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Developing and Validating a Scale for University Teacher's Caring Behavior in Online Teaching

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Abstract: Teacher caring behavior in higher education has been frequently studied in the context of face-to-face instruction. The COVID-19 pandemic has transformed the territory of high education such that synchronous or asynchronous online instruction has become an important component of college students' learning experience. The lack of valid and reliable scales makes it difficult to quantitatively examine teachers' caring behavior in online contexts. Building on existing literature, we designed and implemented a three-stage study that aimed to develop and validate a scale for measuring Chinese university teachers' online caring behavior from students' perspectives. Results from data analysis have shown that the scale has construct validity and internal consistency reliability. The scale has revealed that teacher caring behavior in an online context consists of three latent factors, namely, inclusiveness, support, and conscientiousness. This is consistent with the existing conceptualization of teacher care as a three-dimensional construct. The scale made targeted improvement of existing scales and can be used to quantitatively examine the relationship between teachers' caring behavior and students' academic performance, learning motivation, learning engagement, learning self-efficacy, sense of belonging, and mental health.

Keywords: online teaching; teachers' caring behavior; scale development

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1. Introduction

In the past two decades, more and more researchers have been concerned about teachers' caring behaviors in higher education. Teachers' caring behavior has a positive impact on students' learning, including increasing students' academic achievement, their engagement and cooperation in learning, and their retention in college [1–3]. Besides, teachers' caring behavior plays an important role in students' holistic development, including social and emotional growth, well-being, and mental health [4–6]. Moreover, teachers' caring behavior is also conducive to improving teaching and promoting teachers' professional development [3,7,8]. Therefore, the study of teachers' caring behavior is significant in fulfilling the growth of the ideal selves of the teacher and the students.

Teachers' caring behavior in higher education has been frequently studied in face-to-face learning environments, in which the use of communication technologies is not necessarily integral to teaching and learning. In synthesizing existing literature, Walker and Greaves [9] concluded seven exemplary practices of a caring teacher, including listening to students, showing empathy, supporting students, being active in the processes of learning in the classroom, setting high expectations of students and their behaviors, praising students when appropriate, and showing concern about students' lives outside classrooms. However, to date, few studies have focused on university teachers' caring behavior in online environments.

Meanwhile, the COVID-19 pandemic has transformed the territory of high education. It has affected nearly 1.6 billion (91.3%) learners in 194 countries due to national closures of

schools and universities [10]. In response to the pandemic, higher education worldwide rapidly moved courses online. Ministries of education in many countries issued a notice requesting higher education institutions to suspend traditional face-to-face teaching and implement online teaching [11]. Since the onset of the COVID-19 pandemic, the majority of institutions have been supporting hybrid teaching and learning options for both on-campus and online education [12]. After the epidemic, online learning is still an important component of higher education [13]. As a country with a large population, by November 2022, China launched more than 61,900 MOOCs, which had 402 million registered users, 979 million learners, and 352 million students obtaining credit recognition. Now, the total number of both MOOCs and Chinese learners in MOOCs ranks first in the world and maintains rapid growth [14]. However, teachers' online caring behavior and its impact remain under-researched. In existing studies, some researchers have explored the applicability of Noddings' caring theory to online contexts [15,16], while others explored the specific teachers' caring behaviors amidst online teaching through empirical investigation [17–22]. These studies mostly employed qualitative methods or surveys without reporting their validity and reliability. Therefore, there is a lack of valid and reliable scales to quantitatively examine teachers' online caring behavior. The present study sought to develop and validate a scale for measuring Chinese university teachers' online caring behavior from students' perspectives.

2. Literature Review

We used the core collection of the Web of Science database for English literature retrieval. "Teachers' caring behavior", "ethic of care", "online teaching", "online learning", "caring teaching", "higher education", and "scale development" were searched as keywords. Chinese literature on teachers' caring behavior was identified by using China National Knowledge Internet (CNKI) database to search the keywords mentioned above. We used Excel to mark the author, publication date, journal name, abstract, keywords, research objects, research methods, findings, discussions and conclusions, limitations, and future directions for each article to facilitate analysis of the included studies. Our analysis of the literature focused on how teachers' caring behavior is defined, the dimensions of caring behavior, the cultural aspects of caring behavior, and existing scales for capturing teachers' caring behavior.

2.1. Defining Teachers' Caring Behavior

Care is a core concept of the ethics of caring, a normative ethical theory that holds care or benevolence as a virtue and centers moral action on interpersonal relationships. As the founder of care ethics, American feminist psychologist Carol Gilligan described care as an ethic that focuses on responding to others' needs in relationships. She stated that "the logic underlying an ethic of care is a psychological logic of relationships, which contrasts with the formal logic of fairness that informs the justice approach" [23] (p. 73). Building on the work of Carol Gilligan, Nel Noddings developed one of the first comprehensive theories of care and argued that caring is the foundation of morality. She perceived relationships as ontologically basic to humanity, where identity is defined by a set of relationships individuals have with others. A climate in which caring relations flourish can best meet individual needs, impart knowledge, and encourage the development of moral people [24]. According to Noddings, care, in its essence, is relational, which can only exist in a relationship. Therefore, the particularity of relations is fundamental to the ethics of care. According to Noddings, each caring relation consists of at least two people, the "one-caring" and the "cared-for". What is distinctive in all such relations is that the one-caring acts in response to a perceived need on the part of the cared-for. Therefore, the co-existence in the same physical space does not ensure the establishment of a relationship. Only when the subjectivity of both parties is recognized in the space can the relationship truly exist between one another. A caring act can only exist when the one-caring feels and senses what the cared-for is experiencing and initiates a commitment to help. This does not

mean that the one-caring does exactly what the cared-for desires in all situations. Rather, when formulating a response that provides the best opportunities for helping the cared-for, the one-caring might consider the point of view of the cared-for, the assessment of the need of the cared-for, and the expectations of the one-caring.

Relationships are an essential part of teaching and learning, especially relationships between teachers and students. Effective teachers form authentic, caring relationships with their students. Such a relationship can promote student success in many different ways, including but not limited to increasing academic achievement, promoting self-motivation and self-regulation, improving goal-making skills, and reducing chronic absenteeism [1–3]. As care is a relational structure, teaching with care can make teachers succeed in establishing and strengthening the relationship with students. When teachers show their care, they are motivated by the need to strengthen interpersonal relationships with students [25]. A sustained effort to show care promotes the development of mutually beneficial relationships where students trust their teachers and teachers are able to use their knowledge of students to improve teaching and students' learning experience [26]. Given the importance of relationships in teaching and learning, education researchers have utilized Nodding's theory of care to examine teachers' caring behavior. Teacher care involves pedagogical actions and relational dynamics for promoting students' academic and holistic development [27]. Teacher care is perceived as a deepening of trust, mutuality, responsiveness, and reciprocity between students and teachers, and enrichment of caring scope, embodied in the conceptualization of "Pedagogical Care" to "Holistic Care" and then onto "Sustainable Care" [28].

In synthesizing existing studies, Lei [29] concluded that teachers' caring behavior mainly includes three dimensions: Conscientiousness, support, and inclusiveness. Conscientiousness means that teachers treat their teaching work with chariness and responsibility. Support means that in the process of interaction with students, teachers can take the initiative to approach, understand and care about students, give enthusiastic, selfless, and thoughtful help to students, and invest time to meet their needs. Inclusiveness means that teachers take each and every student as the core and can fully understand and tolerate the cognitive and emotional needs of all students. In Lei's view, conscientiousness and support interact. If teachers do their due diligence but do not invest time to support students' physical and mental development, it may lead to task-oriented teachers. On the contrary, if teachers only attend to the social and emotional needs of the students without supporting their academic development, they do not fulfill their role as a teacher. This is actually "putting the cart before the horse". Conscientiousness and support are fundamental to teacher inclusiveness. Inclusiveness is critical to improving teachers' caring behavior and keeping it sustainable. Therefore, the three factors of teachers' caring behavior (i.e., conscientiousness, supportiveness, and inclusiveness) are mutually influencing and indispensable. In this study, we took Lei's three dimensions of teachers' caring behavior as the foundation for instrument development. Consistent with Lei's definition, we define teachers' caring behaviors as prosocial behaviors that fulfill teaching responsibility, support students' learning and their physical and mental development, and tolerate students.

2.2. Teachers' Care in the Chinese Cultural Context

Existing studies have shown that caring behavior varies among cultures [4,27,28,30]. To apply caring ethics to examine Chinese teachers' caring behavior, we must consider the uniqueness of Chinese culture. Different from pastoral care in Western settings, the notion and expectations of teacher care in Chinese societies are more likely to be paternalistic relationships [30]. In the traditional Chinese view, teachers have the status and power like fathers, the so-called "One day as a teacher, one life as a father". To regard teachers as fathers is an ethical expectation for students. Students respect teachers as "fathers", and teachers have the moral obligation to "love students as sons". The relationship between teacher and student does not collapse towards the end of schooling but transforms into a stronger father–son relationship [31]. Such a high social expectation determines teachers'

moral obligation and responsibility. Teachers should devote themselves to the consideration of students and do their best to reach students. A teacher is expected to teach students in accordance with their aptitude so that each student feels cared for by the teacher.

For many years, caring has been regarded as an important characteristic of exemplary teachers in China [27]. In the Chinese context, a teacher who takes on the role of a father is expected to be an exemplar model, especially models of how to become a whole person of highly regarded character and integrity by practicing good conduct, exemplifying self-cultivation, and enacting moral principles and obligations for the benefit of the collective [32,33]. Teachers' caring attitude and behavior in their daily contact with students is essential to establish caring, trust, and close teacher–student relationships [30]. Students who feel teachers' care believe that these especially caring teachers are role models worth learning from [34].

However, in the Chinese cultural context, there has been a lack of research on college students' views on teachers' caring behavior. Understanding Chinese students' expectations of teachers' caring behavior can help teachers think about how to integrate care into teaching and create a caring, warm, and inclusive learning atmosphere to promote students' holistic development and their well-being. The purpose of this study was to examine university teachers' caring behavior in online contexts from the perspectives of students.

2.3. Scales for Teachers' Caring Behavior

Teven and McCroskey [35] developed a teacher caring scale containing four items. The items ask students to rate the extent to which their teachers understand how they feel or how they think and the extent to which their teachers are empathetic or responsive to them. Since the four items were too abstract, McCroskey and Teven [36] revised the scale. The revised scale contained six items. The items ask students to rate the extent to which the teacher demonstrates the following behaviors (1) caring about students, (2) having students' interests at heart, (3) being selfless, (4) being concerned with students, (5) being sensitive to student needs, and (6) understanding how students feel or think. The revised scale was highly reliable when applied to face-to-face classroom situations. Straits [37] investigated undergraduates' perspectives of instructor caring behaviors within a large biology lecture course and developed a scale consisting of 11 indicators. The indicators include the following behaviors: Being available to students, respecting students as individuals, being willing to give extra effort, welcoming questions in class, inviting discussion outside of class, getting to know students, wanting students to learn and succeed, offering multiple learning opportunities, utilizing various teaching strategies, providing many different resources, and promoting higher-level thinking skills. The indicators were categorized into two groups. One group focuses on learning, emphasizing content mastery and higher-order thinking. The other group relates to learner-centered behaviors, emphasizing a relationship of mutual trust and respecting the learner as an individual. Building on existing research, Lei [29] developed a theoretical perspective that perceives the teachers' caring behavior as a three-dimensional construct (i.e., conscientiousness, support, and inclusiveness) and conducted an empirical study to validate this model. Because Lei's [29] scale is aimed at measuring teacher caring behaviors in a face-to-face context in K-12 schools, it cannot be directly used to study university teachers' caring behavior in online contexts. Sun et al. [27] first identified six factors of the caring behavior of primary and middle school teachers in China, including amiable-helping, strict, understanding, concerned, responsible, and respectful-encouraging. These factors were combined into three higher-order factors, including conscientiousness, receptivity, and availability. The reliability and validity of the scale were verified. These existing scales were all developed to examine teachers' caring behavior in traditional classroom settings. When learning is transferred to the online environment, the lack of physical presence is a major barrier for teachers to show caring to their students. The use of online teaching platforms might challenge conventional ways of how university teachers integrate caring behaviors into their online pedagogical practices,

which would potentially be different from that of face-to-face classroom mode. Therefore, traditional scales cannot fully capture teachers' caring behavior in online contexts.

To date, only a very small number of studies have developed scales for teachers' caring behavior in online settings. Sitzman and Leners [17] first explored the perceptions of students regarding how instructors convey caring in online education. Eight themes emerged from the data: Frequent feedback, timeliness, reciprocity of caring online, personal connection and empathy, clarity, multiple contact opportunities, second-fiddle worries, and teachers' commitment to learning. Later in the same year, they repeated this study among graduate students. The themes uncovered in the data included empathetic perspective, timeliness of communications, tone of appreciation, supporting students being the best they can be, finding a chord of harmony, and feeling the passion of caring online [18]. Sitzman [19] used the data collected in previous studies to compile the online caring scale. The dimensions of the scale were set as follows: Clarity/expertise, timeliness, empathy presence, full engagement/accessibility, and flexibility/openness. Although a reliability analysis was performed, factor analysis was not completed to verify the appropriateness of the four main attributes. Building on existing scales, Li et al. [38] in China have developed and validated a teacher caring behavior scale for online teaching. The scale is divided into four dimensions: Clarity, inclusiveness, participation, and accessibility. Clarity refers to a clear time limit and preset standard for the arrangement of teachers' activities and the use of learning resources. Inclusiveness means that teachers respect the differences in students' development in the teaching process, help each and every student to build confidence, and design differentiated teaching activities. Participation means that teachers take learners as the center and strengthen the design of in-depth learning activities that promote the joint activities between teachers and students and the collaboration among students. Accessibility means that teachers spend enough time understanding students' learning characteristics from the perspective of service providers. Li et al. [38] introduced other researchers' definitions of teachers' caring behavior but did not give their own definition. They only summarized the four dimensions (i.e., clarity, inclusiveness, participation, and accessibility) of teachers' caring behavior through exploratory factor analysis. Therefore, the scale lacks the definition of the core concept and the relationship between this definition and the four dimensions of the scale. Moreover, the items on the scale do not capture teachers' emotional care.

To sum up, existing scales on teacher caring have their limitations. There is still a lack of valid and reliable scales that are appropriate to capture the multi-dimensionality of Chinese teachers' caring behaviors in online contexts. In light of the existing scales and the uniqueness of online teaching, we made targeted improvements to the scale developed by Li et al. [38] and examined the validity and reliability of the new scales for capturing teachers' caring behavior in online teaching.

3. Methodology

3.1. Participants

The participants of this study were undergraduate students at Tianjin Normal University in China who had online learning experiences. We recruited three groups of subjects for the study and distributed a survey to each group via an online survey platform. Invalid responses were excluded (i.e., the response time was less than 120 s or more than 1000 s, questionnaires with obvious regularity of responses). In the first stage, we conducted an open-ended survey for students to investigate their perceived important teachers' caring behaviors in online contexts. A total of 445 questionnaires were collected, of which 365 valid responses were retained (rate of valid response = 82%). In the second stage, we distributed the survey developed in the first stage to examine the construct validity of the survey. Item analysis, exploratory factor analysis (EFA), Cronbach's α coefficient, and split-half reliability coefficient test were conducted with SPSS 26.0. The participants were students of Class 2019 and Class 2020 from Tianjin Normal University. In total, 408 questionnaires were collected, of which 359 valid responses were retained (rate of valid response = 88%).

Among them, 86 were male and 273 were female. There were 176 students majoring in liberal arts, 140 students majoring in science, and 43 students from other majors. In the third stage, a confirmatory factor analysis (CFA) was undertaken with AMOS 24.0 to confirm the stability of the dimensions of the scale. Next, 279 responses were collected, of which 232 valid responses were retained (rate of valid response = 83%). Among them, 57 were males and 175 were females. There were 109 students from liberal arts, 91 students in science majors, and 32 students from other majors.

3.2. Scale Development Processes

This section mainly describes the process of developing the scale, which consists of three stages. In the first stage, we compiled the questionnaire. Through the content analysis of the Teachers' Caring Behavior Scale in Online Teaching developed by Li et al. [38], problems were found on the scale. Namely, most of the items discussed teachers' caring behavior at the academic level, lacking the consideration of teachers' emotional care for students, an important aspect of teacher care. Moreover, the scale does not explain how they defined teachers' caring behavior in their research and what the relationship is between the definition and the four dimensions. Therefore, we made targeted improvements to the scale developed by Li et al. [38]. Firstly, we conducted an open-ended survey to comprehensively capture college students' views of teachers' online caring behavior, especially what kind of caring behaviors students expect from their teachers. The survey was distributed through an online survey platform. The open-ended survey includes the following questions: What can teachers do to show their concern for you in an online teaching setting? Did you have any special experiences that teachers cared or did not care about you in online learning? As a college student, what kind of care do you expect from teachers? The survey responses were analyzed to identify important teacher caring behaviors perceived by students. Secondly, we took Lei's [29] three-dimensional construct of teacher care (i.e., inclusiveness, support, and conscientiousness) as the foundation for scale development, clarifying the definition of teachers' caring behavior and the relationship between the definition and three dimensions of the scale. Thirdly, in order to address the lack of emotional care in existing scales, we referred to the related research on teachers' emotional support in online learning [39]. We drafted a questionnaire based on data from the open-ended survey and our analysis of relevant literature. We then invited experts in related fields to comment on the readability, intelligibility, and situation fitting of the items in the questionnaire. The questionnaire was further modified based on feedback from experts. Finally, 40 items were determined to be included in the questionnaire (see the items in Appendix A, Table A1). The questionnaire included two parts: Demographic information about students and teachers' caring behavior in online teaching, which was measured on a five-point Likert-type scale ('1' = completely inconsistent, '5' = completely consistent).

The second stage was to identify a set of latent constructs underlying the collection of items compiled in the first phase. To this end, we distributed the questionnaire developed in the first stage to another group of undergraduate students from Tianjin Normal University through an online survey platform. SPSS26.0 was used for item analysis, EFA, and reliability test of the scale. Total correlation analysis and independent sample *t*-test were conducted to analyze the degree of discrimination of each item on the scale. The purpose of EFA is to find out the structural characteristics of the multivariate observed variables and to reduce the dimension. To investigate the reliability of the scale, the internal consistency coefficient (Cronbach's α coefficient) and split-half reliability coefficient were analyzed.

The third stage was to validate the factor structure in the previous stage. To this end, we distributed the scale developed in the second stage to a third group of undergraduate students from Tianjin Normal University through an online survey platform. The questionnaire included 19 items retained after EFA, using the same five-point Likert-type scale as the first survey. The data obtained from the second survey were analyzed by AMOS 24.0 to test the fitting degree of teachers' caring behavior in online teaching as a three-factor concept.

3.3. Data Processing and Analysis

Coding is a continuous process of labeling qualitative data that prompts deep thinking about the meaning of the data. Guided by Saldaña's [40] method, we divided our coding activities into two main phases: The first round and the second round of coding. The first round of coding was descriptive, which aimed to summarize the basic theme of the text and provide the basis for the second round of coding. Student responses to the open-ended survey in phase one were initially coded by NVivo to obtain the important teachers' caring behaviors in online teaching. Frequency count was then used to identify the 10 most frequently referred teacher caring behaviors (Table 1), which had a total frequency of 239. In the second round of coding, we grouped the first round of coding materials into fewer and more meaningful analysis units.

Table 1. Coding of the open questionnaire on teachers' caring behaviors in online teaching (n = 239).

Second Round Coding	First Round Coding	Frequency	Percentage	Example from the Survey Data
Conscientiousness	Communication and interaction	38	15.9%	Sometimes it is hard to concentrate in class. I hope teachers can increase interaction in order to avoid the classroom becoming a unilateral output of teachers and passive reception of students.
	Clear up doubts or confusion	34	14.2%	Teachers clear up doubts or confusions carefully.
	Ask more questions	20	8.4%	Ask more questions during online teaching to enhance our sense of classroom participation and enthusiasm for learning.
	Feedback in time	18	7.5%	I can get timely feedback after submitting my homework so that I can realize my weaknesses and make improvements.
Support	Care about students' study and life	33	13.8%	Care about our studies and life and provide help in time.
	Provide learning resources	32	13.4%	Teachers share live video recordings or PPTs so that we can better review the content after class and make up for the missing parts.
	Pay attention to students' mental health	21	8.8%	Pay attention to our mental health and address our psychological problems in time.
	Live broadcasting teaching	11	4.6%	The classroom atmosphere of the WeChat group is not very strong, I think the live broadcast can better reflect the classroom atmosphere.
Inclusiveness	Encourage students	22	9.2%	Through praise and encouragement, teachers show their care to us.
	Equal treatment for every student	10	4.2%	When answering questions, it is important for teachers to treat each of us fairly, not only the students they know well.

The critical ratio method and correlation analysis method were used to examine students' responses to individual items in order to assess the quality of those items and of the scale as a whole. These item analysis methods were conducted in SPSS 26.0. To conduct a critical ratio analysis, the participants were divided into high and low groups according to the total score of the questionnaire. Based on the statistical upper limit of 27% and the

lower limit of 27%, the low group was divided into a total score of less than 144, and the high group was divided into a total score of more than 185. The scores of high and low groups were then tested by independent sample *t*-test. When the critical ratio (CR) value reached a significant level ($p < 0.05$), it indicated that this item could identify the response degree of different participants. The results showed that there were significant differences between the 40 items compiled in the high and low groups, indicating that these items had a good degree of discrimination. The correlation analysis method calculates the correlation between each item and the total score of the questionnaire. When the correlation coefficient is less than 0.3, it is considered that the correlation between the two is low. Therefore, items with a correlation coefficient lower than 0.3 with the total score will be deleted at the significance level of 0.05. The results showed that the critical ratio of the 40 items and the correlation coefficient between each item and the total score reached statistically significant levels, which could be retained for further factor analysis.

Exploratory factor analysis (EFA) was conducted in SPSS 26.0 to identify a set of latent constructs underlying the collection of items compiled in the first phase. Before EFA, KMO, and Bartlett sphericity test were performed on the test items to determine whether the survey data were suitable for factor analysis. The closer the KMO value is to 1, the stronger the partial correlation among the tested variables and the better the effect of factor analysis. The KMO was 0.960, and Bartlett sphericity test statistic was 7664.512 ($df = 171$, $p < 0.001$). This indicates that the sample data are suitable for factor analysis. According to the relevant theoretical requirements of factor analysis and the practice of existing related studies [41], the items were screened according to the following criteria: (1) Delete items whose common degree is less than 0.30, (2) delete items with factor load less than 0.50, (3) delete items with cross-loading on multiple factors, (4) delete the items that are inconsistent with the meaning of the factor and difficult to merge into a concept with the meaning expressed by other topics, (5) in order to improve the overall simplicity of the questionnaire, the items of dimensions were simplified as much as possible, and 5–7 items were reserved for each dimension without decreasing the explanatory power of the overall variance variation. We used Principal Component Analysis (PCA) with an eigenvalue greater than 1 as the criterion to truncate factors. Using Varimax rotation, we obtained the final factor loading matrix. Cronbach's α was then calculated to determine the internal consistency reliability of the factors extracted in the EFA.

Confirmatory factor analysis (CFA) is to establish a hypothesis model to be tested according to the theoretical framework and then compare the degree of fitting between the hypothesis model and the actual measurement results. In order to further test the fitting degree of teachers' caring behavior in online teaching as a three-factor concept, CFA was conducted in Amos analysis software based on the data obtained from the second survey in the third phase. CFA was performed using maximum likelihood estimation. In order to investigate the models' goodness of fit, a number of statistics were used: Overall χ^2 , root mean square error of approximation (RMSEA), comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square residual (RMR), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), incremental fit index (IFI). Common fitness indicators and their standard values are: $\chi^2/df < 5$, $RMR \leq 0.05$, $RMSEA < 0.08$, GFI and AGFI > 0.8 , CFI, NFI, IFI, TLI > 0.9 .

4. Results

The exploratory factor analysis showed that the rotation converges after eight iterations and three factors were finally extracted, which were consistent with the theoretical presupposition. Nineteen items were retained in total. Factor 1 was comprised of seven items reported on a five-point Likert scale that explained 33.25% of the variance with factor loadings from 0.694 to 0.819. Factor 2 was comprised of seven items reported on a five-point Likert scale that explained 25.67% of the variance with factor loadings from 0.593 to 0.751. Factor 3 was comprised of five items reported on a five-point Likert scale that explained 19.19% of the variance with factor loadings from 0.596 to 0.775. The cumulative variation

explained by the three factors was 78.12%, which is acknowledged as adequate to capture the main features of a phenomenon [42]. The names of factors and loads of each item on each factor are shown in Table 2.

Table 2. Outcomes of exploratory factor analysis.

Scale Items	Factors		
	Inclusiveness	Support	Conscientiousness
I1. Give me guidance with patience when I answer questions incorrectly.	0.819		
I2. Give me encouragement and affirmation when I answer the questions incorrectly.	0.817		
I3. Answer my questions patiently and carefully.	0.775		
I4. Guide me to express my views or ideas actively.	0.761		
I5. Have an open exchange of ideas with me and inspire my thinking.	0.747		
I6. Provide me with equal opportunity to express my views.	0.709		
I7. Remind me of my improper behavior and help me correct it.	0.694		
S1. Respond to me within 24 h when I email teachers or leave a message online.		0.751	
S2. Know who I am and be able to call my name.		0.733	
S3. Respond to my emails or online inquiries on weekends.		0.733	
S4. Provide personalized instructions for my questions.		0.723	
S5. Have high expectations for my academic achievements.		0.714	
S6. Be strict with me on the premise of respecting my personality.		0.618	
S7. Pay attention to my mental health.		0.593	
C1. Teaching live and recording or providing corresponding teaching resources.			0.775
C2. Treat teaching with devotion.			0.693
C3. Have a passion for teaching.			0.684
C4. Give me guidance on learning methods and cultivate my ability to autonomous learning.			0.662
C5. Provide detailed course information (e.g., class time, course content, and learning objectives.)			0.596
Characteristic root	12.811	1.028	1.004
Contribution rate (%)	33.253	25.674	19.192

The three factors are named according to the theoretical conception. Factor 1 is named inclusiveness, which means that teachers take students as the core and can understand and tolerate students' shortcomings cognitively and emotionally, actively guide students, give them encouragement, and help them build up confidence. Factor 2 is named support, which means that in their interactions with students, teachers can actively approach students, get to know them, pay attention to them, give them help and guidance, invest time to meet their needs, and support their development. Factor 3 is named conscientiousness, which means that teachers are responsible and dedicated to their teaching work, a basic requirement for the teaching profession and an essential element to measure teachers' caring behavior.

In this study, Cronbach's α value >0.70 was used as the standard to test the reliability of the scale [43]. The results from the reliability test of the model show that Cronbach's α coefficient of each of the three dimensions and total scale was greater than 0.8, which demonstrates the reliability of the scale (See Table 3).

Table 3. Reliability analysis of the scale.

Reliability	Total Scale	Inclusiveness	Support	Conscientiousness
Cronbach's α	0.971	0.962	0.941	0.898
split-half reliability	0.930	0.931	0.906	0.840

In order to test the theoretical foundation of the scale, we performed CFA with the original three subscales (i.e., Inclusiveness, Support, and Conscientiousness). According to the test results of initial model fitness, the values of AGFI, RMSEA, and NFI do not meet the fitting criteria, indicating that the initial model needs to be revised. We mainly followed two criteria when revising the measurement model. First, based on the suggestions

proposed by Hair et al. [44], items with factor loading less than 0.5 and SMC value less than 0.36 were deleted to improve the model fitness. Second, Landis et al. [45] suggested that the items related to residuals should be deleted by observing the modified index (MI) and Par Change on the premise of ensuring the number of items. According to the correction index (MI) and Par Change in output results of Amos24.0, we deleted the S4 and I7 items with strong correlations with other measured variables and re-ran the program. The specific results are shown in Table 4. It was found that the values of both AGFI and NFI met the fitting criteria. RMSEA was greater than 0.08 but less than 0.1, indicating that the fitting degree of teachers' caring behavior in online teaching as a three-factor concept is acceptable [41]. The analysis results are shown in Figure 1.

Table 4. Fitting indices of confirmatory factor analysis.

Indices	Criteria	Initial Model	Revised Model
χ^2		555.628	346.365
χ^2/df	<5	3.729	2.986
GFI	>0.8	0.806	0.855
AGFI	>0.8	0.753	0.808
RMR	<0.05	0.036	0.032
RMSEA	<0.08	0.109	0.093
NFI	>0.9	0.894	0.924
TLI	>0.9	0.908	0.939
IFI	>0.9	0.920	0.948
CFI	>0.9	0.920	0.948

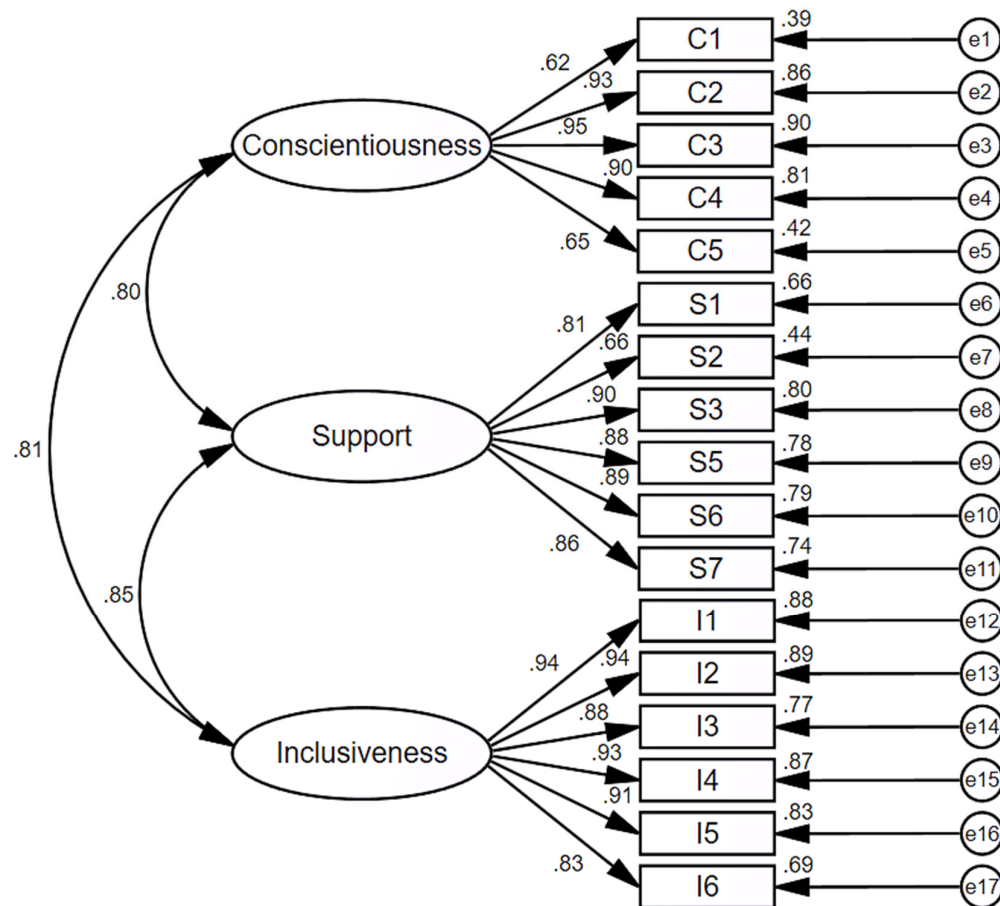


Figure 1. Model of confirmatory factor analysis.

5. Discussion and Conclusions

Existing scales of teachers' caring behavior have been mostly concentrated in face-to-face classroom settings and mainly developed for primary and secondary schools. In China, there is only a Teachers' Caring Behavior Scale in Online Teaching developed by Li et al. [38]. Through Exploratory Factor Analysis, the scale of Li et al. [38] revealed four factors of online teachers' caring behavior: Clarity, tolerance, participation, and accessibility. However, Li et al. [38] did not explain how they defined teachers' caring behavior in their research and what the relationship is between the definition and the four dimensions of the scale. Moreover, the items on the scale do not capture teachers' emotional care, which is an important part of teacher care [4,7,46]. In view of this, we have made targeted improvements on the basis of previous scales and further carried out multiple iterations to establish the validity and reliability of the scale. We took Lei's [29] three-dimensional construct of teacher care (i.e., inclusiveness, support, and conscientiousness) as the foundation for scale development, clarifying the definition of teachers' caring behavior and the relationship between the definition and three dimensions of the scale. In order to address the lack of emotional care in existing scales, we referred to the related research on teachers' emotional support in online learning [39]. On the scale, teachers' encouragement to students, passion for teaching, and attention to students' mental health consider teachers' emotional care for students (Items I2, S7, and C3).

Existing studies have shown that teachers' caring behavior and students' perceptions of caring are different due to the differences between Chinese and Western cultures [4,27,28,30]. In Chinese society, the concept and expectation of teacher care are more likely to be paternalistic. When teachers show caring behavior, it is helpful for students to regard teachers as group members and establish attachment relationships with teachers [30]. We developed the scale based on the scales developed by Chinese scholars Lei [29] and Li et al. [38]. However, the uniqueness of Chinese culture mentioned in previous studies was not actually observed in the data from this study. Students do not expect teachers to care for them as parents do, nor do they expect to establish attachment relationships with teachers, which is inconsistent with the conclusions of previous studies. There are a few possible reasons why college teachers' caring behavior in online teaching fails to highlight the culture. Like universities in many other countries, the management of modern Chinese universities is highly institutionalized. For the sake of efficiency, the operation of Chinese universities tends to exclude teachers' personal factors as much as possible and to emphasize rules and regulations. Teachers are dominated by the rules and regulations in the system. Such institutionalized management erodes the space for teachers to play their roles, which alienates the relationship between teachers and students [31]. Online teaching aggravates this problem because of the lack of reciprocal cues in online communication. Moreover, the fact that college students are adult learners might also contribute to the disembodiment of the cultural aspect of teacher care. Unlike students in K-12 schools, college students in China are expected to be independent individuals who can think critically and make decisions by themselves. As a result, college students might no longer expect a paternalistic relationship with their teachers. The embodiment of cultural aspects of teacher care in online contexts should be explored continuously in the future.

Embodied encounters are constituent of traditional face-to-face classes, where reciprocal cues were evident and ongoing in real time. Such social cues help teachers show care for students [47]. The lack of physical presence is a major barrier to care when learning moves to an online environment. Our study and others have consistently shown that, despite the lack of physical presence, specific teacher behaviors help students feel cared for in online teaching [17–19,21,48]. Simple human-to-human, teacher-to-student, one-to-one connections form the foundation of caring educational practice, whether in face-to-face or online settings [47]. However, the change in the environment also makes the way of forming caring relationships in online contexts unique. Through the development of this scale, it can be seen that students' demands for care in online teaching lie in teachers' timely feedback through email or online messages, live broadcasting teaching, providing

corresponding learning resources, and providing detailed online course information, etc., (Items S1, S3, C1, and C5), which are different from the face-to-face classroom settings. Because of such difference, the scale reported in this study is an important work as it contributes to our understanding of teacher caring behavior in online contexts.

Although online education has shown great advantages, it still has a long way to go in terms of learners' engagement and satisfaction. Existing studies have argued that teachers' caring behavior is not only conducive to building a harmonious teacher–student relationship and improving learners' learning engagement and satisfaction [1,4] but also an important indicator to measure teachers' professional ability [3,7]. These arguments are often supported by qualitative data. Due to the lack of valid and reliable instruments to measure teacher caring behavior in online contexts, there is little large-scale quantitative data that provide evidence to support these arguments. In this study, we focused on the professional attributes and relationship characteristics of teachers' caring behavior in online teaching, developed and validated a measurement scale, and revealed the structure of teachers' caring behavior in online teaching. Results from data analysis have shown that the scale has construct validity and internal consistency reliability. As a result, the scale developed in this study provides a valid and reliable tool to empirically test the benefits of teacher caring behavior with quantitative data.

6. Limitations and Future Directions

Firstly, we used confirmatory factor analysis to examine the structural validity of the scale. Future studies need to further verify the validity of the scale, for example, to test the correlation between the measurement results of the scale and its external criteria to establish criterion-related validity. Secondly, the principle of convenient sampling was adopted for data collection, which led to the limitation of scale popularization. The results may not represent the overall status of Chinese college students, so caution is needed when generalizing the results to other places. In the future, heterogeneous and random samples should be selected to evaluate the reliability and validity of the scale. Thirdly, the participants of our research are college students in Tianjin, China. In our study, the elements of teacher care are derived from native descriptions of Chinese students, applicability outside the context of this study may be limited. The cross-cultural applicability of the scale can be further tested in the future. Finally, future studies can use this instrument to further explore the relationship between teachers' caring behavior and students' academic performance, learning motivation, learning engagement, learning self-efficacy, sense of school belonging, mental health, etc.

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Appendix A

Table A1. The 40 items on teacher caring behavior developed in the first stage.

Items	1	2	3	4	5
1. In online teaching, teachers provide detailed course information (e.g., class time, course content, and learning objectives).					
2. In online teaching, teachers provide detailed instructions, evaluation criteria, and deadlines for various learning activities (e.g., assignments, discussion posts).					
3. In online teaching, teachers teach through live broadcasting and provide video recordings or corresponding teaching resources.					
4. In online teaching, teachers are fully prepared to teach and take every lesson seriously.					
5. Teachers' quality of teaching is high in online teaching.					
6. In online teaching, teachers have a passion for teaching.					
7. In online teaching, teachers treat teaching with devotion.					
8. In online teaching, teachers give me guidance on learning methods and cultivate my ability for autonomous learning.					
9. In online teaching, teachers express their views based on professional knowledge and share with us the most recent development in academic research.					
10. In online teaching, teachers give clear and detailed explanations of learning concepts and give examples.					
11. In online teaching, teachers respond to my questions, answers, and other learning behaviors in time.					
12. In online teaching, teachers answer my questions patiently and carefully.					
13. In online teaching, teachers guide me to express my views or ideas actively.					
14. In online teaching, teachers give me encouragement and affirmation after I answer the questions.					
15. In online teaching, teachers guide me with patience when I answer questions incorrectly.					
16. In online teaching, teachers have an open exchange of ideas with me and inspire my thinking.					
17. In online teaching, teachers pay attention to our state of learning.					
18. In online teaching, teachers will improve teaching according to students' feedback.					
19. In online teaching, teachers carefully check my assignments and provide suggestions for revision.					
20. In online teaching, teachers assign a wide range of assignments, such as writing papers, creating artifacts through hands-on work, and solving complex problems.					
21. In online teaching, teachers provide a wealth of selective learning resources.					
22. In online teaching, teachers provide us with additional support, such as professional advice on job hunting and interview skills.					
23. In online teaching, teachers build harmonious relationships with us as friends.					
24. In online teaching, teachers pay attention to our learning experience and create a positive classroom atmosphere.					
25. In online teaching, teachers often express positive expectations for us and help us build up confidence.					
26. In online teaching, teachers often respond to my efforts with positive comments.					
27. In online teaching, teachers often praise my progress in learning.					
28. In online teaching, all of us have an equal opportunity to express our views.					
29. In online teaching, teachers know who I am and are able to call my name.					
30. In online teaching, teachers provide personalized instructions for my questions.					
31. In online teaching, teachers encourage me to share dissident views.					
32. In online teaching, teachers provide me with help, advice, and guidance when I need it.					
33. In online teaching, teachers pay attention to my mental health.					
34. In online teaching, teachers communicate the right values and improve our morality.					
35. In online teaching, teachers respond to me within 24 h when I email teachers or leave a message online.					
36. In online teaching, teachers respond to my emails or messages on weekends.					
37. In online teaching, teachers have high expectations for my academic achievements.					
38. In online teaching, teachers are strict with us on the premise of respecting our personality					
39. In online teaching, I can feel teachers' concern for me from their strict requirements.					
40. In online teaching, teachers remind me of my improper behavior and help me correct it.					

References

1. Wimpenny, K.; Savin-Baden, M. Alienation, agency and authenticity: A synthesis of the literature on student engagement. *Teach. High. Educ.* **2013**, *18*, 311–326. [\[CrossRef\]](#)
2. Hawk, T.F.; Lyons, P.R. Please don't give up on me: When faculty fail to care. *J. Manag. Educ.* **2008**, *32*, 316–338. [\[CrossRef\]](#)
3. Walker, C.; Gleaves, A.; Grey, J. A study of the difficulties of care and support in new university teachers' work. *Teach. Theory Pract.* **2006**, *12*, 347–363. [\[CrossRef\]](#)

4. Tang, A.L.; Walker-Gleaves, C. Hong Kong university teachers' conceptions and articulation of teacher care: Towards building a model of caring pedagogy. *High. Educ.* **2022**, *83*, 503–526. [CrossRef]
5. Broglia, E.; Millings, A.; Barkham, M. Challenges to addressing student mental health in embedded counselling services: A survey of UK higher and further education institutions. *Br. J. Guid. Couns.* **2018**, *46*, 441–455. [CrossRef]
6. Fitzmaurice, M. Voices from within: Teaching in higher education as a moral practice. *Teach. High. Educ.* **2008**, *13*, 341–352. [CrossRef]
7. Anderson, V.; Rabello, R.; Wass, R.; Golding, C.; Rangi, A.; Eteuati, E.; Bristowe, Z.; Waller, A. Good teaching as care in higher education. *High. Educ.* **2020**, *79*, 1–19. [CrossRef]
8. de Guzman, A.B.; Uy, M.M.; Siy, E.Y.; Torres, R.K.C.; Tancico, J.B.F.; Hernandez, J.R. From Teaching from the Heart to Teaching with a Heart: Segmenting Filipino College Students' Views of their Teachers' Caring Behavior and their Orientations as Cared-for Individuals. *Asia Pac. Educ. Rev.* **2008**, *9*, 487–502. [CrossRef]
9. Walker, C.; Gleaves, A. Constructing the caring higher education teacher: A theoretical framework. *Teach. Teach. Educ.* **2016**, *54*, 65–76. [CrossRef]
10. UNESCO Addresses G20 Education Ministers' Meeting. Available online: <https://en.unesco.org/news/unesco-addresses-g20-education-ministers-meeting> (accessed on 29 June 2020).
11. Salto, D. COVID-19 and Higher Education in Latin America: Challenges and possibilities in the transition to online education. *eLearn* **2020**, *9*, 2. [CrossRef]
12. Gao, W.; Zhou, J.; Jing, Z.; Xu, N. Technical Shift of Higher Education in Post-Pandemic Era: Practice Reflection and Future Scenarios—Analysis of the Key Points of 2021 Horizon Report (Teaching and Learning Edition). *Mod. Distance Educ. Res.* **2021**, *33*, 63–72.
13. Li, Y.; Zhu, Y.; Zhai, Y. The Trend and Enlightenment of Technology-enabled Higher Education Reform Under the Influence of the Epidemic—A Comparison Study based on the 2020–2022 Horizon Reports. *Mod. Educ. Technol.* **2022**, *32*, 14–25.
14. Ministry of Education of the People's Republic of China. Available online: http://www.moe.gov.cn/jyb_xwfb/s5147/202301/t20230103_1037816.html (accessed on 3 January 2023).
15. Goldstein, L.S.; Freedman, D. Challenges enacting caring teacher education. *J. Teach. Educ.* **2003**, *54*, 441–454. [CrossRef]
16. Borup, J.; Graham, C.R.; Velasquez, A. Technology-mediated caring: Building relationships between students and instructors in online K-12 learning environments. In *Emotion and School: Understanding How the Hidden Curriculum Influences Relationships, Leadership, Teaching, and Learning*; Emerald Group Publishing Limited: Bingley, UK, 2013; Volume 18, pp. 183–202.
17. Sitzman, K.; Leners, D.W. Student perceptions of caring in online baccalaureate education. *Nurs. Educ. Perspect.* **2006**, *27*, 254–259. [PubMed]
18. Leners, D.W.; Sitzman, K. Graduate student perceptions: Feeling the passion of caring online. *Nurs. Educ. Perspect.* **2006**, *27*, 315–319.
19. Sitzman, K. Student-preferred caring behaviors for online nursing education. *Nurs. Educ. Perspect.* **2010**, *31*, 171–178.
20. Post, J.; Mastel-Smith, B.; Lake, P. Online teaching: How students perceive faculty caring. *Int. J. Hum. Caring* **2017**, *21*, 54–58. [CrossRef]
21. Mann, J.C. A pilot study of RN-BSN completion students' preferred instructor online classroom caring behaviors. *ABNF J.* **2014**, *25*, 33.
22. Pagoto, S.; Lewis, K.A.; Groshon, L.; Palmer, L.; Waring, M.E.; Workman, D.; De Luna, N.; Brown, N.P. STEM undergraduates' perspectives of instructor and university responses to the COVID-19 pandemic in Spring 2020. *PLoS ONE* **2021**, *16*, e0256213. [CrossRef]
23. Gilligan, C. *A Different Voice: Psychological Theory and Women's Development*; Harvard University Press: Cambridge, MA, USA, 1982; p. 73.
24. Noddings, N. The caring relation in teaching. *Oxf. Rev. Educ.* **2012**, *38*, 771–781. [CrossRef]
25. Larsen, A.S. Who Cares? Developing a Pedagogy of Caring in Higher Education. Ph.D. Thesis, Utah State University, Logan, UT, USA, 2015.
26. Strachan, S.L. The case for the caring instructor. *Coll. Teach.* **2020**, *68*, 53–56. [CrossRef]
27. Sun, B.; Shao, Y.; Richardson, M.J.; Weng, Y.; Shen, J. The caring behaviour of primary and middle school teachers in China: Features and structure. *Educ. Psychol.* **2017**, *37*, 362–379. [CrossRef]
28. Tang, A.L.; Walker-Gleaves, C.; Rattray, J. Hong Kong Chinese university students' conceptions of teacher care: A dialectical framework of care. *J. Furth. High. Educ.* **2021**, *45*, 573–587. [CrossRef]
29. Lei, H. CSI: An analytical framework for teachers' caring behavior. *J. Shanghai Educ. Res.* **2014**, *4*, 64–67.
30. Tang, L. An Exploratory Study of Hong Kong Chinese Students' Conceptions and Experiences of Academics' Care within a Higher Education Context. Ph.D. Thesis, Durham University, Durham, UK, 2017.
31. Guo, H. Modern dilemmas of "beloved teacher". *J. Shanxi Univ.* **2022**, *5*, 128–135.
32. Gao, L.; Watkins, D.A. Towards a model of teaching conceptions of Chinese secondary school teachers of physics. In *The Chinese Learners: Cultural, Psychological and Contextual Influences*; Watkins, D.A., Biggs, J.B., Eds.; Comparative Education Research Centre and the Australian Council for Educational Research: Hong Kong, China, 2001; pp. 27–45.
33. Shim, S.H. A philosophical investigation of the role of teachers: A synthesis of Plato, Confucius, Buber, and Freire. *Teach. Teach. Educ.* **2008**, *24*, 515–535. [CrossRef]

34. Su, J. On teachers' caring quality. *Teach. Educ. Res.* **2006**, *6*, 42–47.
35. Teven, J.J.; McCroskey, J.C. The relationship of perceived teacher caring with student learning and teacher evaluation. *Commun. Educ.* **1997**, *46*, 1–9. [[CrossRef](#)]
36. McCroskey, J.C.; Teven, J.J. Goodwill: A reexamination of the construct and its measurement. *Commun. Monogr.* **1999**, *66*, 90–103. [[CrossRef](#)]
37. Straits, W. "She's Teaching Me": Teaching with Care in a Large Lecture Course. *Coll. Teach.* **2007**, *55*, 170–175. [[CrossRef](#)]
38. Li, Y.; Wang, L.; Yao, Q. Development of teachers' caring behavior scale in online teaching. *Mod. Distance Educ.* **2021**, *3*, 52–61.
39. Zhao, C.; Li, H.; Jiang, Z.; Huang, Y. Alleviating Online Learners' Burnout: A Study on the Influence of Teachers' Emotional Support. *China Educ. Technol.* **2018**, *2*, 29–36.
40. Saldaña, J. The coding manual for qualitative researchers. *Winter Aasa J. Scholarsh. Pract.* **2016**, *21*, 146–169.
41. Hou, J.; Wen, Z.; Cheng, Z. *Structural Equation Modeling and Its Applications*; Educational Science Publishing Company: Beijing, China, 2004.
42. DeVellis, R.F. *Scale Development: Theory and Applications*; Sage Publications: Thousand Oaks, CA, USA, 1991.
43. Fornell, C.; Larcker, D.F. Evaluating structural equation models with unobservable variables and measurement error. *J. Mark. Res.* **1981**, *18*, 39–50. [[CrossRef](#)]
44. Hair, J.F., Jr.; Black, W.C.; Babin, B.J.; Anderson, R.E. *Multivariate Data Analysis*, 7th ed.; Prentice Hall: New York, NY, USA, 2010.
45. Landis, R.S.; Edwards, B.D.; Cortina, J.M. On the practice of allowing correlated residuals among indicators in structural equation models. In *Statistical and Methodological Myths and Urban Legends: Doctrine, Verity and Fable in the Organizational and Social Sciences*; Lance, C.E., Vandenberg, R.J., Eds.; Routledge: New York, NY, USA, 2009; pp. 193–214.
46. Kemp, H.; Reupert, A. "There's no big book on how to care": Primary pre-service teachers' experiences of caring. *Aust. J. Teach. Educ.* **2012**, *37*, 114–127. [[CrossRef](#)]
47. Sitzman, K.L. What student cues prompt online instructors to offer caring interventions? *Nurs. Educ. Perspect.* **2016**, *37*, 61–71.
48. Plante, K.; Asselin, M.E. Best practices for creating social presence and caring behaviors online. *Nurs. Educ. Perspect.* **2014**, *35*, 219–223. [[CrossRef](#)]

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