



Research article

Teaching behaviours of clinical teachers and professional commitment among nursing students: A moderated mediation model of optimism and psychological well-being

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ABSTRACT

Background: Understanding the paths that influence professional commitment among nursing students is important for helping students continue the nursing profession after graduation. The paths between the teaching behaviours of clinical teachers (TBCT) and professional commitment were unknown.

Objectives: This study aimed to examine whether psychological well-being mediated the relationships between the teaching behaviours of clinical teachers and professional commitment of nursing students. Moreover, we investigated whether the mediating effects of psychological well-being were moderated by optimism.

Design: A cross-sectional design was conducted.

Setting and participants: A total of 318 students from 24 hospitals in 13 cities in northern, north-eastern, and eastern China were included in the study.

Methods: The instruments used in this study included the scale of teaching behaviours of clinical teachers, a brief inventory of thriving (measuring psychological well-being), a life orientation test (measuring optimism), and a professional commitment scale. The PROCESS macro for SPSS was used to perform mediation analysis and moderated mediation analyses.

Results: Psychological well-being of nursing students partially mediated the relationships between the teaching behaviours of clinical teachers and professional commitment of nursing students. Also, optimism moderated the indirect effect of this mediation model. The indirect effect of clinical teachers' teaching behaviours was stronger for nursing students with low levels of optimism.

Conclusion: The findings suggest that the teaching behaviours of clinical teachers and psychological well-being promote professional commitment. In addition, the mediation of psychological well-being between the teaching behaviours of clinical teachers and professional commitment was conditional on different levels of optimism. Clinical teachers should pay special attention to students with low levels of optimism because teaching behaviours of clinical teachers exert more influence on those students' professional commitment.

1. Introduction

Professional commitment, also called occupational commitment, is a strength of attachment to one's profession, an attitude of identifying with the profession, internalizing the profession into one's own sense of responsibility, and a willingness to work hard for that profession (Lee et al., 2000; Caricati et al., 2015). Professional commitment is related to the retention of nursing students, professional development, and quality of care in their future work. Low professional commitment is a risk factor for turnover (Li et al., 2016).

Researchers have given attention to the professional commitment of

nurses in hospitals (Hoeve et al., 2018; Mersin et al., 2020; Ten Hoeve et al., 2020). However, to the best of our knowledge, research about factors related to the professional commitment of nursing students in the clinical setting is limited, despite the necessity for them to be comprehensively understood. Nursing students in practice are future nurses, and their professional commitment is key to deciding to stay in the nursing profession. Nursing students transitioning from campus to practice settings face a complicated environment—a challenge deserving greater attention from researchers and practitioners (Guerrero et al., 2017). Moreover, many nurses experienced intense stress and intended to leave their jobs due to the prolonged time required to take

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care of a larger number of patients during the Covid-19 pandemic. Thus, improving social support and nurses' positive coping skills have been emphasized (Fronada and Labrague, 2022). As future nurses, nursing students' psychological well-being and professional commitment also play an important role in their future contributions to human health.

2. Background

2.1. Teaching behaviours of clinical teachers (TBCT)

Nurse educators on campus are replaced by clinical teachers (mentors) in practice settings. The role of clinical teaching is becoming increasingly important in clinical practice (Saukkoriipi et al., 2020). The teaching behaviours of clinical teachers (mentors) include teaching practical skills, supervising students, completing student assessments, providing support, and working with students during their shifts (Hanson et al., 2018; Niaz and Mistry, 2020). Students in a supportive clinical learning environment receive appropriate instruction and feedback that benefit the development of competence. The quality of the clinical learning environment is largely determined by clinical teachers (Cantillon et al., 2019). Enhancing students' professional competence in nursing is associated with their professionalism (Jokelainen et al., 2011) and success in clinical learning (Saukkoriipi et al., 2020). As such, clinical teachers should not only possess clinical skills, knowledge scope, and teaching abilities (including constructive feedback and fair assessments), they should also respect students, acting as role models (Niaz and Mistry, 2020). Thus, TBCT may potentially influence students' professional values and commitment.

2.2. Psychological well-being as a potential mediator

The TBCT were assumed to be related to psychological well-being in the present study. Psychological well-being includes positive feelings, self-value, self-confidence, goals of life, engagement, and a sense of belonging (Su et al., 2014). The guidance of clinical teachers enhances the clinical competence of students and impacts their satisfaction and motivation in clinical learning (Saukkoriipi et al., 2020). On the one hand, satisfaction with teaching behaviours in the clinical learning environment enables students to be more competent and confident (Eick et al., 2012); on the other hand, supportive teaching styles that ensure that all students are fairly involved and engaged are important for any unconscious biases, which can profoundly influence student's sense of belonging (Harrison et al., 2019). Hence, the aforementioned basis implies a possible link between TBCT and the psychological well-being of nursing students.

Psychological well-being was assumed to be related to professional commitment in the present study. Negative emotions, job stressors, care complexity, lack of support, and insufficient competence have been shown to be negatively related to professional commitment among in-service nurses (Hoeve et al., 2018; Ten Hoeve et al., 2020). Burnout, job satisfaction, compassionate love, career interest, and human capital have also been associated with professional commitment among nurses (Chang et al., 2019; Mersin et al., 2020). However, other positive factors associated with professional commitment should also be explored, particularly among nursing students during internships in their final study year. The perspective of positive psychology emphasises what is positive in human development (Mcdermott et al., 2020). Well-being has been the focus of positive psychology (Lopez et al., 2018). Individuals with psychological well-being have self-value and a sense of belonging, which may potentially increase their professional commitment. Thus, psychological well-being may potentially mediate the relationship between TBCT and professional commitment, which has not yet been explored.

2.3. Optimism as a potential moderator

Optimistic individuals have positive expectations for the future and handle problems in a positive way (Scheier and Carver, 1992). Therefore, optimism benefits individuals' mental health (Chen et al., 2019) and gives them a better sense of direction (Bazargan-Hejazi et al., 2021). The effects of TBCT may be conditional at different levels of optimism. For instance, one possibility is that students with low levels of optimism may need more supportive teaching behaviours than students with high levels of optimism. Thus, optimism may potentially influence (moderate) the effect of teaching behaviours on psychological well-being, further influencing students' professional commitment. However, the indirect effects of TBCT on professional commitment and whether the indirect (mediating) effects are moderated by optimism are unknown. The present study aims to address this literature gap.

3. Methods

3.1. Design

The present study used a cross-sectional design. The study aimed to explore the mechanism between TBCT and professional commitment with three hypotheses (H1–H3):

- H1. . TBCT is positively associated with psychological well-being. In turn, psychological well-being is positively associated with professional commitment.
- H2. . The associations between TBCT and professional commitment are mediated by psychological well-being.
- H3. . The mediation effects in H2 are moderated by optimism.

The direction of the moderation was not specified due to the implications of a dearth of literature on the influence of different levels of optimism on this relationship.

The hypothesized relationships were demonstrated in Fig. 1.

3.2. Ethical considerations

The study was approved by the ethical committee of main researcher' university in Eastern China (No. 202021). The instructions about the study aims and the procedures for filling out the questionnaires were informed by the clinical teachers and gained their approval. Informed consent of the participants, confidentiality, and the right to quit at any time were ensured. Permission to use the instruments in the study was obtained from the original authors when necessary.

3.3. Participants and settings

In this study, a conditional process analysis was conducted. Conditional process analysis is a regression-based approach. For G*power (Faul et al., 2009), a linear multiple regression was selected. The effect size was set as 0.15, α err prob. as 0.05, power (1- β err prob) as 0.95, number of tested predictors as 8, total number of predictors as 8, and total sample size as at least 160.

The inclusion criteria included being a full-time nursing student in a bachelor's or associate's degree programme who had practiced in a hospital for more than one month. To reduce selection bias, participants were recruited from 24 hospitals in 13 cities in northern, north-eastern, and eastern China.

3.4. Measures

The measures included demographics (age, gender, and teaching background), general characteristics (examination anxiety and the role of teachers' praise), and instruments measuring TBCT, psychological well-being, professional commitment, and optimism.

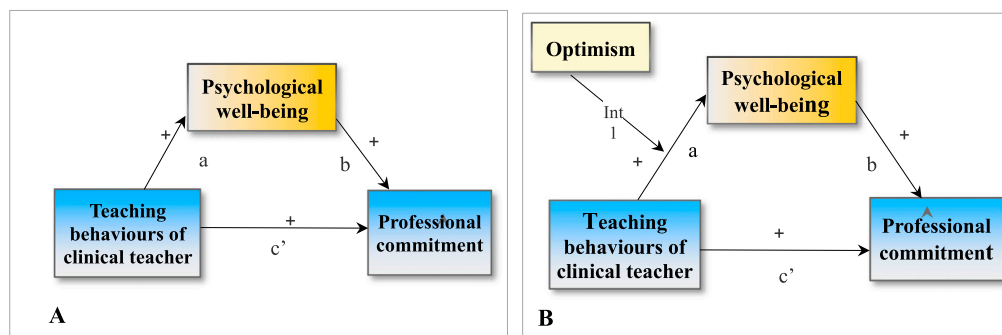


Fig. 1. A. Mediated model in which teaching behaviours of clinical teacher are hypothesized to be positively associated with professional commitment directly and indirectly through psychological well-being.

B. Moderated mediation model. Optimism was supported as a moderator by statistical interaction (Int_1) in the mediation model.

Both models used significant general information including age, gender, educational background, role of praise from teachers and examination anxiety as covariates.

Examination anxiety was measured by one item, “Your responses when you face examination,” with response choices on a Likert scale ranging from *very anxious* (1) to *not anxious at all* (5). The role of teachers' praise was measured by one item, “Your opinion about the encouragement role of teachers' praise,” with response choices on a Likert scale ranging from *none* (1) to *very big* (4).

3.4.1. Teaching behaviours of clinical teachers (TBCT)

The TBCT were evaluated by the inventory of Teaching Behaviours of Clinical Teachers (Zhao et al., 2009). The scale has 27 items and 5 dimensions, including knowledge fields (4 items), nursing technique (3 items), interpersonal communication (6 items), teaching ability (8 items), and teaching attitude (6 items referring to giving encouraging and guiding feedback for students' performance, showing teaching enthusiasm, acting as a model, and treat students sincerely, etc.). The response choices for actual teaching behaviour in this study were scored on a Likert scale ranging from *never* (1) to *always* (5). Cronbach's α was 0.94, and the test-retest reliability was 0.75 in Chinese nursing students. On this scale of expected teaching behaviours, the 5 dimensions accounted for 76.862 % of variance (He et al., 2011). The confirmatory factor analysis showed that the model fit was mediocre in this scale of actual teaching behaviours in the present study (CFI: Bentler's comparative fit index = 0.961, TLI: Tucker-Lewis index = 0.946, RMSEA: root mean square error of approximation = 0.083, and SRMR: standardized root mean squared residual = 0.029). Higher score indicated better teaching behaviours.

3.4.2. Psychological well-being

Psychological well-being was tested using the Brief Inventory of Thriving (BIT; (Su et al., 2014), which measures core psychological well-being. The items included positive feelings, self-value, self-confidence, goals of life, engagement, and a sense of belonging. The scale has 10 items, with response choices ranging from *totally disagree* (1) to *totally agree* (5). Test-retest reliability was 0.83, and Cronbach's α ranged from 0.75 to 0.93 across five samples (Su et al., 2014). The BIT showed good convergent validity and discriminant validity (Su et al., 2014).

3.4.3. Professional commitment

Professional commitment was measured by the Professional Commitment Scale (Lian et al., 2005). The scale has 27 items in 4 dimensions: affective commitment, normative commitment, ideal commitment, and continuance commitment. It was scored on a Likert scale from *not in accordance with me at all* (1) to *totally in accordance with me* (5). The 4 dimensions accounted for 52.63 % variance of professional commitment. The confirmatory factor analysis showed that the model fit was acceptable and Cronbach's α was 0.927 in Chinese college students (Lian et al., 2005). A higher score indicates a higher level of professional commitment.

3.4.4. Life orientation test (LOT)

Optimism was measured in the present study by the short version of

the Life Orientation Test (LOT-R; (Scheier et al., 1994), modifying from the original Life Orientation Test (Scheier and Carver, 1985). The LOT-R has 10 items, of which 4 are filters and 6 are calculated. The responses to each item ranged from *strongly disagree* (0) to *strongly agree* (4). Cronbach's α was 0.71 (Yuan et al., 2021). The scale has one dimension which accounted for 48.1 % of the variance (Scheier et al., 1994). A higher score indicated a higher level of optimism.

3.5. Data collection

The survey was conducted from June 2021 to September 2021. Convenient sampling was used. The teachers in charge gave students instructions about aims, procedures for filling out the questionnaires, and voluntary participation. An online questionnaire link and QR code created by Wenjuanxing (Questionnaire Star) were distributed via the WeChat platform by clinical teachers and teachers in charge of students completing internships in hospitals in northern, north-eastern, and eastern China. If the students were interested in the survey, they could click the link or scan the QR code, after which the informed consent information about the study purpose and process would appear and ask whether they agreed to participate. Participants were told that they could withdraw at any time without any prejudice. In total, 394 questionnaires were collected, and 318 valid questionnaires met the inclusion criteria. The valid questionnaire return ratio was 80.7 %.

3.6. Data analysis

First, the data were cleaned. Missing values were imputed using the Values-Expectation-Maximization method. Extremes outside the fence of $Q1-3 \times IQR$ (Interquartile range) and $Q3 + 3 \times IQR$ were deleted. Second, descriptive analyses of the mean, standard deviation (SD), independent-samples *t*-test, and Pearson correlation were conducted using IBM SPSS 25. Then, the mediation effect and moderated mediation were examined in PROCESS macro for SPSS (Hayes, 2017). The significant variables in demographic characteristics were controlled as covariates.

Model 4 in the PROCESS macro for SPSS was used to test the mediation of psychological well-being between TBCT and professional commitment. Model 7 in the PROCESS macro for SPSS was used to test the moderated mediation effect. The interaction term was used in PROCESS after standardizing the independent variable (i.e., TBCT) and moderator (i.e., Optimism) to test whether the direct or indirect effects are moderated by the moderator (i.e., optimism). The index of moderated mediation showed whether the indirect effect of the independent variable (i.e., the TBCT) was conditional on different levels of moderator (i.e., optimism). The 95 % confidence interval (CI) excluding zero indicated that mediation (indirect effect) and moderation (interaction) effects were significant.

Sensitive analysis was conducted by including and excluding extremes and missing values separately. The insignificant difference and the consistent conclusion showed that the results were not sensitive to

the extremes and missing values.

The mediation effect and moderated mediation were examined based on both 1000 and 5000 bootstrap samples. Their results were almost the same, and the conclusions were the same. Therefore, the results were not sensitive to the number of bootstrap samples. For the number of participants were sufficient in this study, 1000 bootstrap samples were selected.

4. Results

4.1. Preliminary analysis

The 318 participants included 166 bachelor's degree students and 152 associate's degree students. Of the 318 questionnaires, 4 questionnaires were filled with punctuation in age and were imputed using the Values-Expectation-Maximization method. The 4 extremes in the professional commitment variable were deleted. Thus, 314 students were included in the analysis. The targeted sample size was 480, which included nursing students from northern, north-eastern and eastern China. The final valid participant response rate was 65.4 %.

Table 1 shows the demographic characteristics of the participants. The students' ages ranged from 17 to 24, with a mean age of 20.83 (SD = 1.24). There was no significant difference in the main study variables in terms of gender or educational background.

4.2. Correlation analysis

Table 2 displays the correlation of the continuous variable in general information with the main study variables and the mean with SD. The correlation analysis showed that examination anxiety and the role of praise from teachers were correlated with professional commitment. The TBCT, psychological well-being, and optimism were positively correlated with professional commitment.

4.3. Mediation analysis

Table 3 shows the mediation analysis including the direct effect (path a, path b, path c'), total effect (path c) and indirect effect were significant after controlling the examination anxiety and role of the teachers' praise. The TBCT were positively associated with psychological well-being, and psychological well-being was positively associated with professional commitment, which supports H(Hypothesis)1. The indirect effect (a × b) of TBCT on professional commitment through psychological well-being was significant (B = 3.31, 95 % CI [2.41, 4.29]), which supports H2. Given that the direct effect of TBCT on professional commitment was also significant (path c', B = 5.17, 95 % CI [4.01, 6.34]), psychological well-being partially mediated the association between TBCT and professional commitment. Fig. 2A demonstrates the mediation model.

4.4. Moderated mediation analysis

Table 4 and Fig. 2B show the moderated mediation analysis after controlling for the role of the teachers' praise and examination anxiety. The confidence limit is denoted by "LLCI" for the lower limit confidence

interval and "ULCI" for the upper limit confidence interval, which are the lower and upper bounds of a confidence interval (CI), respectively.

Optimism was hypothesized to be a moderator between TBCT and psychological well-being (Path a). The moderation effect of optimism on the relationship between TBCT and psychological well-being was significant (B = -0.70, 95 % CI [-1.33 (LLCI), -0.06 (ULCI)]). The simple slope showed that the effect of TBCT on psychological well-being increases as the optimism level increases, and when the optimism level of students is low, the increasing trend of the effect of TBCT on psychological well-being is more obvious (Fig. 3). The findings suggest that compared with students with high levels of optimism, TBCT is more strongly predictive of psychological well-being among students with low levels of optimism.

The moderated mediation model showed that the indirect effect of TBCT on professional commitment was conditioned at different levels of optimism. There was a decreasing trend in the indirect effect of TBCT one SD below the mean (B = 3.70, 95 % CI [2.59, 4.91]), at the mean (B = 2.95, 95 % CI [2.05, 3.90]), and one SD above the mean (B = 2.21, 95 % CI [1.16, 3.38]) of optimism. The moderated mediation index was significant (index = -0.75, 95 % CI [-1.42, -0.11]). This finding suggests that the indirect effects of TBCT on professional commitment through psychological well-being are moderated by optimism, which supports H3. The moderated mediation index is negative, showing that the indirect effect of TBCT on professional commitment decreases as optimism increases.

5. Discussion

The score index of professional commitment in the present study was at a moderate level of 74.4 %—a bit higher than 68.46 % among nurses during the COVID-19 pandemic in Turkey (Duran et al., 2021). The results found that TBCT was associated with psychological well-being and that psychological well-being was associated with professional commitment. Also, TBCT was directly and indirectly associated with professional commitment. Moreover, optimism moderated the indirect effect. The hypotheses were supported.

The TBCT were directly and positively associated with professional commitment in the present study. Research on clinical teaching has been conducted, and the importance of clinical teaching for the learning outcomes has been documented (Nishiya et al., 2020; Saukkoriipi et al., 2020). The present study extended the range that teaching behaviours contribute to the professional commitment of nursing students. Clinical teachers are role models for practice nursing students, and from them, nursing students envision their future selves and understand the meaning of their work. The study also showed that nursing students regarded the role of praise from teachers as important. Thus, praise for the progress of students should be offered generously and adequately.

Good clinical teachers have characteristics such as knowledge, skills, enthusiasm for the profession and teaching, communication capabilities, and respect for others (Sutkin et al., 2008). Therefore, clinical teachers also need formal education training. Incentives such as lectureship and recognition to increase knowledge and skills within teaching are appealing (Elmberger et al., 2019; Wisener et al., 2021). The workloads and schedules of clinical teachers may limit their chances of seeking educational development. Therefore, educational developers also need

Table 1
The categorial general information and its association with main study variables.

Demographics	N (%)	Clinical teacher behavior M ± SD	p	Psychological well-being M ± SD	p	Professional commitment M ± SD	p	Optimism M ± SD	p
Gender			0.072		0.387		0.463		0.070
Male	33 (10.5)	117.30 ± 19.53		38.97 ± 6.12		102.18 ± 15.71		12.52 ± 1.42	
Female	281 (89.5)	111.62 ± 16.84		37.98 ± 6.21		100.31 ± 13.64		13.35 ± 2.57	
Educational background			0.104		0.454		0.102		0.193
Bachelor degree	164 (52.2)	110.71 ± 17.07		37.84 ± 5.71		99.28 ± 13.13		13.43 ± 2.22	
Associate degree	150 (47.8)	113.87 ± 17.23		38.36 ± 6.69		101.84 ± 14.53		13.07 ± 2.75	

Table 2
Pearson correlations, mean, and standard deviations of study variables.

	1	2	3	4	5	6	7	M ± SD (Score index)
1.Age	1							20.83 ± 1.24
2. Role of praise from teachers	0.073	1						3.55 ± 0.59 (88.8 %)
3.Examination anxiety	-0.056		1					2.88 ± 1.04 (57.6 %)
4. TBCT	-0.084	0.238**	0.197**	1				112.22 ± 17.20 (83.1 %)
5.Psychological well-being	-0.044	0.184**	0.293**	0.551**	1			38.09 ± 6.19 (76.2 %)
6.Professional commitment	-0.008	0.182**	0.312**	0.657**	0.714**	1		100.50 ± 13.85(74.4 %)
7. Optimism	0.023	0.052	0.271**	0.226**	0.348**	0.303**	1	13.26 ± 2.49(55.3 %)

Note. **P < 0.01. Score index, actual score/possible maximum score of the scale. TBCT, Teaching behaviours of clinical teachers.

Table 3
Mediation effect of psychological well-being between TBCT and professional commitment.

Variable	B	SE	95 % CI	
			Lower limit	Upper limit
a path: direct effect				
TBCT → Psychological well-being	3.09***	0.30	2.50	3.68
b path: direct effect				
Psychological well-being → Professional commitment	1.07***	0.10	0.88	1.26
c' path: direct effect				
TBCT → Professional commitment	5.17***	0.59	4.01	6.34
c path. Total effects c = c' + a × b				
TBCT → Professional commitment	8.48***	0.60	7.29	9.66
Indirect effects a × b				
TBCT → Psychological well-being → Professional commitment	3.31*	0.49	2.41	4.29

Note. TBCT, Teaching behaviours of clinical teachers. *p < 0.05, ***p < 0.001. Controlling for examination anxiety and the role of praise from clinical teachers. Covariates, TBCT and optimism were standardized before analysis.

to change the inherent rules and division of labour (Elmberger et al., 2019) to avoid the risk of a vicious circle in which students are recruited without proper supervision because of staff shortages and consequent turnover (Hoeve et al., 2018). Management also needs to participate in establishing clinical workplaces where the advancement of teaching is valued (Knight et al., 2006). When clinical teachers feel valued and appreciated for their teaching efforts, they will be motivated to develop clinical teaching (Wisener et al., 2021).

The TBCT were indirectly associated with professional commitment through psychological well-being in the present study. Clinical teachers not only teach nursing skills and knowledge, but also include communication capabilities, teaching attitude, and teaching ability. Nursing students need to be heard, prepared, and supported during the pandemic, and it is crucial for schools and clinical sites to provide students with effective teaching (Ulenaers et al., 2021). The guidance of clinical teachers impacts students' clinical competence and satisfaction in clinical learning (Saukkoriipi et al., 2020). Satisfaction and competence increase their self-confidence (Jokelainen et al., 2011; Saukkoriipi et al., 2020). Supportive teaching behaviours that ensure that all students are fairly engaged can increase students' sense of belonging (Harrison et al., 2019). Self-confidence and a sense of belonging are part of the scopes covered by the psychological concept (Su et al., 2014). This explanation supports why supportive TBCT were related to increased psychological well-being in the present study.

Negative emotions, stressors, and burnout have been indicated to be negatively related to professional commitment among nurses (Hoeve

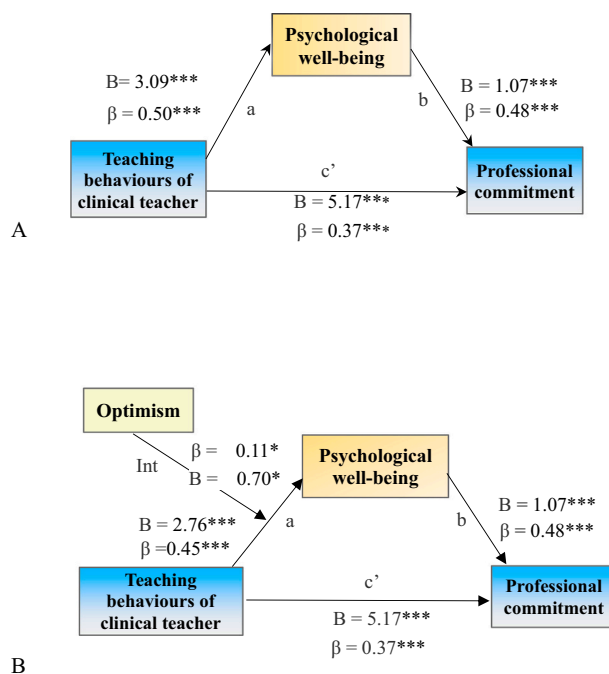


Fig. 2. A. The mediation effect of psychological well-being between the relationship of teaching behaviours of clinical teacher and professional commitment (***) p < 0.001). Significant general information including role of praise from teachers, and examination anxiety were used as covariates. Covariates, TBCT and optimism were standardized before analysis. B is unstandardized regression coefficients and beta is standardized regression coefficients.

B. The moderated mediation model (** p < 0.01; *** p < 0.001). Significant general information including role of praise from teachers, and examination anxiety were used as covariates. Covariates, TBCT and optimism were standardized before analysis. B is unstandardized regression coefficients and beta is standardized regression coefficients.

et al., 2018; Ten Hoeve et al., 2020). The present study contributes new evidence that psychological well-being is positively associated with professional commitment. These findings highlight the positive benefits of increasing psychological well-being in enhancing professional commitment among nursing students. In addition to emphasizing the connection between TBCT and professional commitment, the present results support the mediating role of psychological well-being between them.

The indirect effect of TBCT on professional commitment was moderated by optimism. Supportive TBCT may increase the professional commitment of nursing students. Nursing students with low optimism rely more on the supportive TBCT to maintain professional commitment. However, the professional commitment of students with high levels of optimism remains comparatively stable at different TBCT.

Table 4
The moderated mediation effect of optimism on the relation between TBCT and professional commitment via psychological well-being.

Variable	B	SE	t	LLCI	ULCI
Outcome variable: psychological well-being					
TBCT	2.76***	0.30	9.21	2.17	3.34
Optimism	1.60***	0.33	4.78	0.94	2.26
Int_1 (TBCT × optimism)	-0.70*	0.32	-2.16	-1.33	-0.06
Model summary: R ² = 38.8 %					
Outcome variable: professional commitment					
TBCT	5.17***	0.59	8.73	4.01	6.34
Psychological well-being	1.07***	0.10	11.06	0.88	1.26
Conditional indirect effect of TBCT on professional commitment					
Low level of optimism	3.70*	0.58	-	2.59	4.91
Moderate optimism	2.95*	0.47	-	2.05	3.90
High level of optimism	2.21*	0.57	-	1.16	3.38
Index of moderated mediation					
	-0.75*	0.33	-	-1.42	-0.11
Model summary: R ² = 61.9 %					

Note. TBCT, Teaching behaviours of clinical teachers. *p < 0.05, ***p < 0.001. SE: standard error; Lower limit confidence interval; ULCI: upper limit confidence interval. The significant covariates including role of clinical teachers' praise and examination anxiety were controlled. Covariates, TBCT and optimism were standardized before analysis.

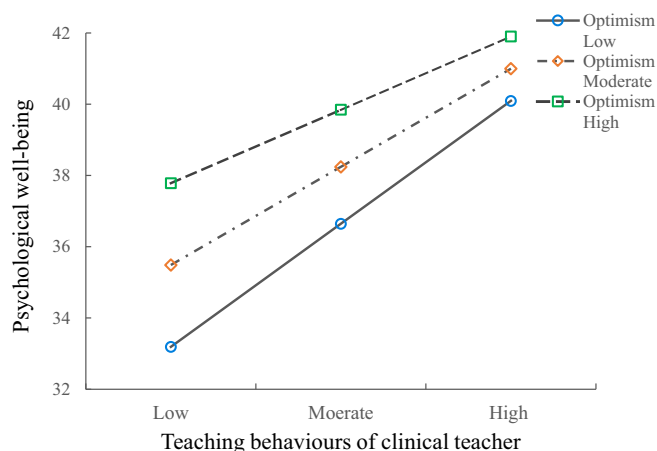


Fig. 3. The moderating effect of optimism on the relationship between teaching behaviours of clinical teachers and psychological well-being.

5.1. Limitations

There were some limitations to the study. First, the cross-sectional design was not enough to draw conclusions about the causality of the associations. A longitudinal study to confirm these assertions will be needed in future research. Second, although the participants were from diversified cities in China and representative of certain districts, the scope is limited for the lack of survey range in southern and western China. Generalizations should be used internationally with the consideration that the students' characteristics may vary slightly. However, overall, the results may be generalizable because nursing competencies are fairly universal (Vierula et al., 2021). The width of a CI is usually influenced by three factors: confidence level, sample size and variation in the sample. The confidence level was fixed, and the sample size was adequate. The 95 % CI of moderated mediation in this study was relatively wide, which may be due to the variation in the sample across 24 hospitals. Subgroup analysis in a large-scale sample may be needed in

future studies.

6. Conclusions

Supportive TBCT was beneficial for increasing psychological well-being and professional commitment among nursing students. Nursing students with low levels of optimism particularly need positive TBCT to promote professional commitment. Students with a high level of optimism are comparatively stable in terms of professional commitment. Therefore, the present findings also highlight the importance of psychological well-being and optimism among students. Positive psychological strengths like hope, efficacy, and resilience benefit positive mental health (Selvaraj and Bhat, 2018), and self-acceptance beliefs that benefit optimism (Oltean et al., 2019) should be enhanced. The findings could be used in education and management in health care to develop strategies to increase professional commitment.

Ethical approval

Ethical approval was given by the ethical committee of Nantong University (No. 202021) prior to the study.

Informed consent

Informed consent was obtained from participants.

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CRediT authorship contribution statement

FangFang Zhao: Conceptualization, design, data collection, data analysis and interpretation, funding acquisition, Writing - original draft, review & editing.

Declaration of competing interest

The authors have no relevant financial or non-financial interests to disclose.

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