significantly determine tutors' creative nurturing behaviors. Tutors who experience linear and caring relationships with others in the learning settings perceive themselves with a higher level of support that improves their characteristics (personal significance). This positive orientation of tutors' characteristics, in turn, makes them more favored in their professional practice. It is believed that tutors who understand

the parameters of their authority within the learning setting are provided with opportunities to exhibit creativity spontaneously, try new things comfortably, and pursue professional goals with invigorated motivation (Hunzicker et al., 2009).

1.2. Tutors' age and creativity nurturing behaviors

Research linking age and tutors' creativity nurturing behaviors appears to be scarce, inconclusive, and heterogeneous. Kinai (2013) surveyed Kenyan student teachers on creative teaching and the relationship between their gender, age, and teaching experience, and found no significant effect of teachers' age on their creativity in teaching. In another study of 70 Iranian teachers, Khodabandeh and Jamali (2019) investigated the relationship between their creative teaching behaviors and their age. Their study revealed that teachers' age did not affect their creative teaching behaviors. On the contrary, Ng and Feldman (2013) found that teachers' age was related to their creative teaching abilities, while Thurlings et al. (2015) observed that teachers' age was negatively related to their creative behaviors.

Anecdotal records and professional discussions appear to support that teaching experience may be a major contributor to the attitude of teachers toward creative teaching. Extant literature stresses the impact of teaching experience on teachers' creative teaching. For instance, Vasudevan (2010) examined the influence of teaching experience on teachers' creativity and found that it had positive effects. Similarly, Al-Nouh et al. (2014) investigated teachers' attitudes toward creativity and their perceptions of practice and noticed statistically significant differences in teachers' creative teaching based on their teaching experience. Likewise, Kettler et al. (2018) researched teachers' perceptions of creativity in the classroom in Alaska. Their study revealed that teachers' creative characteristics differed based on their experience.

Gendered impacts have remained topical in educational research on abilities like creativity. However, the findings on differences between male and female respondents regarding their creativity remain inconsistent and inconclusive (Abraham, 2016). While several studies have established higher levels of creative abilities among women (Kuhn and Holling, 2009; Cheung and Lau, 2010), some studies have found higher levels of creative abilities among men (Jiang et al., 2015). In yet another related study, no differences were observed between male and female respondents regarding their creative abilities (Lin et al., 2012).

2. The study context

It has consistently been acknowledged that teacher creativity is fundamental for churning out creative and innovative learners (Beghetto and Kaufman, 2014; Carmeli et al., 2014; Craft, 2015; Doyle, 2019). The stimulation of creativity in the classroom is an integral part of the tutor-student relationship (Sawyer, 2012; Sharma and Sharma, 2018) and is in consonance with the 21st-century learning environment. Therefore, enhancing and nurturing creative and critical thinking skills are important goals for 21st-century learning (Bloom and Doss, 2021). Nurturing creativity benefits not only the learner but stimulates a change in the tutor's delivery strategy and adds to an active learning environment (Justyna, 2016). Therefore, the teacher's creative ability is a key component of the educational process of every learner. Extant literature acknowledges teachers' creative influence as one of the major determinants of students' outcomes (Erwin and Garman, 2010; Hall et al., 2011), and this is partly supported by the bond created between teachers and their students (Kin et al., 2015). In as much as these are documented in the literature, the issue of teachers' creative nurturing behaviors being influenced by their characteristics and age appears to be less documented. Some empirical studies have found an appreciable level of creativity nurturing behaviors among teachers but factors responsible for such latent abilities appear under-explored (Sharma and Sharma, 2018; Mahama, 2022).

In the Ghanaian context, for example, creativity has been made one of the major components of the standard-based curriculum (Mahama, 2022; Ministry of Education, 2018; National Council for Curriculum and Assessment [NaCCA], 2019). The curriculum outlines how learners should be taught and how learners should learn and demonstrate what has been learnt through creative strategies. The introduction of creativity in the curriculum requires tutors to improvise and make room for teaching students to become creative in their learning expeditions. The demand for a creative learning environment has compelled tutors to shift lesson delivery from the traditional mode (teacher-centered) to a more open and blended approach that presents teacher trainees with the opportunity to come up with new ways of learning and teaching. The success or otherwise of such instructional shift on the part of tutors could be influenced by dispositional factors that may not be readily known. Therefore, the current study examines how tutors' characteristics and age determine their ability to nurture creativity in teacher trainees.

3. Materials and methods

The researchers surveyed tutors from various colleges of education using a cross-sectional design. The design was appropriate as it offered the researchers the opportunity to gather the needed data from different locations simultaneously (Ary et al., 2018). The respondents comprised both male and female tutors from 16 out of 48 public colleges of education in Ghana. The sample for the study was 340 tutors (men = 220 and women = 120). The stratified-proportionate sampling procedure was used to achieve a fair representation of participants from each selected college. In addition, the simple random technique (table of random numbers) procedure was used to select the individual participants from each college.

The tutors' characteristics were assessed with an adapted 36-item multidimensional teachers characteristics scale (teacher-student interaction = 13 items; teaching profession = 12 items; humanistic and justice = 11 items) (Yaratan and Muezzin, 2016). The teachers' creativity nurturing behavior was measured using an adapted 15-item multidimensional creativity scale (abstraction = 5 items; inquisitiveness = 3 items; motivation = 3 items; critical thinking = 4-items) (Sharma and Sharma, 2018). A pre-test was conducted with 50 participants who were selected from

two colleges that were exempted from the study sample. The purpose of this exercise was to ascertain the usability of the adapted scales in the Ghanaian context and the satisfaction of internal consistency requirements. The internal consistencies were established using Cronbach's alpha, where an index of 0.87 for teachers' characteristics and 0.85 for creative nurturing behaviors was obtained. The data gathered were cleaned for outliers and inconsistencies. In addition, statistical assumptions such as normality, linearity, multicollinearity, autocorrelation, homoscedasticity, and homogeneity of variance were tested and satisfied before the main analyses were performed.

4. Results

Several regression assumptions were considered, and all were satisfied. For instance, the normality assumption was met as cases were concentrated along the 0 point in the scatter plot. In terms of the linearity assumption, the normal probability plot produced a straight line from the bottom left part of the curve to the upper right part of the curve. Multicollinearity assumptions were met for the two independent variables as neither of them exceeded a correlation coefficient of 0.9. The homoscedasticity assumption was met with an alpha value greater than 0.05. With the autocorrelation assumption, no autocorrelation was identified as the Durbin Watson statistic ranged between 1.6 and 2.3 (Pallant, 2020).

4.1. H_1: tutors' characteristics will predict their creative nurturing behavior in teaching teacher trainees

This hypothesis focused on whether the characteristics of tutors made them engage in teaching and learning activities that facilitated the transfer of knowledge leading to trainee tutors becoming creative tutors in their future teaching profession. The predictor variable was tutors' characteristics, and the criterion variable was creative nurturing behavior.

Table 1 presents the regression results of the teacher characteristics and their creative nurturing behaviors. The results depicted a positive interaction between the constructs; there was a significant positive effect between the tutors' characteristics and their creative nurturing behaviors [$F(1,338) = 91.91$, $p < 0.000$, $R^2 = 0.214$, $R^2_{\text{adjusted}} = 0.211$]. The regression coefficient was further examined [$\beta = 0.307$, $t = 9.59$, 95% CI (0.244, 0.370)] and it showed that teacher characteristics was a significant predictor in the model. The results suggest that an increase in teacher characteristics could lead to an improvement in teachers' creative nurturing behavior with a variance contribution of 21.4%.

4.2. H_2: tutors' age will predict their creative nurturing behaviors in teaching teacher trainees

This hypothesis focused on whether the age of the tutors leads them to nurture creativity among trainee tutors for their future teaching profession. The age of the tutors was made continuous as they were asked to write their exact age. The average age of the tutors was $M_{age} = 41.79$ and $SD_{age} = 6.74$. In this test, the predictor variable was the age of the tutors while the criterion variable was creative nurturing behavior.

Table 2 shows the results of age predicting tutors' creativity nurturing behavior. There was a positive interaction between the age of tutors and creativity nurturing behaviors. The results showed a significant positive effect between the age of tutors and creative nurturing behaviors [$F(1,338) = 14.17$, $p < 0.000$, $R^2 = 0.040$, $R^2_{\text{adjusted}} = 0.037$]. The regression coefficient was further examined [$\beta = 0.207$, $t = 3.76$, 95% CI (38.86, 48.04)] and it showed that the tutors' age was a significant predictor in the model. This implied that the older the tutors were, the better their creative nurturing behavior was, with a variance contribution of 4%.

4.3. H_3: there will be significant gender differences in tutors' characteristics and their creative nurturing behaviors

This hypothesis focused on establishing differences between male and female tutors regarding their characteristics and creative nurturing behaviors. The independent samples *t*-test was used after satisfying that the data were normally distributed and ensuring adequate sample size and equality of variance.

Table 3 shows the results of the independent samples *t*-test performed for male and female tutors to explore the differences in their characteristics as tutors and their creativity nurturing behaviors. The results indicated no differences between male and female tutors. For instance, the tutor characteristics of 220 male tutors ($M = 126.14$, SD = 11.98) compared to 120 female tutors ($M = 126.00$, SD = 7.04) were not different [$t(336,136) = 0.132$, $p > 0.895$], as statistically significant results were not observed. Similarly, the creative nurturing behavior in 220 male tutors ($M = 54.41$, SD = 7.02) compared to 120 female tutors ($M = 51.58$, SD = 6.89) was not different [$t(338) = 1.043$, $p > 0.298$], as statistically significant results were not observed. These results indicated that tutors who were engaged in training teachers for Ghanaian classrooms exhibited no gender-wise differentiation in their characteristics and their ability to nurture creativity in their teacher trainees.

4.4. H_4: there will be statistically significant differences in tutors' characteristics and their creative nurturing behaviors based on their teaching experience

The aim of this hypothesis was to test for potential differences in tutors' characteristics and their creative nurturing behaviors toward teacher trainees based on their teaching experience (1–10, 11–20, 21–30, and 31 years and above). In testing the hypothesis, the One-Way ANOVA (between groups) was performed, where assumptions were tested, and interpretations offered. See Tables 4, 5.

TABLE 1 Linear regression results.

Variables	*R*	R^2	Adj. *R*	B	S.E	*T*	*F*	Sig.	*P*
TC*CNB	0.462	0.214	0.211	0.307	0.032	9.59	91.91	0.000	0.000

CNB, creativity nurturing behavior; TC, tutors' characteristics.
*Interaction between the variables that were used for the regression analysis.

TABLE 2 Linear regression results.

Variables	*R*	R^2	Adj. *R*	B	S.E	*T*	*F*	Sig.	*P*
Age*CNB	0.201	0.040	0.037	0.207	0.055	3.76	14.17	0.000	0.000

CNB, creativity nurturing behavior.
*Interaction between the variables that were used for the regression analysis.

TABLE 3 Gender difference in tutors' characteristics and their creative nurturing behaviors.

Variable	Sample	Mean	SD	*t*	df	*F*	Sig.	*P*
Creative nurturing behavior								
Male	220	52.41	7.02	1.043	338	0.149	0.699	0.298
Female	120	51.58	6.89					
Tutors' characteristics								
Male	220	126.14	11.98					
Female	120	126.00	7.04	0.132	336.136	21.219	0.000	0.895

Table 4 shows the results of the homogeneity of variance, where the Welch F (CNB = sig. < 0.000, TC = sig. < 0.012) test was reported at the expense of ANOVA F due to the violation of the assumption. Extant literature supports the choice of the Welch F test as the most appropriate test to report for a violated homogeneity of variance assumption in the ANOVA test (Field, 2013; Pallant, 2016), hence its applicability in this study was supported. Following this step, the ANOVA results were examined for any significant difference or otherwise.

Table 5 shows the ANOVA results regarding any possible significant difference in creative nurturing behavior and tutor characteristics based on the number of years of teaching experience of the tutors. The results in Table 5 show that there were significant differences in creative nurturing behavior [$F(3,336) = 45.04$, $p < 0.000$] based on the number of years of teaching experience of the tutors but no significant differences were observed in tutor characteristics [$F(3,336) = 0.99$, $p > 0.396$]. The effect size, established using the partial eta squared, was 0.29, signifying a medium effect. Because of the possible significant differences identified in ANOVA results, it was essential to ascertain which variables were responsible, so results for the *post hoc* Multiple Comparisons were examined.

Table 6 shows the results of the *post-hoc* test. The Tukey HSD test revealed differences in creativity nurturing behavior among tutors with varying years of teaching experience. Tutors whose teaching experience was 31 years and above ($M = 64$, SD = 13.97) were the only group that had higher creativity nurturing behavior than those whose teaching experience ranged between 21 and 30 years ($M = 52.00$, SD = 1.24) and those with teaching experience between 11 and 20 years ($M = 50.56$, SD = 5.33). This implied that a longer service experience as a tutor aided in fostering creative nurturing activities among trainee tutors so that they can, in turn, recreate a creative environment in their classrooms on completion of their academic programmes.

TABLE 4 Robust tests of equality of means.

Dependent variables		Statistic	df1	df2	Sig.
Creative nurturing behavior (CNB)	Welch	11.519	3	102.652	0.000
	Brown-Forsythe	23.583	3	36.795	0.000
Tutors' characteristics (TC)	Welch	3.828	3	114.542	0.012
	Brown-Forsythe	1.365	3	197.919	0.255

5. Discussion

It is worth noting that tutor characteristics such as good teacher-student interaction, their zeal for being teachers, and humanistic and just behaviors could serve as enablers for creative ideas and strategies (e.g., abstraction, inquisitiveness, motivation, and critical thinking) in their professional life. In the current study, we found that tutors' characteristics determined their creative teaching and creativity nurturing behaviors in the teaching and learning environment. For instance, by adopting an engaging classroom presence strategy which values real-world learning, these tutors can exchange best practices and develop a lifelong love for learning among learners. As a result, these tutors can engage their students in advanced cognitive skills such as problem-solving, critical thinking, and knowledge transfer among several subjects or programmes. The finding of the current study is confirmed in the existing literature. For example, Craft and Chappell (2016) found that tutors' creative nurturing behaviors could be influenced by their attitudes and characteristics while Farmer' et al. (2003) study corroborated with the assertion that individual characteristics of tutors could influence their creative nurturing behaviors.

Furthermore, the tutors' age appears critical to their adoption of creative teaching and creative nurturing among their students,

TABLE 5 ANOVA results.

Dependent variables		Sum of squares	df	Mean square	*F*	Sig.
Creative nurturing behavior (CNB)	Between groups	4, 730.85	3	1, 576.95	45.04	0.000
	Within groups	11, 764.44	336	35.01		
	Total	16, 495.29	339			
Tutor characteristics (TC)	Between groups	328.19	3	109.40	0.99	0.396
	Within groups	37, 019.17	336	110.18		
	Total	37, 347.35	339			

TABLE 6 Multiple comparisons.

Dependent variable		(I) Years of teaching	(J) Years of teaching	Mean difference (I−J)	S.E	Sig.	95% confidence interval	
							Lower bound	Upper bound
CNB	Tukey HSD	1.00	2.00	0.78	0.76	0.739	−1.19	2.75
			3.00	−0.67	1.12	0.934	−3.57	2.24
			4.00	−12.67*	1.24	0.000	−15.89	−9.45
		2.00	1.00	−0.78	0.76	0.739	−2.75	1.19
			3.00	−1.44	1.03	0.502	−4.11	1.23
			4.00	−13.44*	1.17	0.000	−16.46	−10.43
		3.00	1.00	0.67	1.12	0.934	−2.24	3.57
			2.00	1.44	1.03	0.502	−1.23	4.12
			4.00	−12.00*	1.43	0.000	−15.69	−8.31
		4.00	1.00	12.67*	1.25	0.000	9.45	15.89
			2.00	13.44*	1.17	0.000	10.43	16.46
			3.00	12.00*	1.43	0.000	8.31	15.69

*Interaction between the variables that were used for the regression analysis.

and this is evident in the current study. This finding is supported and refuted by the available literature. For instance, Kinai (2013) has debunked the influence of tutors' age on tutors' creativity in teaching. On the other hand, the finding from Ng and Feldman (2013) study supports the current study's results where tutors' age is related to their creative teaching abilities.

Surprisingly, differences in gender and tutors' characteristics and their creative nurturing behaviors were not observed. This finding reaffirmed several previous assertions that gender differences and professional abilities in tutors appear inconclusive. Our finding corroborated the study by Lin et al. (2012) that found no difference between male and female tutors in their characteristics and creative potential. Although differences in gender concerning their abilities may exist, such discussions should consider their context than generalize such observations (Sari and Basarir, 2016; Zaky et al., 2020). In this regard, stakeholders and academic scholars should be cautious in comparing male and female tutors when it comes to the teaching profession. Such comparisons may be unhealthy for either gender and generate unnecessary debates that may divert attention from topical issues that could enhance the teaching profession positively.

Tutors' teaching experience is one of the important factors that is considered when considering variables that could predict tutors' positive characteristics and potential to nurture students creatively. Some scholars have advocated that the longer the tutor's experience, the better the tutor's behavior when it comes to professional teaching in the 21st-century classroom. Such assertions may not be the case for all tutors' professional behaviors like their characteristics and creative teaching. For instance, in this study, we found that teaching experience influenced tutors' creativity nurturing behaviors but not their characteristics in the classroom, and even in this context only tutors with teaching experience of 31 years and above were likely to exhibit a creative potential in their teaching and not those with fewer years of teaching experience. This finding is supported by some studies which have also found teaching experience to predict the creative potential of tutors (Vasudevan, 2010; Al-Nouh et al., 2014; Kettler et al., 2018). Therefore, we recommend a cautious approach when comparing tutors' abilities with their experience as a focal point. Scholars should be aware that abilities are dynamic and experiences may sometimes be just the accumulation of years and not necessarily an accumulation of proper practice of the teaching profession. Therefore, generalized assumptions such as the teaching experiences of tutors as the best determinant of their ability to nurture the creative potential in students should be avoided.

6. Conclusion

The findings of this study have revealed that tutors' characteristics and age are two key drivers of their creative

abilities in the 21st-century classroom. Even whilst tutors exhibit appreciable dispositions and characteristics they still need to improve their ability to nurture learners or students creatively. After gaining 31 or more years of teaching experience, their zeal and motivation to nurture creativity in their learners or students would be high, as they may then have the skill to improvise and find new ways of meeting the professional requirements of their future classrooms. Though improvisation may be subtle it is one of the key promoters of the creative abilities of tutors in a dynamic 21st-century learning setting.

7. Implications for policy and practice

To equip tutors for the learning demands of the future and for learner development, senior leadership in teacher training institutions must cultivate appreciable characteristics and dispositions among their tutors so that they can use that to nurture trainee teachers. Such characteristics encourage tutors to have positive self-esteem, value themselves, and show proficiency in their profession. These qualities combined create the self-confidence, enthusiasm, and determination necessary for tutors to successfully lead the process of training contemporary teachers. The management in colleges of education should empower their tutors and encourage them to invest time in honing their skills as these could help in their creative abilities. Issues relating to job turnover should be addressed so that experienced tutors are available to nurture creativity among trainee teachers.

Data availability statement

The original contributions presented in this study are included in the article/**Supplementary material**, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the Institute of Educational Research, University of Education, Winneba. The patients/participants provided their written informed consent to participate in this study.

Author contributions

IM conceptualized the idea and shared it with DD and PE. IM wrote the draft. DD analyzed the data. PE discussed the findings. All authors worked on all the sections from the beginning to end and contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2023.1078017/full#supplementary-material

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The Commit to Be Fit framework: a community case study of a multi-level, holistic school-based wellness initiative in rural Virginia

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Background: Public health interventions that target children's physical, mental, and emotional health will enhance their ability to learn and grow. Although more complex, school initiatives that address multiple ecological levels and take a holistic view may be more effective and likely to lead to lasting change.

Aims: This article presents the framework of Commit to Be Fit (C2BF) as an example of how schools can integrate multi-level and holistic approaches for health. This innovative school-based intervention includes activities addressing individual, home, school, and community to create a culture of wellness. We describe the implementation of C2BF and its basis in ecological models and give examples of activities across three components: cafeteria, classroom, and community. We discuss challenges and note that leadership engagement and alignment were critical elements for C2BF's success thus far.

Discussion: C2BF uses a school-based multi-level approach to creating a culture of wellness and holistic health for students, teachers, and community members. C2BF is unique compared to other school-based programming and includes activities that address all eight domains posited for program sustainability within public health. Built to be flexible and adaptive, C2BF was able to successfully pivot during the COVID pandemic and also follow new science.

Conclusion: C2BF and other multi-level holistic approaches are more likely to achieve long-term change by utilizing strategies across the multiple levels of the ecological model to improve health and wellbeing.

KEYWORDS

social ecological model (SEM), child health, school intervention programs, holistic health, Whole Child, healthy schools, school wellness, Health Belief Model (HBM)

1. Introduction

The United States is experiencing negative trends in children's health. Children experience worse mental health, decreased resilience, an increasingly sedentary lifestyle, and higher rates of obesity when compared to previous generations (1–3). An inverse relationship exists between child mental health and academic achievement. Results from a 20-year longitudinal study indicate that mental health problems (e.g., internalizing such as anxiety or depression; and externalizing such as conduct disorders) predict educational attainment (e.g., academic performance in English and mathematics and number of incomplete final grade levels from compulsory school) (4). In addition, excess weight gain in children can create a snowball effect of interrelated health issues with emotional, psychological, and social impacts (5). Without effective efforts to counter such trends, many children will continue to experience a substantial health gap (6, 7) with downstream effects such as lower pay and discrimination (8), decreased life span, lower quality of life, and increased rates of depression later in life (9).

Best practices for addressing the complexity of child health include engagement in activities on more than one ecological level (multi-level approach) and addressing more than one aspect of health (holistic approach). In behavioral ecological models, multiple levels of influence interact across levels, and the most effective approaches for changing behavior will address multiple levels (10). Single-level interventions may create short-term effects but tend to be less robust or sustainable in their impact (10). Interventions with multi-level approaches can incorporate participation from peers, teachers, parents, and community members, leading to increased momentum and broad intervention support (10, 11). Multi-level school-based approaches decrease childhood obesity (12) and improve mental health (13, 14), especially when community members are also involved (15). Such approaches tend to cover intrapersonal (in this case, the student), interpersonal (teachers or family), and school levels. On the other hand, interventions using holistic approaches that address multiple aspects of student wellbeing (e.g., physical, mental, and emotional needs and academic achievement) have also been successful (16). The "Whole Child" initiatives that have become popular across the US in recent years are examples of holistic approaches to addressing child health (17–19). To date, we have not found examples of school-based child health programs that combine multi-level strategies with a holistic approach to health for students as well as teachers and community members.

Schools are uniquely positioned to influence childhood health; most American children (50.8 million) spend an average of 7 h per day at school. A "health promoting schools" approach can influence students' activity levels, eating habits, and mental health (20–24), but this requires a coordinated effort and cannot be effectively addressed using oversimplified interventions (21).

This paper describes the Commit to Be Fit (C2BF) framework as a community case study of how a school may combine best practices to address health holistically by integrating activities at the individual, home, school, community, and policy levels to create a culture of wellness for students, teachers, and the community. This paper is not a comprehensive evaluation of C2BF nor an in-depth review of all pertinent literature.

Abbreviations: C2BF, Commit to Be Fit; RCPS, Rappahannock County Public Schools; ES, Elementary School; HS, High School; ABL, Action Based Learning.

2. Context

Rappahannock County Public Schools (RCPS) is a small Virginia school division in a rural county (population 7,500), with one K-7 elementary school (~500 students, ages 5–12, one class of preschool age 4) and one high school (~320 students, 13–18). Rappahannock County has limited access to food and wellness resources; 74.8% of the residents do not have access to a large grocery store (25), and prior to C2BF, many residents would travel by car for upwards of 30 min to reach a full-service gym, wellness center, or medical clinic. Only 1 in 3 adults attended college, and 1 in 3 homes do not have internet access (26); there is a wide gap in income and access to health resources in the county.

2.1. History and development

Commit to Be Fit (C2BF) is an award-winning school-based holistic wellness program at RCPS. The program aims to improve the overall (physical, mental, emotional, and social) health and wellness of students, parents, staff, and community members (https://www.rappc2bf.com) by creating a healthier culture. C2BF was piloted and implemented with funding from a regional health foundation. The initial C2BF team included the superintendent (principal investigator), the district's nutrition director, and two wellness integration specialists certified as health coaches, fitness instructors, and action-based learning facilitators. Initially, C2BF was framed as addressing childhood obesity but pivoted to a more holistic approach and is now focused on building a "culture of wellness" within the school division and among the community.

C2BF is unique in multiple ways. First, C2BF uses a three-pronged approach (cafeteria, classroom, and community components) to work simultaneously across multiple facets of health and multiple ecological levels. Addressing wellness at the community level and focusing on students/school staff was especially important due to disparities in access across the county. Second, the superintendent initiated this effort, got district leadership to buy in early, and continues integrating C2BF into general district practices and policies. Finally, C2BF was designed to be implemented progressively over 5 years, addressing different themes and ecological levels each year to build outward over time: (1) Inspiring Healthy Role Models (teachers and school staff); (2) Focusing on the family; (3) Changing Community Culture; (4) A Broader Scope; and (5) Global Outreach and Sustainability. The smaller initial scale allowed C2BF to build stakeholder buy-in gradually and test the synergy of the interconnected elements before scaling up and adding further layers of complexity.

C2BF was the recipient of the 2017 Virginia School Board Association's *Food for Thought Competition* for wellness/physical activity. Over a dozen presentations on C2BF's model have been given at various local, national, and international education, health, and wellness conferences (27–29).

3. The Commit to Be Fit model

3.1. Guiding theory

C2BF is based on the social-ecological model and the Health Belief Model. Because health issues, such as poor mental health or obesity, are complex and are caused by multiple factors, using an ecological framework that encourages intervention at multiple levels is critical (56) to address the underlying factors influencing health (30). C2BF influences the health of children and adults in Rappahannock County by intervening at the intrapersonal (individual), interpersonal, school (organizational), and community levels (Figure 1).

C2BF activities addressing each level are intended to influence intermediate outcomes within a particular dimension (shown in Figure 1 as wedges: social change, policy, environmental change, and programs and practices) that may intersect with and influence other behaviors or audiences. For example, C2BF offers fitness classes and challenges at the schools to build a culture of fitness among teachers, who then may impact social norms at the interpersonal level (e.g., via modeling) to change student perceptions and encourage students to also engage in healthy behaviors (e.g., reducing inactivity).

The Health Belief Model was also considered when developing C2BF programming at the individual level. Constructs such as perceived benefits, perceived barriers, and self-efficacy (31) help explain why people desire and engage in certain health behaviors (11, 32). An example from C2BF is a class on preparing healthy meals to freeze. Learning about the benefits of increasing fruit and vegetable intake, modeling, and practicing can increase self-efficacy in preparing healthy, easy-to-make meals at home. Perceived susceptibility and perceived severity help people to gauge risk; C2BF components regularly apply these constructs by addressing the connections between behaviors and disease as well as between behaviors and health (e.g., health coaching, newsletters, etc.).

The application of behavioral theory can help maximize the likelihood of behavior change. Using a tool developed by a team of health pedagogy and behavioral theory experts to focus curricular efforts on essential knowledge and skills needed to support the adoption and maintenance of healthy behaviors (see https://sph.uth.edu/research/centers/cchi/resources), the *Personal Fitness and Nutrition* course curriculum (high school) was assessed for best practices in Year 2. Lesson plans were developed or modified per the National Health Education Standards, objectives from the Health Education Curriculum Analysis Tool, targeted Healthy Behavior Outcomes established by the Centers for Disease Control and Prevention, and The Characteristics of Effective Health Education (33–35). For example, one lesson plan addressed the connection between nutrition and chronic disease and calories based on grams per macronutrient. Several additional activities were suggested to address functional knowledge, self-efficacy, perceived susceptibility, perceived severity, and skill while drawing the connection between nutrition and disease and aligning with the above health education standards and resources.

- Using fictional case studies, students determine possible nutrients lacking in patients that may have contributed to their disease development.
- Students create an online family health history tree using *My Family Health Portrait: A tool from the Surgeon General* (https://cbiit.github.io/FHH/html/index.html) and summarize (a) chronic diseases that run in their family and (b) nutrition behaviors they can practice themselves to help prevent the development of chronic disease.

3.2. Initiative components

C2BF activities are designed to build a "Culture of Wellness", so activities are implemented among three audiences (students, staff/teachers, and community members) and across the three components (classroom, cafeteria, and community). Figure 2 is a matrix that lists activities within these components and across the three audiences to illustrate the scope of C2BF. The ultimate intended beneficiaries of C2BF are the children, with children's health most likely to be achieved when there is overall wellness in staff/teachers, parents, and the community.

3.2.1. Cafeteria

The cafeteria component and its associated activities strive to enhance school nutrition to contribute to a "Culture of Wellness". For example, at the community level, the C2BF team created a farmer's market at the school: twice a year staff members are given vouchers as a show of appreciation from the C2BF team and district administrators. Students are provided "pop bucks" to purchase a complete meal (e.g., protein and produce) from the weekly Power of Produce collaboration with the Farmers Market between April-Oct. Benefits include increased connection among staff and administrators (social climate and collaboration); improved accessibility of fresh produce (e.g., during summer vacation for students and intrapersonal produce intake); introducing students, staff, and parents to the market; as well as providing financial support to local farmers, and building relationships between community members and farmers (community cohesion).

Several additional activities address psychosocial and behavioral factors at the intrapersonal level. Taste testing (monthly) helps students experience a variety of foods and has been shown to change food preferences by addressing food neophobia since children can be scared to try new foods (36). A school garden may help students appreciate food sources or be more willing to try new feeds (37), while an elementary school cooking club can build self-efficacy for preparing healthy foods (38). At the school level, adding daily salad bars and incorporating Farm to School (an environmental change at the school level) increased fresh produce availability for students and teachers (environmental change and increase determined using cafeteria records).

3.2.2. Classroom

At the school level, the classroom component uses kinesthetic learning techniques to improve academic achievement and incorporates additional physical activity opportunities to decrease sedentary time (see Supplementary video). The Action Based Learning (ABL) lab is a converted classroom at the elementary school with a series of 10 stations designed to help fill

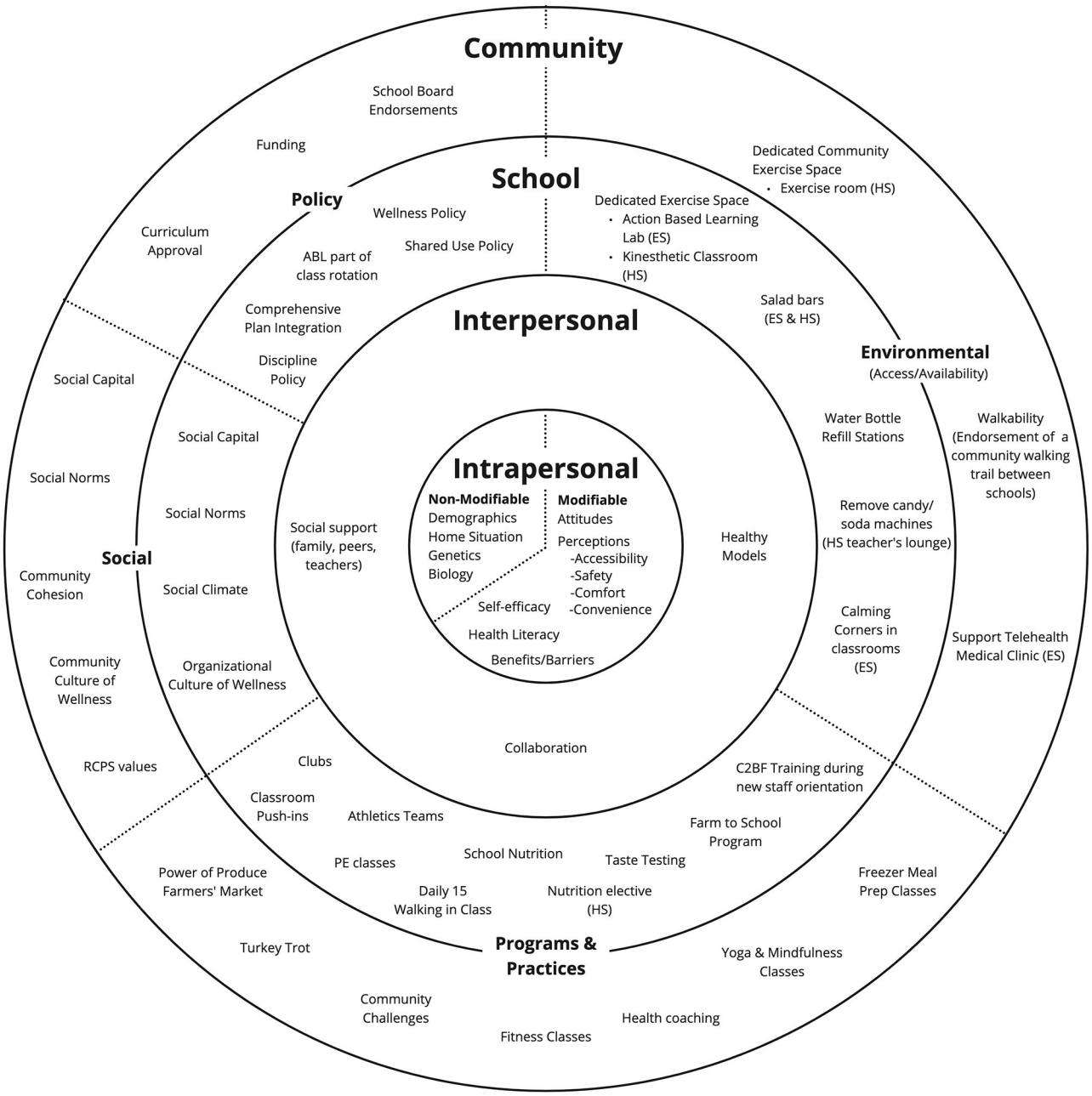

FIGURE 1
Ecological model for C2BF. ES, Elementary School; HS, High School; PE, physical education.

developmental movement gaps (e.g., activities that encourage crossing the body midline) and enhance learning by improving brain functioning (Action Based Learning by Kids Fit; https://www.abllab.com and https://www.ablacademy.com). ABL was added to the exploratory class rotation (e.g., art and music), so children use the lab for 30 min once every 6 days per school policy. The lab also allows traditional classroom curricula to be taught with kinesthetic methods and is designed for practicing mindfulness. The "Neuronasium" is a converted classroom at the high school, outfitted with special desks that are paired with cardio equipment to allow students to move while learning (e.g., pedals and gliders). Specific classes such as *Personal Fitness and Nutrition* are taught in the Neuronasium each school year, and any teacher can schedule time there for other classes as well. During a 2020 visit from the Assistant Secretary of the US Department of Education to RCPS, Dr. Dave Meyers (Assistant Superintendent for Data, Research, and Technology at the Virginia Department of Education) stated, "I have been through thousands of schools and have never seen anything like the Neuronasium before" (personal communication, September 17, 2020). Additional class activities were incorporated in both elementary and high schools to build skills such as emotional regulation (e.g., calming corners), mindfulness, and

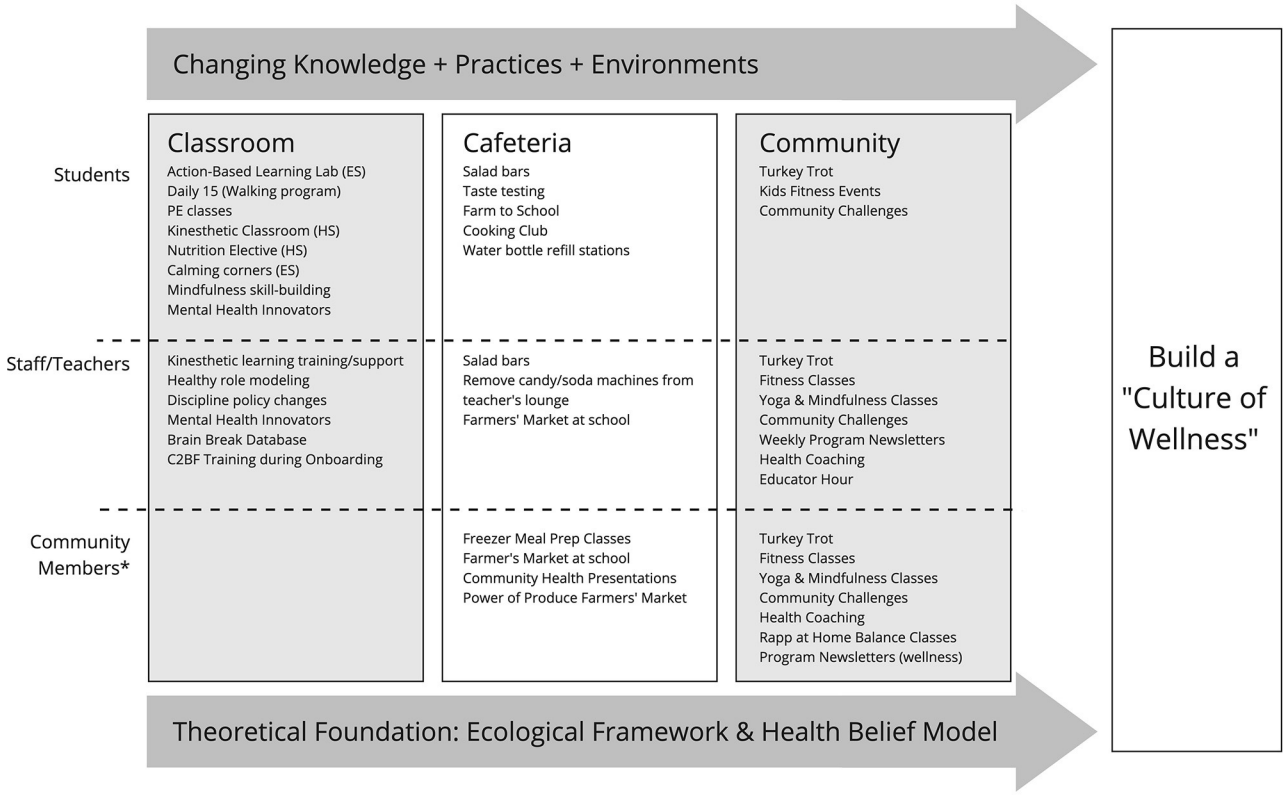

FIGURE 2
C2BF program activities by audience and component. ES, Elementary School; HS, High School; PE, physical education.

resilience in students and teachers at the intrapersonal level. C2BF staff also offer annual trainings for teachers (e.g., brain breaks), and are available to facilitate kinesthetic learning time in individual classrooms upon request (e.g., push-ins where C2BF staff join a class and facilitate the activity, offered daily). Such trainings have not been required; instead, the strategy was first to work with innovators and early adopters and develop champions. Later, they expanded their focus to the early and late majority when those teachers were more ready (39).

3.2.3. Community

Lastly, the community component aims to improve the health and wellness of the staff, parents, and other community members through free fitness classes, events, workshops, and various incentives. For example, trauma-informed yoga and mindfulness classes are provided weekly; according to feedback from community members, participation in these sessions increased confidence in using these tools to improve mental health and build resilience skills. Additionally, converting the high school teachers' lounge into an exercise space allowed C2BF to offer free physical activity classes (e.g., step, balance, cardio boot camp, and circuit) to community members, an environmental change that increased access in this rural county. Weekly "Wear Your Workout Clothes to Work Wednesdays" encourages teachers to engage their classes in a movement activity with their students while simultaneously decreasing a barrier to engaging in physical activity themselves. Engaging with this extended audience (parents, staff, and others in the community) is strategic: (1) to get students on board, you need parents and teachers to be on board and (2) culture is best changed with a community approach (40).

Other examples of community activities include monthly community challenges. The first walking challenge, created as a response to COVID pandemic stay-at-home orders, used social media accounts to register teams from the community to "Step on Hunger", with C2BF committing to donate funds to the local food pantry based on the total distance walked. What started as a goal to "walk to San Francisco" became a series of walking challenges that resulted in enough miles walked to reach Australia over 8 weeks. The online Challenge of the Week has persisted (Figure 3), and the C2BF staff has built a significant repository of free wellness, exercise, and mindfulness videos and worksheets available to the community.

3.3. Process: scope, delivery, and reach

The various program activities (Figures 1, 2) in C2BF were intentionally chosen to fit within the revised scope. The team differentiated roles for responsibility and delivery of activities and sessions. Broadly speaking, the Nutrition Director oversaw efforts related to nutrition such as taste testing and Farm to School, the C2BF coordinator supported community efforts such as setting up the partnerships to hold Farmer's Markets at

FIGURE 3
Example of the C2BF challenge of the week (online exercise tutorial and modifications).

school, and the C2BF communications specialist oversaw program newsletters and social media programming. Because of the multi-component nature of C2BF and the use of communications as part of the interventions within the community, it can be difficult to quantify the full reach of the program in terms of independent persons touched. However, programming occurred for both students and employees across the school division (including both the elementary school and high school) in every year since 2016. Student body size across the two schools averaged 807 students (min 747, max 884 students), and about 164 employees per year (77 elementary; 53 high school; 34 central office, other). Participation in activities can range widely, from under 10 individuals participating in an after-school exercise class to hundreds participating in teams during the 2020 C2BF walking challenge (see Supplementary material C2BF Program Delivery and Reach for a list of activities, responsibilities, frequency, and estimates of reach).

One economic limitation of the current C2BF model is the reliance on external grant funds for team salaries. The C2BF coordinator, the nutritionist, and ABL coordinator were all fully grant funded. The food service director was fully funded by RCPS. However, the superintendent has begun institutionalizing positions related to C2BF; the communications director is covered at 50% by RCPS.

3.4. Flexibility and challenges

C2BF was designed with pre-determined themes to expand the program's reach over time. The initial intended long-term goal of C2BF was to reduce childhood obesity. There came a growing understanding that obesity is a multi-faceted disease, with influences including genetics and environmental stressors as well as dietary and lifestyle choices (41), and recognition that obesity is challenging to address. Additionally, initial implementation of C2BF led the team to recognize the interplay between physical, emotional, and mental health that drives overall wellbeing was the true intent of the program. While reducing the risk of childhood obesity might be an appropriate goal for a subset of the students, holistic wellness became the preferred focus of the team.

As the focus evolved, activities were added each year, including efforts to expand partners and achieve community buy-in. Furthermore, because C2BF was intentionally designed to allow for adaptation and modification, innovative ideas that matched the intent and goals of C2BF could be adopted. For example, C2BF created a sensory pathway in the elementary school by adding stickers on the floor spanning the length of two hallways, encouraging students to engage in various movement patterns (e.g., hopping, marching, heel-to-toe balance walk, hopscotch, and crab walking) during breaks and to and from recess. The flexibility that

allowed C2BF to pivot toward holistic wellness and incorporate new ideas was also critical to successfully navigating the problems and challenges that arose over time, including during the COVID-19 pandemic.

Implementation very rarely occurs without challenges arising. A small sample of the barriers to implementing C2BF are outlined in Table 1 based on a series of fall 2022 individual interviews with the C2BF staff and RCPS Superintendent. The table also lists how the barrier impacted the program and the actions the C2BF staff took to overcome these challenges. The C2BF team and leadership were creative and strategic in addressing barriers from limited space to resistance to change. The global COVID-19 pandemic required the C2BF team to pivot significantly. However, several modifications—such as the highly successful online walking challenges and modifications for classroom physical activity (Figure 4)—allowed programming to reach a different audience within the county than had been previously connected to C2BF. Additionally, the efforts the C2BF team had made to begin helping students, teachers, and community members develop emotional regulation skills and mindfulness before the pandemic became even more critical. For these reasons, an additional portion of the C2BF staff time was shifted toward activities to improve resilience and mental health during the 2021–2022 and 2022–2023 school years.

3.5. Keys to C2BF

The full evaluation results of various facets of C2BF is beyond the scope of this paper and will be described in detail elsewhere. However, we provide an overview here of the broad approaches we used to discover what has been happening in C2BF and why. We provide the results of a strategic planning activity in 2018 as a bridge to discuss the critical elements of C2BF identified by team members and stakeholders in 2022.

3.5.1. Evaluation

External evaluators have partnered with RCPS and the funding organization to undergo process, developmental, implementation, and outcome evaluations of C2BF. Many individual interviews and focus groups have been held over the course of 4 years to gather data from C2BF team members, stakeholders, and participants. Power hierarchies were considered when focus groups were used, and individual conversations were held with each contributing participant to confirm interpretations (42). To allow triangulation [(43), p. 301], additional data were gathered from RCPS archival records (e.g., cafeteria records and behavioral referrals), C2BF documents (e.g., newsletters and lesson plans), direct observation, physical artifacts, systems mapping, and behavior logs, in addition to objective measures. C2BF approaches are also being compared to existing scientific literature. One example of this literature review is to explain how movements that cause arms/legs to cross the midline of the body (like in ABL foundations) are important for reaching developmental milestones for fine and gross motor skills (44) and coordination of the two brain hemispheres (45, 46). Cross-case analyses (47) are in process to contrast C2BF with other school based wellness initiatives. The variety of data sources, investigators, theories, and methods [(43), p. 301] allows us to use triangulation to enrich, refute, confirm, and explain (42) while also reducing bias.

Early C2BF evaluations were often developmental and progressive [Parlett and Hamilton, 1976, as cited in (48)], and included approaches such as (1) a curriculum analysis (see https://sph.uth.edu/research/centers/cchi/resources for details on the Curriculum Evaluation Tool) based on behavioral theory to optimize lesson plans to encourage healthy behaviors; (2) an Enhanced Force Field Analysis for strategic planning to identify driving forces and restraining forces (Redelfs et al., in submission). We also incorporated outcomes measured via (3) reflectance spectroscopy (VEGGIE METER®, Longevity Link, Inc., Salt Lake City, UT) to objectively track changes in fruit and vegetable intake in children and RCPS staff over time (e.g., adding salad bars). Recent evaluation efforts include (4) assessing improvements in developmental gaps via children's kinesthetic movement in ABL, and (5) testing how participation in the ABL lab may affect academic achievement. Such knowledge could provide a mechanism for kinesthetic learning to address learning losses in young children.

In 2018, the external evaluators conducted an Exploratory Force Field Analysis (E-FFA) with the C2BF team, the Superintendent, and the funding program officer. Leveraging strategic planning, participatory approaches, and Appreciative Inquiry, E-FFA enables participants to evaluate driving (enabling) and restraining (barrier) forces, and generates useful data to make strategic decisions (Redelfs et al., in submission).[1] The underlying principle is that change, progress, and growth can only be realized by either strengthening the driving forces or mitigating the restraining forces to change. We concluded with a participatory summative content analysis (49, 50) to increase relevance, consider context, and reduce evaluator bias as stakeholders interpreted the data and prioritized next steps. Comments related to the superintendent and funders were verified with participants later in individual conversations to reduce the effect of potential power dynamics on responses.

The C2BF team identified buy-in as one of the most influential positive forces, specifically buy-in from the superintendent, principals, and the funding organization, and to a slightly lesser degree from students and teachers who were early adopters. Strategic plans that were prioritized included creating division-wide action plans for health (including development of an RCPS wellness policy), participating in the committee to revise the Rappahannock County Comprehensive Plan and increase alignment, and increasing visibility (earned media, presentations, social media, etc.) as a vehicle for improving buy-in. The C2BF team was intentional about integrating these and other strategic actions into the proposed tasks for upcoming annual plans.

3.5.2. Critical elements

Several years later (fall 2022), team members and the principal investigator (superintendent) were interviewed by the principal external evaluator regarding their experiences with C2BF and their perceptions of challenges and successes. Interviews were done individually to reduce power dynamics and potential bias;

1 https://scholarsarchive.byu.edu/facpub/5832/

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TABLE 1 C2BF challenges, impacts, and actions taken.

Challenge	How it impacts C2BF	Actions taken by C2BF team
Dynamics of Rappahannock County (e.g., size of county and distance traveled)	Difficult to reach the entire county and for community members to participate in organized physical activity	• Increasing opportunities available to community members (e.g., fitness classes taught in converted teacher's lounge and nutrition/meal prep classes offered) • Offering classes in alternate locations
Space is limited in school buildings	Potentially limited opportunities to reach students/staff/community members	• Repurposing existing rooms (e.g., ABL lab, Neuronasium, and HS teachers' lounge) • Using floor space in the hallways (e.g., Sensory Pathway)
Lack of buy-in and competing priorities	Hinders program from expanding or being utilized fully	Developed buy-in from critical players • *New principal:* Worked with superintendent, shared the purpose and the supporting research • *New teachers:* Incorporated C2BF as part of standard orientation, including providing C2BF swag, and making it an invitation to "be part of the C2BF family"
Resistance to change	Difficulty implementing programming and initiatives, especially when required significant staff buy-in	• Phased in C2BF • Worked to earn trust early • Used a participatory/engaged approach to allow those who would implement to have a voice (e.g., cafeteria staff)
COVID challenges		
Child nutrition procedures no longer functioned during the at-home phase	Students who relied on school food faced increased food insecurity; which hindered C2BF cafeteria objectives	• Used POP Bucks for students to pick up lunches at Farmers Market • School lunch moved to delivery for weekday + weekend meals
Community offerings canceled during at-home phase	C2BF was unable to offer in-person classes and workshops	• Held a highly successful community walking challenge to benefit the Food Pantry • Offered online strength training programs in 12- and 8-week formats. • Moved much content online, which expanded reach
Teacher exhaustion and low morale	Teachers were less able to engage in healthy behaviors, model healthy behaviors for students, and support C2BF programming	• Show extra gratitude to teachers • Organized farmer's markets at the school with teacher certificates for free produce • RCPS provided extra compensation when teachers had remote learners in class
Student poor mental health	Students encountered additional trauma and stress due to COVID	• Created calming corners • Shifted disciplinary protocols to use calming corners before referral • Set up mindful minute push-ins

this would avoid the superintendent being present. After briefly reviewing previous evaluation findings and recommendations, the evaluator asked each person questions such as "What have been the most important factors for C2BF to grow/be sustained?" and "What made C2BF successful?" along with negatively framed questions like "What have been the greatest barriers for C2BF?" The full description and analysis of these interviews are reported in the paper with evaluation results. Interviewees' responses were thematically analyzed; the most common elements around success (and lack of failure) were: (1) buy-in and engagement from the RCPS superintendent, board, and other administrators; (2) a committed and supportive funding agency; (3) alignment with critical priorities within the district and the broader field of education; (4) buy-in from staff, students, and community members; (5) taking programming to the people (geographically and in terms of stages of change); (6) continually seeking feedback and ideas from stakeholders to address perceived needs and build buy-in; and (7) the breadth and inclusivity of the C2BF programming that provides "something for everyone" (potentially decreasing resistance). As an example, C2BF team members, school staff, and community members involved in programming frequently refer to the positive culture of health and wellness developed at RCPS.

The evaluators compared these elements with the driving and restraining forces from the 2018 Enhanced Force Field Analysis. Two elements stood out in this comparison and also aligned well with our evaluation experience as critical to program success and longevity: leadership engagement and aligned efforts.

3.5.3. Leadership engagement

Intentionally involving leadership has been a priority effort of C2BF. As the principal investigator, the superintendent has been highly involved in C2BF since the beginning. The superintendent's leadership style is inspiring and persuasive instead of authoritative, allowing her to gently persuade stakeholders instead of forcing compliance and slowly building buy-in. She has successfully engaged leaders at all levels (e.g., school board, central administration, and principals) as well as a majority of staff and teachers, so there are actors at every level who care and contribute. Building relationships with the school board, principals, and county commissioners has helped cultivate broader support and has minimized pushback. The superintendent also has carefully integrated C2BF into school-level policy, from inclusion in the district comprehensive plan to changes in disciplinary processes that incorporate best practices for self-regulation.

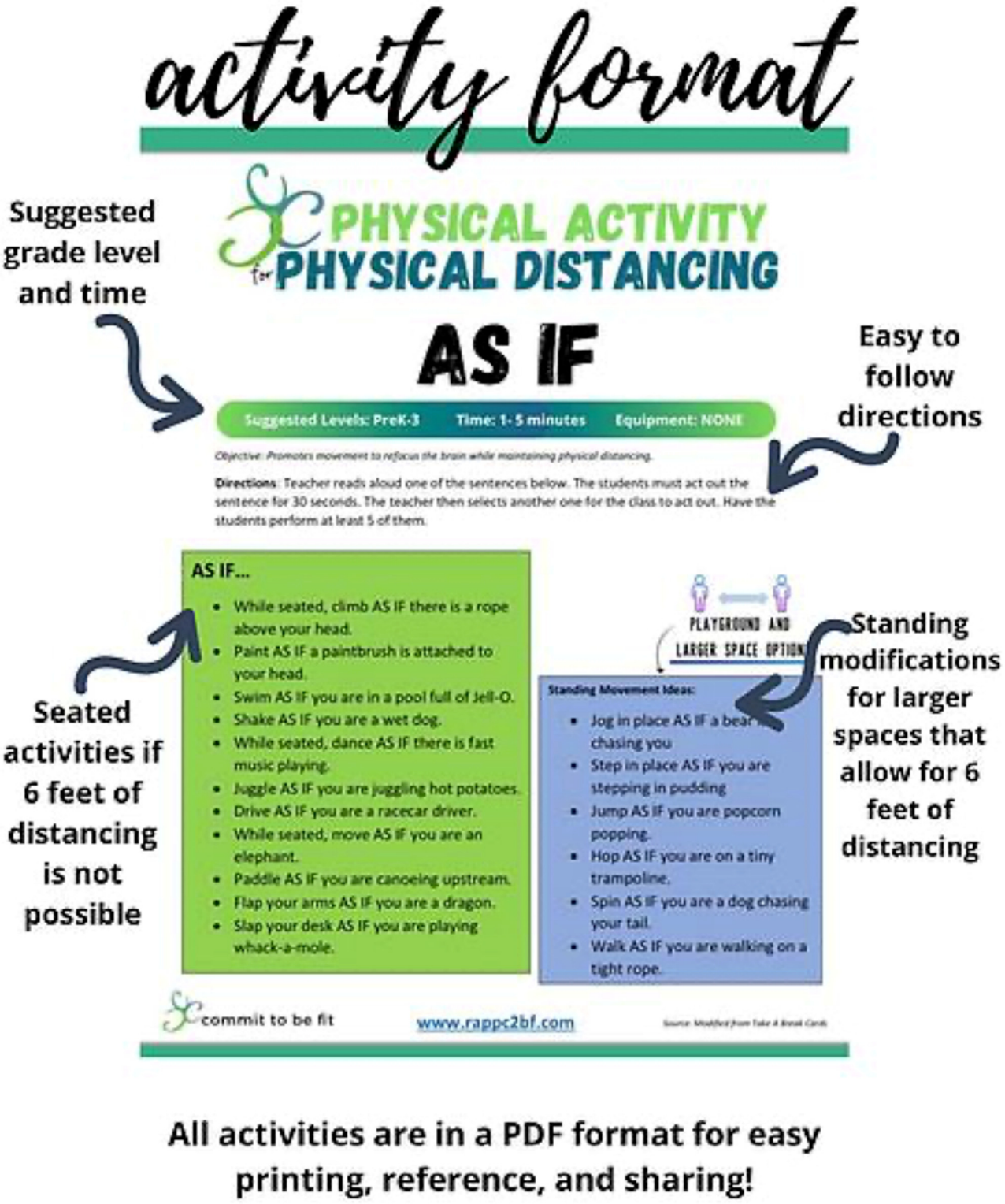

FIGURE 4
Example of physical activities class activities created by C2BF for teachers as modified for COVID-19.

Of the community residents interviewed in 2018, the majority (n = 11 of 16) made statements about perceiving the RCPS superintendent as having a deep commitment to the community, informed at least in part by C2BF. Generally, they expected this

commitment would translate into a greater long-term impact of C2BF on the schools and community than they would expect otherwise.

3.5.4. Aligned efforts

At the district level, C2BF was created to align with the already existing features of the health and wellness systems. At a local level, C2BF is aligned with (and incorporated into) the RCPS 5-year comprehensive plan as a mechanism through which the district can support student wellness; this includes C2BF support of a new telehealth clinic at the elementary school (there were no medical providers in the county prior to this clinic). RCPS provided input in the Rappahannock County Comprehensive Plan revisions in an effort to better align school and county efforts around health. At the state and national level, C2BF aligns with the Whole Child approach. The C2BF team has contributed to discussions with the Virginia School District Association around integrating a holistic approach to child health within the Commonwealth and, at a national level, with the US Department of Education and other educational associations.

4. Sustainability of C2BF

C2BF is an initiative that seeks to build a "culture of wellness" within its schools and the community by implementing holistic strategies across ecological levels. Although more complex, school initiatives that take a holistic approach and incorporate multiple, mutually supportive components across various ecological levels are more effective and sustainable (51). In addition, an essential strength of C2BF is the leadership and enduring commitment from the RCPS superintendent. While buy-in and engagement from principals, teachers, school nurses, and child nutrition staff are vital, the success and longevity of a district-wide health initiative depend on buy-in from upper-level leaders (e.g., the superintendent's office and/or school board) (52). Having the superintendent as the change agent has allowed C2BF to be consistently included in district-level policies and practices which would be critical to shifting organizational culture.

Programs such as C2BF will only benefit their intended audiences if the activities and practices can be sustained over time (53). Evaluators, the C2BF team, and key stakeholders agree that C2BF includes activities addressing the eight domains in the Program Sustainability Assessment Tool [PSAT; (53, 54)].

- Environmental support: C2BF has internal (e.g., superintendent, school board, teachers, and staff) and external (e.g., regional foundation and county leadership) champions and support.
- Funding stability: C2BF has external funding from a regional foundation and has integrated and aligned C2BF activities with school division functions [e.g., the C2BF staff member responsible for increasing public support and awareness (partially grant funded) also fills the role of RCPS media/community liaison (RCPS funded)]. Were the grant funding to go away, adaptations would have to be made to fully cover staff salaries through division funds.
- Partnerships: Community leaders and stakeholders are involved with C2BF (e.g., conversations between RCPS/C2BF and county officials; partnership with the Rappahannock Farmer's Market for Power of Produce bags; involvement with Rapp at Home—a senior village—to provide balance and modified fitness classes for aging residents).
- Organizational capacity: C2BF is integrated into standard RCPS operations, including child school nutrition, classroom teaching, PE classes, and communications.
- Evaluation: Ongoing process, developmental, implementation, and outcomes evaluations have been used to inform future planning and strategic development.
- Adaptation: C2BF has adapted to changing priorities (e.g., shift from child obesity focus to holistic health) and environmental changes (e.g., adaptations in response to the COVID pandemic).
- Communications: C2BF includes a communications strategy for public awareness, engagement, and support. This strategy aligns with RCPS media relations, increasing sustainability through shared funding.
- Strategic planning: C2BF has applied evaluation results to address prioritized restraining forces (barriers), including ensuring roles and responsibilities are clearly defined and developing a sustainability plan.

Luke et al. (53) found that funding stability, communications, strategic planning, and sometimes political support were typically the domains with the lowest scores for the 592 community and government-sponsored programs they assessed. C2BF addresses all eight PSAT domains, including the less common domains, a positive indication of potential sustainability.

5. Limitations

The framework underlying C2BF presented here is the result of the application of many principles and behavioral theories within the specific context of RCPS and Rappahannock County. While the foundational principles themselves may be considered universal (e.g., the most effective approaches for changing behavior will address multiple levels of the ecological model) the specific application as seen in C2BF may not be completely generalizable to other school districts and communities. We sought to reduce bias by involving multiple evaluators, engaging in participatory analyses (55) to test alternative explanations, and triangulation.

6. Conclusion

C2BF is working to create a strong foundation for positive change in Rappahannock County. The C2BF program and other similar initiatives (51) provide examples and show the importance of holistic interventions that span multiple ecological levels. Multi-level interventions have been shown to have a better chance of positively impacting children's health and optimizing their learning ability. Future longitudinal research is needed to confirm the long-term outcomes of multi-level holistic programming on behavior, norms, culture, and health.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding authors.

Ethics statement

The studies involving human participants were reviewed and approved by the Institutional Review Board at the University of Texas El Paso or the Institutional Review Board at Brigham Young University, and by Rappahannock County Public Schools Administration. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

SG and KD contributed to the conception of the C2BF initiative. SG, HJ, JT, and AB implemented the initiative and planned for upcoming phases. KD and ME provided strategic guidance. LW built the relationships that led to an evaluation partnership. AR organized and led the evaluations with assistance from DP. MS and AR wrote the first draft of the manuscript. JM wrote multiple sections of the manuscript and provided extensive revisions. All authors contributed to the manuscript revision, read, and approved the submitted version.

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Conflict of interest

HJ, JT, and AB are RCPS employees who received at least partial salary support from the PATH Foundation through the C2BF grant. SG is the RCPS superintendent and received no compensation from PATH. HJ, JT, AB, and SG were not involved in data analyses outside of the participatory analysis in the Enhanced Force Field Analysis. LW, AR, and DP were contracted by the PATH Foundation to provide evaluation support for C2BF. KD and ME are employees of the PATH Foundation but did not have a role in the evaluation design, data collection, analysis, or interpretation of the findings that were the basis for this publication, and their support as C2BF program officers was critical to its implementation and success; however, their roles in this publication were limited to providing feedback on the final draft.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2023.1067454/full#supplementary-material

SUPPLEMENTARY VIDEO
C2BF promotional video (copyright PATH Foundation 2019, used with permission).

SUPPLEMENTARY MATERIAL
C2BF program delivery and reach.

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Inclusive classroom climate development as the cornerstone of inclusive school building: review and perspectives

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Education institutional guidelines around the world agree that building more inclusive schools is a priority. The reality of school practice, however, belies this institutional will. To help fill the gap, this theoretical review documents the value that the construct of classroom climate brings to research and practice in terms of inclusive school development. The article firstly points out that the current main challenge is to develop Inclusive Mainstream Teaching (IMT) in diverse classrooms. Indeed, IMT is needed in all classrooms to guarantee the effectiveness of special accomodating measures in schools that are targeted at special education needs students. Intervening at classroom level is both a pragmatic and powerful way of developing inclusive schooling. However, developing IMT in the classroom remains a challenge for both teachers and researchers. Thus this review documents the central role that classroom climate should play in the development of IMT. More precisely, the factors of classroom climate that are associated with inclusive outcomes are identified. We also highlight how these factors and the measurements associated with them are efficient tools to guide IMT development. These measures are proximal, sensitive, complementary, and pragmatic indicators of effective IMT. Such indicators are very useful in helping research empirically document effective IMT, ensure that any small improvement is assessed, monitor teachers' progress, and assist their professional growth. Theoretically positioned as a mediator between inclusive teaching in mainstream classrooms and inclusive school outcomes, inclusive classroom climate is a tool that appears to be effective in supporting IMT development and, consequently, in the establishment of more inclusive schools.

KEYWORDS

inclusion, classroom environment, inclusive teaching, special education needs (SEN) students, integration, universal teaching

1. Introduction

Building more inclusive schools is a core element of international educational guidelines (UNESCO, 2015, 2016) and school policies around the world (Peters, 2004; Curcic, 2009; Katz, 2013; Watkins, 2017; Schwab, 2021). This political and institutional consensus is accompanied by a shared definition of the goals of inclusive education (Avramidis et al., 2000; UNESCO, 2009; Katz, 2013). The "ultimate" goal of inclusive education (Booth and Ainscow, 2002; Schwab, 2021) is that school forms "the basis for a just and non-discriminatory society" (UNESCO, 2009, p. 9). As such, this is a deeply social goal. Inclusive schools must promote

positive relationships between diverse students, peer acceptance and a sense of community for all, including those with special education needs (SEN; Koster et al., 2009; Bossaert et al., 2013). Since this first objective can only be achieved in a context of diversity, the second, more academic objective, is engagement and learning for all students despite the differences between them. Striving to achieve these goals is also crucial for overcoming other recurrent educational issues like bullying (e.g., Thornberg et al., 2022), school dropout (e.g., Reinke and Herman, 2002), students' well-being (e.g., Wang et al., 2020b) and even long-term health (e.g., Holt-Lunstad et al., 2015).

However, despite agreement over the objectives of an inclusive school, developing inclusive practices remains a major challenge (Ferguson, 2008; Heiniger and Hercod, 2017). The philosophical underpinnings of inclusive education are generally shared by teachers (Jury et al., 2021), but difficulties remain when it comes to implementation. This leads to skepticism, lack of confidence if not outright rejection by teachers of the inclusive approach (Desombre et al., 2019; Savolainen et al., 2022; Jury et al., 2023).

This theoretical review argues that there is a need to draw on the construct of classroom climate to overcome the gap between institutional objectives and the reality of the classroom. It followed a three-steps argumentation[1]. The first section point out that a top priority is to develop inclusive mainstream teaching (IMT) in diverse classrooms. Next, the article documents the central role that the classroom climate can play in developing IMT. The second section identifies the factors of the classroom climate that produce inclusive outcomes. The third section shows how those factors of inclusive classroom climate and the measures associated with them are tools that can efficiently support IMT development in classrooms.

2. Inclusive mainstream teaching as the current main challenge to developing inclusive schools

Although segregated schools for students with special education needs (SEN) still exist, most educational systems around the world aim to welcome as many students as possible in the same schools (for reviews, Curcic, 2009; Schwab, 2021). Nearly all the enrolled school population is now educated in mainstream schools (e.g., 97.36% in Education, E.A.f.S.N.a.I, 2017). To adapt these schools to such diversity, guidelines propose a variety of special accommodations targeting certain students around a mainstream form of teaching that is required to be more inclusive (Schwab, 2021). "Special accommodations" refer to the permanent or temporary formation of special needs groups within the school and to special needs teaching that occurs within or alongside mainstream classes. Such accommodations generally concern about 15% of school pupils, including pupils with learning or/and behavioral difficulties at school and students with officially-recognized specific needs (4.53% of students in Europe; Education, E.A.f.S.N.a.I, 2017). IMT is intended to provide the opportunity to as many students as possible to be included in mainstream teaching. The social aim is to create connections between diverse students and the pedagogic aim is to be flexible and differentiated enough to offer the best possibilities for development and learning for all (Willis and Mann, 2000; Tomlinson et al., 2003). The following empirical findings show that generalizing the development of IMT to all classrooms is what is currently needed to establish inclusive schools.

2.1. Inclusive mainstream teaching and efficiency of special accommodations

In this section, we review empirical evidence showing that special accommodations for SEN struggle to be efficient if they are not articulated with IMT in all classrooms.

First of all, special accommodations that permanently segregate students lead to mixed results in terms of academic achievement (Chiu et al., 2017). Moreover, this segregation gives no opportunity for cross-group interactions, thus doing nothing to counter stereotype-ridden, negative attitudes towards SEN students among the mainstream pupil population (for a review, Juvonen et al., 2019). Intergroup contacts in schools are necessary to enhance positive attitudes and trust towards minorities (Hewstone et al., 2018), cross-ethnic friendships, the emergence of complex social identities (Knifsend and Juvonen, 2017) and more positive outgroup stereotypes (Munniksma et al., 2013). In segregated situations, precautions are needed to ensure that intergroup contacts outside the classroom are constructive and even sought after. This requires the development of inclusive education principles in all students, i.e., an efficient IMT. Indeed, inclusive peer norms, low intergroup anxiety, expectation of similarity, the valuing of difference, social competencies like perspective taking, empathy and tolerance, are all essential to prompt mainstream students to be open to mixing with SEN students (for a review, Turner and Cameron, 2016). In sum, IMT is needed to encourage intergroup contact with SEN students and reduce the exclusion effects of special accommodations that isolate them.

In the second case, where special accommodations are based on the creation of temporary special groups and specialized interventions within mainstream classrooms, intergroup contacts do exist. Such arrangements are common in many countries. For example, most SEN students are placed in mainstream classrooms for 80% or more of their time in European schools (UNESCO, 2016). However, such settings can also lead to stereotype-reinforcement and status differences (Bigler and Liben, 2007). Without IMT, this intergroup saliency can

1 This theoretical review aims to document why the classroom climate approach is a promising perspective to build more inclusive schools. In this perspective, empirical evidence that feeds each of the three steps of the argumentation was collected and organized. This review was firstly based on the analysis of empirical studies found in the systematic reviews and meta-analyses dealing with inclusive teaching or with the consequences and antecedents of classroom climate. It was completed with a search realized in January 2023 on *Sciences direct*, *Web of Sciences*, *ERIC*, *Pascal & Francis*, *APA PsyNET* and *Taylor & Francis* databases, for French or English articles including the keywords "inclusive" and "classroom climate." This search led to 650 different articles that were analyzed and used to document each step of our argumentation.

actually reinforce discrimination and exclusion (Córdova and Cervantes, 2010; Covelli and de Anna, 2020). For example, special accommodations targeted at SEN can at times be seen as an unfair use of resources by mainstream students—especially those experiencing academic difficulty, their parents and even teachers. In such circumstances, even more discrimination may result, if SEN students are perceived as a threat to mainstream students' development and to values of meritocracy (for reviews, Iyer, 2022; Stanczak et al., 2023). Similarly, if achievement is defined in terms of superiority over others in the classroom (i.e., normative comparison), special accommodations can result in SEN students again being seen as a threat to mainstream students' achievements. This can lead to rejection of SEN students and their feelings of exclusion (Iyer, 2022).

Interestingly, some studies show a third scenario. In this case, offering special accommodations initially provided just for students with SEN, to other mainstream students when necessary, can contribute to breaking down intergroup divisions and reducing threat perceptions. For example, high-quality co-teaching between mainstream and specialized teachers within an inclusive setting facilitates learning for students with and without SEN, social acceptance of students with SEN and socio-emotional development for all (Bear and Proctor, 1990; Juvonen and Bear, 1992; Schwab, 2017).

Taken together, these findings highlight that mainstream and special teaching needs to be more inclusive in all contexts (Hornby, 2015). IMT development is thus a key to the development of truly inclusive schools.

2.2. Classroom teaching as a pragmatic and powerful element to develop inclusive schools

IMT within a classroom is a considerable challenge, but less than developing an entire inclusive school. IMT is circumscribed to the classroom environment specifically cultivated by one teacher (Schweig et al., 2019). Moreover, modifying the way to teach in their classroom is the teacher's foremost concern. This is the element in which they will invest the most (Bonvin and Margas, 2021). Seeking to build an entire inclusive school requires both training and convincing virtually every member of the educative team. Since training courses are often organized by academic discipline, this is rarely the case. Inversely, even isolated teachers can seek to implement IMT. This perspective fits with the relative independency of each classroom dynamics in a school (Wang and Degol, 2016). The progress of one teacher in implementing IMT may even give others self-confidence and trigger a broader transformation.

The classroom level is not just more pragmatic for developing inclusive schools. It is also the main source of variation in students' learning and achievement (Nye et al., 2004; Pianta and Hamre, 2009). The classroom is the environment in which students learn and interact with peers and teachers on a daily basis (Brackett et al., 2012; Fraser, 2015). These daily interactions are the primary processes that provide students the opportunity to develop academic and social competencies (Hamre, 2014). As such, the development of IMT in classrooms seems the most pragmatic and efficient factor for developing inclusive schools.

2.3. Inclusive mainstream teaching: the main current issue for teachers and researchers

Special accommodations are often explicitly defined in institutional directives because they are often associated with specific fundings (Schwab, 2021) and because they build on the legacy of previous special education development efforts (Bedoin and Séguillon, 2021). However, this is not the case for IMT. Institutional directives focus only on the objectives of IMT and, at best, describe what IMT needs to develop in an appropriate way (e.g., differentiated instruction, accessible teaching content, positive relationships between students in classrooms, cooperation) without indicating how. The implementation of IMT is therefore left to teachers who can feel powerless and helpless. As evidence of this situation, many teachers express concerns about inclusive education and more precisely, by order of importance, (a) the lack of resources in terms of staff and funding, (b) the extended working hours induced by an inclusive classroom, (c) the difficulties associated with IMT, and (d) the appropriateness of inclusive education in the classroom, which may lead to reduced learning for mainstream students (Jury et al., 2023). This last issue appears the most frequently in teachers' concerns about inclusive education (Jury et al., 2023). Teachers' negative attitudes are also often fueled by a perceived lack of self-efficacy (Desombre et al., 2019) and the feeling that they are unable to cope with specific students' difficulties (de Boer et al., 2011; Monsen et al., 2014). In sum, the main issue behind teachers' resistance to developing IMT is the perceived difficulty of teaching in a diverse classroom.

It is not very surprising that educational guidelines are unclear about IMT implementation and that teachers are reluctant to try, considering that even research has trouble identifying effective IMT strategies (Juvonen et al., 2019; Schwab, 2021). Empirical evidence of successful IMT implementation is largely lacking, especially in contexts of diversity (Bossaert et al., 2012; De Vroey et al., 2016; Loreman, 2017; Fabes et al., 2019). For example, the development of differentiated instruction leads to diverse practices, with no consensus or empirical conclusions to guide these practices (Galand, 2017). Similarly, the management of social dynamics in the classroom lacks empirical evidence (Farmer et al., 2018). These observations help us to understand the lack of existing teacher training on IMT (Stough, 2006; Webster-Stratton et al., 2008). For many authors (Juvonen et al., 2019; Van Mieghem et al., 2020) and politicians (United Nations Human Rights Special Procedure, 2019), the key foundation for successful implementation of IMT remains the development of evidence-based trainings. Yet, identifying empirically validated IMT practices constitutes the most prominent challenge to developing inclusive schools, according to teachers, researchers and even politicians. In other words, how do we know if the IMT used actually make a difference? As IMT obviously works at the level of the classroom, taking classroom climate into consideration seems a particularly promising way of testing its efficacy. The two following sections present the model of classroom climate and evidence that classroom climate represents an effective approach for developing IMT.

3. Classroom climate and the achievement of inclusive school goals

Coming from organizational psychology, the concept of climate refers to the feel of an environment (e.g., the school, the classroom) that emerges from actors' perceptions of their experiences in this environment (e.g., Ostroff et al., 2003). Even though these experiences may vary from one day to another, they converge towards "a consistent image of the long-standing attributes of classroom environment" (Fraser, 1998, p. 8). Classroom climate thus corresponds to the overall perception of relatively stable characteristics and social interactions that occur within the classroom environment (Filiault and Fortin, 2011).

A major finding on classroom climate is that students' perceptions of their experiences in the classroom are critical in guiding their behaviors and, consequently, their engagement, learning and social behaviors at school (Fraser, 1998; Wang, 2012; Wagner et al., 2013; Wang et al., 2020b). Students' perceptions of different factors of classroom climate are thus key to understanding how modifying teaching in the classroom may affect both goals of inclusive schooling.

3.1. Classroom climate multidimensional model

Conceptualizations of classroom climate encompass the different processes experienced in classrooms (for reviews, Hamre et al., 2007; Downer et al., 2010; Kaplan Toren and Seginer, 2015). As classroom climate refers to the perception of the classroom environment stemming from various types of experiences, classroom climate models are multidimensional. Following Moos and Trickett (1974) and Walberg and Anderson (1968) conceptualizations, these models all converge towards at least three basic dimensions (Fraser, 1998; Pianta and Hamre, 2009; Filiault and Fortin, 2011; Fauth et al., 2014; Bardach et al., 2020; Wang et al., 2020b), even if the terminologies and boundaries of these dimensions sometimes diverge.

The first dimension, often called the *relationship* (Fraser, 1998) or *socioemotional support* dimension (Wang et al., 2020b) refers to the perceptions of the "nature and intensity of personal relationships within the environment and assesses the extent to which people are involved in the environment and support and help each other" (Fraser, 1998, p. 9). It relies on the social and emotional wellbeing of students, including the warmth, safety, connectedness, quality of interactions between teachers and peers, and their consecutive sense of belonging to the classroom (Filiault and Fortin, 2011; Wang et al., 2020b). The second dimension is named the *system maintenance and change dimension* (Fraser, 1998) or *organization and management dimension* (Wang et al., 2020b). It includes perceptions of the organization inside the classroom such as clarity of rules and order, openness to negotiation. This dimension is related to the management of students' behavior, time, and attention in the classroom (Hamre et al., 2007). Finally, the *personal development* (Fraser, 1998) or *instructional dimension* (Wang et al., 2020b) assesses the perceptions of instruction strategies and learning processes, which favor (or not) students' personal growth and learning in the classroom (Fraser, 1998). This dimension is dependent on supportive interactions that facilitate learning, the provision of challenging tasks, and constructive feedback (Hmelo-Silver et al., 2007; Fauth et al., 2014).

A construct validity approach suggests that theory, measurement, empirical research, and practice are intertwined and that the neglect of one aspect can undermine the others and the resulting validity of the construct (Marsh, 2002). Such an approach is useful in appreciating the relevance of the classroom climate model. When it comes to the factors within the three basic dimensions of classroom climate, the relations between theory, measurement and empirical results are well-documented (for reviews, Fraser, 1998; Pianta and Hamre, 2009). Recent meta-analysis (Wang et al., 2020b) and large scale studies (e.g., Hamre et al., 2014) showed relations between these factors of classroom climate and important educational outcomes. Moreover, beyond the validated scales that exist to measure each specific factors of classroom climate, some measurement instruments regrouped several of these scales (for reviews, Fraser, 1998; Altaf, 2015; Fraser, 2015) and revealed good factorial validity (e.g., the WIHIC, Skordi and Fraser, 2019). Adaptations of these instruments for various types of schools and students exist (e.g., Beld et al., 2018). Researchers can therefore choose the appropriate instrument or even part of this instrument to test their hypothesis in various contexts. It is even assumed that "few fields in education can boast the existence of such a rich array of validated and robust instruments that have been used in so many research applications" (Fraser, 1998, p. 8).

Despite this solidity, more research is needed to specify the exact definition and boundaries of the three basic dimensions of classroom climate. The terminologies of these dimensions vary and the specific factors included in those dimensions can also vary from one model to another (see, Fraser, 1998; Pianta and Hamre, 2009). For example, perceived autonomy support in the classroom may, depending on how it is conceptualized, be included in the *relationship* or *socio-emotional dimension* (Pianta and Hamre, 2009), the *organization and management dimension* (Wang et al., 2020b), or the *instructional* or *personal development dimension* (Moos and Trickett, 1974). Similarly, the perception of safety in the classroom (i.e., physical and emotional security) is proposed as a specific fourth dimension (Wang and Degol, 2016), included in the *relationship dimension* or even the *instructional dimension* (e.g., Wang et al., 2020b). To add to the confusion, empirical tests of the three dimensions model of classroom climate are not yet very conclusive (e.g., Hamre et al., 2014).

Nevertheless, in practice, researchers rarely need to encompass the classroom climate as a whole. They often only choose the appropriate validated scales depending on the specific factors of classroom climate they are focusing on and their hypotheses (Fraser, 2015). In sum, the issue of the precise definition of the three basic dimensions of classroom climate does not prevent researchers from identifying the antecedents and consequences of specific factors of classroom climate. These factors of classroom climate, whatever the dimension they belong to, are theoretically and empirically posited as mediators between classroom teaching and important educational outcomes and can be measured with validated instruments. They represent a promising perspective to identify key elements of IMT. The next section hence reviews empirical work identifying factors of classroom climate that help accomplish the social and academic goals of inclusive schools.

3.2. The relations between factors of classroom climate and inclusive outcomes

The social objective of an inclusive school is to improve social behaviors between peers, especially that involving potentially stigmatized peers. The academic objective of an inclusive school is to promote engagement, learning and achievement for all students, particularly those with learning difficulties, in a context of diversity. This section reviews factors of classroom climate that are associated with such outcomes. These are presented according to the three proposed basic dimensions of classroom climate, bearing in mind that these dimensions are open to discussion. The objective here is to focus on factors of classroom climate that are related to inclusive outcomes.

Concerning the *relationship dimension* of classroom climate, previous results have identified three factors that foster achievement in terms of both the social and academic goals that inclusive schools aim for. Firstly, perceived quality of relations between classroom peers and perceived quality of relations between pupils and teachers are two important factors of an inclusive classroom climate and they are associated with both social and academic goal fulfilment. More precisely, these two aspects of the relational classroom climate are related to students' social behaviors (Kellam et al., 1998; Mooij, 1999; Roubinov et al., 2020), especially peer victimization and bullying (Barboza et al., 2009; Gregory et al., 2010; Raskauskas et al., 2010; Gendron et al., 2011; Turner et al., 2014; Thornberg et al., 2017; Gage, 2020; Montero-Montero et al., 2021). Perceived quality of relations between peers and between pupils and teachers are also related to students' engagement, self-determination, efficient learning self-regulation and achievement (Ferguson and Dorman, 2003; Anderson et al., 2004; Lynch and Soukup Sr, 2017). Meta-analyses have found moderate relationships between the quality of teacher-students relations and students' engagement at school and achievement (e.g., Quin, 2017), as well as general executive functioning (Vandenbroucke et al., 2018). Additionally, longitudinal large cross-sectional studies reveal the short-term and long-term benefits of positive peer relations and pupil-teacher relations in terms of reduced aggression and exclusion between students, and also students' academic results (e.g., Avant et al., 2011; Thornberg et al., 2022). Crucially from the point of inclusion, even if all children benefit from the quality of relationships in the classroom, this is especially true for at-risk, stigmatized, and vulnerable students. Indeed, the positive effects of the quality of classroom relations on such students in terms of reduced exclusion, improved social adjustment, less deviant peer affiliation and greater sense of belonging within the school (Gazelle, 2006; Avant et al., 2011) have been well documented. Furthermore, their active academic engagement and achievement are also improved (Hamre and Pianta, 2005; Berti et al., 2010; Allodi, 2010a). The third factor of an inclusive classroom climate is the perceived belonging to the classroom (Bossaert et al., 2013). Perceived classroom belonging is related to the academic self-efficacy, intrinsic motivation and task value perceived by students and their sense of belonging and social acceptance (Freeman et al., 2007). It is also related to degree of persistence for African American undergraduate women (Booker, 2016). In sum, students' sense of classroom belonging, student-student and student-teacher relationships in the classroom are three crucial factors in achieving both the social and academic objectives of inclusive schools. Yet they are often neglected in educational policies and teacher training programs (Allodi, 2010b).

Concerning the *organization and management dimension* of the classroom climate, four factors appear to be linked to the two desired outcomes. First of all, a meta-analysis has showed that the perceived quality of class organization and clarity of classroom rules improve behavioral and emotional outcomes (Korpershoek et al., 2016), as well as social competence (Shechtman, 2006; Barbarin et al., 2010). Moreover, these factors also lead to higher math and reading achievements over time (Bennacer, 2000; Ponitz et al., 2009; Gaskins et al., 2012; Hatfield et al., 2016; Korpershoek et al., 2016) and more efficient self-regulation (Brody et al., 2002), engagement and task persistence in the classroom (Bohn et al., 2004; Rimm-Kaufman et al., 2009). Even more important for effective inclusion, the quality of classroom organization in an inclusive setting is associated with social and academic outcomes for special needs students as well as for others (Ainscow et al., 2006). Students' autonomy management is a second factor of the organization and management dimension which helps achieve inclusion-related social and academic objectives. Indeed, the perceived authoritarianism of teachers is directly related to bullying (Thornberg, 2018) and, inversely, a democratic management climate in the classroom promotes democratic values in students and attitudes of responsibilities inside as well as outside the school (Torney-Purta et al., 2001). Complementarily, a student-centered style of teaching (i.e., where students are considered to be active participants of their learning and where teachers try to facilitate students' autonomous efforts to learn) induces positive social consequences for students susceptible to stress whilst having no negative impact on less sensitive students (Roubinov et al., 2020). A third related inclusive classroom climate factor resides in the feeling of justice (or injustice) between students in the classroom. More precisely, feelings of injustice from teacher management are negatively associated with academic self-efficacy (Dorman, 2001), engagement (Berti et al., 2010), learning motivation (Dalbert and Maes, 2002), and even long-term academic achievement (Resh and Sabbagh, 2009). Feelings of injustice, moreover, modify the conception of equity and just societies (Dar and Resh, 2003). Finally, the fourth factor observed in the literature refers to the social norms that are perceived as salient in the classroom. Indeed, salient pro-inclusion social norms in the classroom lead to more inclusive behaviors in all students, a stronger sense of belonging among students from marginalized groups, and a reduction in the achievement gap (Murrar et al., 2020; Brauer et al., 2021).

Examining the *instructional dimension* of classroom climate, we find three factors related to inclusive outcomes. Firstly, the perceived differentiation of learning improves social participation in the classroom (Zurbriggen et al., 2021) and achievement (Fast et al., 2010; Curby et al., 2011), a positive effect that applies to at-risk students as well (Hamre and Pianta, 2005). Conversely, lack of consideration for differences between pupils is associated with school disengagement and absenteeism (Fallis and Opotow, 2003). Secondly, a climate that supports pupil perceived autonomy and avoids perceptions of teacher control leads to prosocial behavior between students (Cheon et al., 2019). And thirdly, pupil perceptions of a mastery-goal classroom learning structure are associated with a sense of belonging (Kumar, 2006), positive socio-emotional outcomes (Shim et al., 2013), less self-handicapping strategies (Ferguson and Dorman, 2003) and better achievement (Bennacer, 2000; Fast et al., 2010; Curby et al., 2011). Conversely, pupil perceptions of performance goal promotion and a competitive climate induce negative socio-emotional

outcomes (Loukas and Murphy, 2007) and self-handicapping strategies (Ferguson and Dorman, 2003).

Even if non-exhaustive, the factors identified here allow us to draw more precise guidelines as to what we should aim for as we go forward in building IMT. These factors sketch out concrete outcomes rather than simply focusing on the ultimate and more abstract, distal goal of inclusion (e.g., achievement for all, stereotype-reduction and increased pro-social behavior). The next section continues to document this promising perspective. It focuses on how the measurements of these factors of inclusive classroom climate can help us develop the concrete building-blocks of IMT in classrooms and accurately evaluate their effects.

4. Inclusive classroom climate factors and the development of IMT

Studies identifying concrete IMT actions that actively support the inclusive factors of classroom climate are lacking (Tetler and Baltzer, 2011; De Vroey et al., 2016; Loreman, 2017). For example, in the mentioned search in scientific databases, only 10% of the 650 articles including "classroom climate" and "inclusion" were empirical studies investigating antecedents of classroom climate. These studies were moreover mostly based on correlational designs. The following section aims to show how being aware of the factors of inclusive classroom climate can help concretely develop IMT in the classrooms and guide the development of much-needed action research studies.

4.1. Factors of inclusive classroom climate perceived by students are proximal, sensitive, and pragmatic indicators of IMT

The factors of inclusive classroom climate are closer to day-to-day classroom life than the final inclusion-related outcomes, which need time to be changed. These factors are direct specific perceptions of classroom experiences. As such, they are more sensitive indicators of objective progress in IMT (Tetler and Baltzer, 2011). Sensitive indicators of IMT efficiency make it possible to detect even the smallest effects of modifications in IMT. That means that smaller samples and less time-consuming studies are required to obtain significant results and provide evidence-based practice guidelines. Sensitive indicators of efficient IMT are also essential to preserve teachers' self confidence in their capacity to improve their practices. This is particularly important as teachers' lack of self-confidence to teach in an inclusive manner has been well documented, along with the resulting impact on attitudes towards inclusive education (Desombre et al., 2019). Finally, the various validated measures of factors of classroom climate (for a review, Fraser, 2015) also provide evidence that the classroom climate approach is an appropriate and pragmatic way to identify effective IMT elements. Such measures can even be used in addition to final inclusive outcomes to test the expected mediation process and offer a more complete view of the effects of IMT modifications.

From another point of view, using students' perceptions of classroom climate rather than teachers' or observers' reports is likely to be a more reliable way of developing IMT. Theoretically, students' self-reports, compared to teachers' and external observers' reports, have the advantage of capturing the perceptions of the individuals whose behaviors are precisely the expected outcomes (Fraser, 1998). Students' self-reports are also more precise because they are based on comparisons with other classroom climates that students have previously experienced throughout their schooling. They moreover result from all of the experiences that took place for them in the classroom, while external observers and even teachers only observed part of these experiences (Wang et al., 2020a). Evidence for this assumption can be found in studies comparing the relationships between inclusive outcomes and classroom climate measured according to these different sources. For example, in the study of Wang et al. (2020a), teachers' reports did not significantly predict any student' outcomes. Student reports had larger and more significant prediction effects when it came to student engagement and grades, whilst observers' reports had smaller but better prediction effects on students' long term achivement (i.e., standardized test scores after one year). Meta-analysis confirmed these results, as the source of reports of classroom climate (students, teachers, or observers) significantly moderated the strength of the relations between classroom climate and educational outcomes (Wang et al., 2020b). More precisely, only students' reports of classroom climate were significantly associated with all outcomes assessed in the study (i.e., social competence, externalizing behaviors, socioemotional distress, engagement, and achievement). Additional evidence can be found in studies testing the effects of IMT modifications on both classroom climate and inclusive outcomes. For example, the study of Cheon et al. (2019) tested the longitudinal effects of a teacher training program on students' social behaviors and measurements of inclusive classroom climate *via* students and observers' reports. Results showed that students' reports were as effective as observers' reports in detecting changes in teaching style. But students' reports of classroom climate were a better predictor of final inclusive outcomes than observers' reports. Given that IMT needs to promote inclusive student outcomes to be effective, inclusive factors of classroom climate as perceived by students seem to be the best indicators of effective IMT. Students are key stakeholders to be consulted on issues that concern them, such as inclusion (Ainscow, 2007; Tetler and Baltzer, 2011).

Finally, classroom climate questionnaires are more pragmatic than videos, external observations, and techniques of naturalistic inquiry, ethnography, case study or interpretive research (see, Fraser, 1998). While recognizing that all methods have advantages and remain complementary, classroom climate questionnaires are particularly well adapted to school context. A last additional advantage is that classroom climate questionnaires can easily be used by teachers themselves if they want to evaluate their own practice and its evolution. Such procedures based on classroom climate questionnaires have already been developed and proved their efficiency in improving practices (see, Taylor et al., 1997; Fraser, 1998; Nelson et al., 2015; Moreu et al., 2021). Because they are easy to use, classroom climate questionnaires can also help to diagnose problems and develop responses before problems are grounded in classroom routines (Hoy and Woolfolk, 1990; MacNeil et al., 2009; Schweig et al., 2019).

To summarize, students' self-reports of the listed inclusive factors of classroom climate are not only predictors of inclusive outcomes. They are also proximal, sensitive, and pragmatic indicators of IMT efficiency. They can help research to identify efficient elements of IMT,

monitor progress, ensure that even small improvements are assessed, and assist professional growth (Schweig et al., 2019).

4.2. A multilevel multi-factor classroom climate measure to better identify effective IMT

IMT needs to be accessible to all students in the classroom. IMT aims to create a teaching experience that is shared by the entire classroom, rather than only focusing on marginalized students and trying to compensate their shortcomings. This universal accessibility is the core of the universal design for learning (Rose and Meyer, 2002), which led to promising results in promoting inclusion (Katz, 2013, 2015). This means that IMT improvements should result in improvements of student perceptions of the classroom climate for the large majority of students.

It follows that two methods can help to better document IMT improvement by means of students' self-reports of classroom climate. First of all, the quality of IMT can be observed through the reduction of influence of students' status (social and academic) in the classroom on their perception of classroom climate. Efficient IMT needs to increase engagement and learning for all students, and consequently independently from students' status (Cohen, 1994; Lotan, 2006; Pescarmona, 2014; Lotan and Holthuis, 2021; Lotan, 2022). Measuring student status in addition to classroom climate provides the opportunity to document the decrease in the influence of student status on classroom climate which implies successful IMT implementation.

Second, IMT improvement can also be addressed through hierarchical linear modeling (HLM). HLM can distinguish the classroom level and the individual level of the students' reports of classroom climate (Lüdtke et al., 2009; Marsh et al., 2012; Bardach et al., 2020). The common variance between students, at classroom level, constitutes an indicator of shared perceptions of the climate. Conversely, large residual differences between students in the same class, once shared agreement between students in the same class is controlled for, implies that there is significant diversity in perceptions of classroom climate. Efficient IMT is supposed to increase students' reports of classroom climate and its inclusive consequences at the class level. Nevertheless, focusing on climate at the classroom level requires large sample studies, as the number of classes included in the analysis must be sufficient.

From another point of view, measuring several factors of the classroom climate at the same time offers a more effective measure of IMT. For example, cooperative pedagogy, often highlighted as a core element of IMT (e.g., Juvonen et al., 2019), is supposed to improve the student relationship aspect of classroom climate (Roseth et al., 2008). Nevertheless, cooperative pedagogy is also related to feelings of justice (Ghaith, 2003) and equity (Buchs and Maradan, 2021), and can improve learning, especially in a context of diversity (e.g., Falvey and Givner, 2005). To really catch the efficiency of cooperative pedagogy for inclusion hence requires measuring different factors of inclusive classroom climate. Similar conclusions can be reached when focusing on the inclusive effects of socioemotional learning programs, which primarily target the quality of relationships between students but can also impact factors of classroom climate associated with instruction (Durlak et al., 2011; Sklad et al., 2012). Moreover, hypothetical elements of IMT (e.g., Jigsaw cooperative method), often initially suggest fostering one factor of inclusive classroom climate (e.g., improving intergroup attitudes, Williams, 2004). But they may also undermine another factor (e.g., engagement, Cochon Drouet et al., 2022). Using a multi-factor measure of classroom climate helps to show that a single promising element of IMT has the potential to increase different factors of classroom climate, whilst maybe at the same time undermining others. Finally, the use of multi-factor measures of classroom climate is also a good way to diagnose specific difficulties in IMT and focus on one targeted factor (Moreu et al., 2021).

5. Conclusion

Despite the long-standing consensus on the need for inclusive education in educational systems around the world, mainstream schools are struggling to meet their two inclusion goals, i.e., promoting prosocial behaviors between diverse students and fostering engagement, learning and achievement for all students in a context of diversity. Recurrent problems such as bullying, school drop-out and ill-being are markers of, among other things, a lack of inclusion in the schools. This article helps address the discrepancy between the institutional will for inclusive schools and the reality of practices in the field. It reviews findings that show the added value of the classroom climate construct in developing more inclusive schools. According to these findings, the development of an inclusive classroom climate must be considered as the cornerstone of inclusive school building for three reasons.

Firstly, developing inclusive teaching in all classrooms is the core, yet also the main challenge of inclusive schools. Secondly, previous works clearly identify certain inclusive factors of classroom climate that are associated with the two inclusive objectives. Even if further work is needed to complete this picture, the factors reviewed constitute a preliminary definition of what characteristics a classroom climate needs in order to be inclusive. Thirdly, beyond the guideline that this definition of an inclusive classroom climate already represents, the classroom climate approach and associated validated measures can provide a hands-on way to develop IMT in the field. Indeed, measures of those listed factors, and especially students' self-reports, are proximal, sensitive, and pragmatic indicators of effective IMT. A multilevel multi-factor classroom climate measure has the potential to document efficient IMT even more precisely. Moreover, such measures can also help teachers and education teams carry out an inclusive climate audit of their learning context (e.g., MacNeil et al., 2009), monitor their efforts in improving the situation (Nelson et al., 2015), and participate in their professional growth (Schweig et al., 2019; Moreu et al., 2021).

On this question of building inclusive schools, teachers have legitimate concerns when faced with the important professional transformation required by IMT in inclusive settings. Researchers are also struggling, as IMT is a practical challenge that requires being aware of the specific constraints that come with teaching. External bodies can draw up useful guidelines that ideally document associations between factors of classroom climate and inclusive outcomes. However, the concrete development of IMT in classrooms ultimately requires collaboration between teachers and researchers. The classroom climate construct constitutes an efficient tool to support these collaborations.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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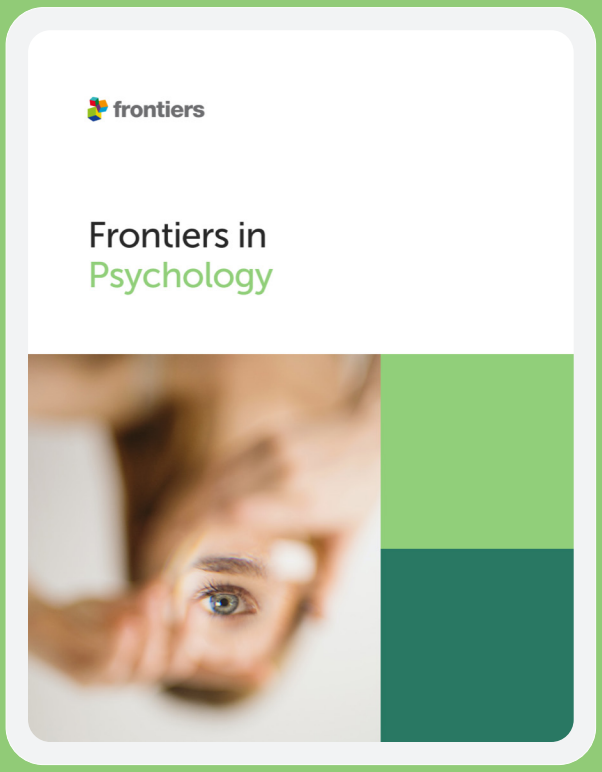

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