FNJN

İSTANBUL UNIVERSITY CERRAHPAŞA

Florence Nightingale Journal of Nursing

DOI: 10.5152/FNJN.2024.23101

Research Article

Effects of Professional Growth-Need Strength on Nursing Competencies: A Care-Task Design and Clinical Reasoning Program

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Cite this article as: Yu, C.H., Wu, P.L., & Pai, H.C. (2024). Effects of professional growth-need strength on nursing competencies: A care-task design and clinical reasoning program. *Florence Nightingale Journal of Nursing*, *32*(1), 10-16.

Abstract

AIM: The study aimed to examine the relationship among professional growth-need strength, care-task characteristics, critical thinking, and holistic nursing competencies after a care-task design and clinical reasoning program intervention in nursing students.

METHODS: This study used a longitudinal study design. The study was conducted from August 12, 2019 to July 30, 2020. Participants were third-year nursing students of a medical university. Data were collected by questionnaires at three time points. Structural equation modeling was used to examine the relationship among all measures variables.

RESULTS: A total of 91 students participated in the study. The results show that growth-need strength had a significant positive effect on care-task characteristic and critical thinking and a nonsignificant effect on holistic nursing competencies. Care-task characteristics, however, had a significant positive effect on critical thinking, resulting in improvement in holistic nursing competencies. It is worth noting that the moderating effect of growth-need strength on care-task characteristics and nursing competence relationships could not be established.

CONCLUSION: Our findings suggest the importance of improving students' perceived care-task characteristics through an objective structured clinical examination and, at the same time, promoting students' critical thinking and improving their professional abilities.

Keywords: Critical thinking, growth-need strength, job characteristics, nursing competency

Introduction

The learning and testing of nursing students' skills and techniques concentrates on the correct completion of tasks. As nursing tasks are cumbersome, however, courses and examinations should simulate the clinical environment to provide students with vivid learning content that aligns with future job characteristics. Hackman and Oldham (1975) introduced a job characteristic model (JCM) and the associated job diagnostic survey tools. They proposed that job characteristics could influence an individual's job outcome and identified five major elements (skills variety, task identity, task significance, autonomy, and feedback) as well as three important psychological states (experienced meaningfulness of the work, experienced responsibility of the outcomes of the work, and knowledge of the results of work activities). In addition, the relationship between an individual's job outcome (such as high work performance), key work elements (such as skills variety, task identity, and task significance), and important psychological states are moderated by the strength of this growth need (Hackman and Oldham, 1975, 1980). During the COVID-19 pandemic, when remote teaching was used, these elements of JCM had an influence on teachers' motivation and performance and changed teacher–student patterns of communication (Kulikowski et al., 2021a, 2021b).

Previous studies have indicated that individuals with high growth-need strength are more likely to experience their work as meaningful and to be self-aware and responsible, which, in turn, produces positive work experiences (Mumtaz & Parahoo, 2019; Oldham & Fried, 2016; Saud, 2020). These findings suggest that the strength of growth need is positively correlated with job characteristics and psychological states and has a constructive influence on an individual's achievements, making it critical for the formulation of his or her professional performance (Hackman & Oldham, 1980; Sarkawi et al., 2016). In addition, an integrated analysis highlights the role of the strength of growth need and finds that the stronger an individual's growth-need strength, the stronger this correlation (Wegman et al., 2018).

There are, however, individual differences in strength of growth need, which can affect the degree and the direction of the correlation between job characteristics and job outcome. Interaction theory indicates the need to pay attention to not only contextual factors but also individual factors (Chou and Lu, 2014). Chou and Lu note that individuals with high growth-need strength would experience high satisfaction upon facing positive tasks that could provide appropriate feedback, in which they had a sense of control and were meaningful. This is because the characteristics of these tasks not only are challenging and stimulating but

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Received: May 9, 2023
Accepted: December 5, 2023
Publication Date: February 28, 2024

also can inspire participants' curiosity and sense of competence. Oldham and Fried (2016) stated that research is needed to extend this work, perhaps by identifying the specific individual traits that are especially relevant for each job's core characteristics. One study also found that the relationship between the growth-need strength and affective commitment is mediated by attitudes toward organizational change (Elias, 2009). Another study found that work characteristics indirectly influenced job performance through individual dispositions (Peiró et al., 2020). Mahoney et al. (2020), however, found that job characteristics were positively associated with job outcomes. As seen, these findings are inconsistent with each other and require further clarification. Therefore, based on the concept of professional growth-need strength, this study involved the design of a teaching program that combined the concept of task design with the characteristics of nursing jobs, thereby allowing the tracking and strengthening of students' growth need.

At present, in addition to promoting clinical simulation teaching, nursing schools also have introduced objective structured clinical examinations (OSCEs) to test students' nursing skills. Because the clinical environment, where nurses may have to deal with multiple problems and demands from patients, can be complicated, the ability to exercise critical thinking and judgment has become increasingly important. The cultivation of this ability, however, often relies on self-reflection.

Based on the above literature, by integrating multiple strategies, including self-regulated learning, clinical care tasks, and clinical reasoning, this study involved a Care-Task Design and Clinical Reasoning Program (CTD-CR) that lasted over an entire academic year (two semesters). A detailed description of CDT-CR will be presented in the latter part of the program. Based on the concept model of JCM and the literature, we posit a positive relationship between job characteristics and work outcomes. Nevertheless, growth-need strength may mediate this relationship. In this study, job characteristics refer to "task characteristics," which include students' perceived "task variety," "significance," and "identity" related to clinical examination; work outcomes refer to students' "holistic nursing competencies and critical thinking" about performing the care task. Based on this, and as shown in Figure 1, we constructed a hypothesized full model. Based on the model, we propose the following research hypotheses (H): students' greater professional growth-need strength is associated with better perception of care-task characteristics (H1a), better critical thinking (H1b), and better holistic nursing competencies (H1c); students' stronger perceptions of care task characteristics will be associated with better holistic nursing competencies (H2a) and better critical thinking (H2b); students' higher critical thinking will be associated with better nursing competencies (H3); and students' professional growth-need strength moderates the relationship between care-task characteristics and nursing competencies (H4a) and the relationship between critical thinking and nursing competencies (H4b).

Research Questions

1. Does students' professional growth-need strength is associated with perception of care-task characteristics, critical thinking, and holistic nursing competencies.
2. Does students' perceptions of care task characteristics will be associated with holistic nursing competencies and critical thinking.
3. Does students' critical thinking will be associated with nursing competencies.
4. Does students' professional growth-need strength moderates the relationship between care-task characteristics and nursing competencies and the relationship between critical thinking and nursing competencies.

Methods

Study Design

This study used a longitudinal research design.

Procedure

Participants were sampled from a medical university in central Taiwan. The study was conducted from August 12, 2019 to July 30, 2020. Early in the semester, we invited 112 third-level nursing students to participate in the study, of whom 91 (81.25%) completed the questionnaires at the three time points. The students' demographics were as follows: 68 females (74.7%), 23 males (25.3%), and an age range of 21 to 24 years ($M=21.51$, $SD=0.69$). The CTD-CR program is implemented throughout the student's academic year. The first stage, which starts at the first semester of the third level, focuses on the practice of students' self-learning ability and clinical nursing skills. This stage is designed such that students can use their spare time to independently practice the basic nursing techniques that they have learned in the second level and learn the integrated operation of various techniques at clinical skill centers. Students can freely determine their practice time and are required to attend an OSCE at the end (18th week) of the semester.

In the second stage of the program, which starts in the second semester, students are asked to attend a formal course on medical-surgical nursing skills, for which they can earn two credits. During this stage, teachers will first spend 2 hours per week demonstrating a certain technique, followed by dividing students into groups composed of three to four for a series of practices that are supervised by a teacher. The course lasts for a total of 14 weeks, during which students will practice the most difficult techniques selected by the group as well as record practice videos. In addition, they will spend approximately one to two hours discussing operations of the technique with the teacher, during which students will first try to independently identify any errors made and then receive correct information and feedback from the teacher. All participating students are required to sit for a medical-surgical nursing skill exam held during the last week of the course.

To collect data on different indicators, measurements on certain indicators were acquired at different time points of the course. Specifically, during the first week of the first semester of students' third level, researchers first explained the research purpose to all students, invited them to participate, and measured their individual professional growth-need strength as the first indicator. A second measurement was taken after students participated in the OSCE, which focused on determining the characteristics of students' conscious care tasks following the

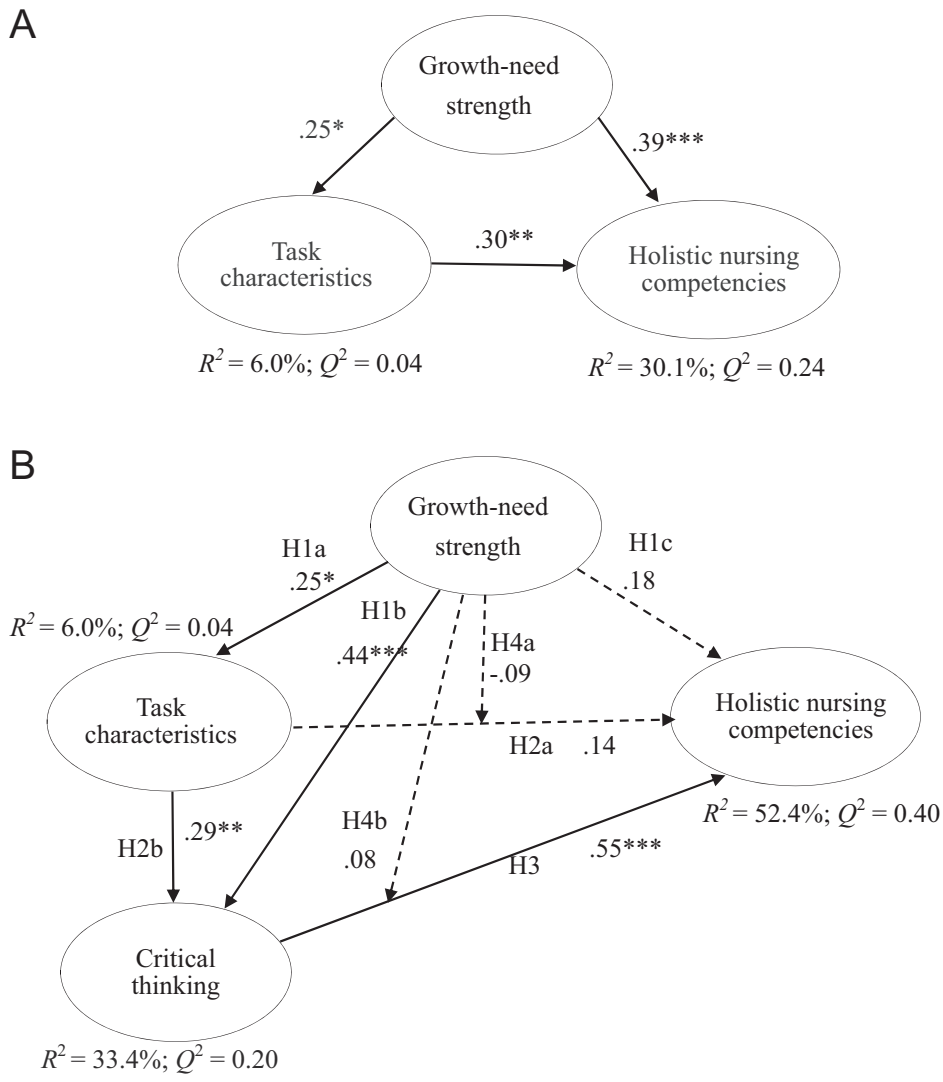

Figure 1.
(A) Effect of Growth Need on Task Characteristics and Holistic Nursing Competencies (SRMR = 0.040, NFI = 0.92); (B) Full Model among Research Variables and Moderating Effect (SRMR = 0.069, NFI = 0.85). *p < .05, **p < .01, ***p < .001.

exam. A third measurement was performed at the end of the study, the indicators of which included students' critical thinking and nursing competence.

Data Collection Tools

Five scales were used to assess students' learning effectiveness: Professional Growth-Need Strength Scale, Task Characteristics Scale, Taiwan Critical Thinking Disposition Inventory, and Holistic Nursing Competence Scale. The content validity index (CVI) was above 0.80 for all scales.

Professional Growth-Need Strength Scale

The Professional Growth-Need Strength Scale was used to assess students' learning needs for care task. It is part of the Job Diagnostic Survey questionnaire developed by Hackman and Oldham (1975, 1980). This subscale contains 11 items and uses seventh-rank scoring. A 4-point score indicates that students would like having this need only a moderate amount (or less), a 7-point score indicates that students would like having this need very much, and a 10-point score indicates that students would like having this an extreme amount. Final scores range from 44 to 110, with higher scores' indicating higher levels of growth-need strength. We translated this scale into Chinese and invited an expert with bilingual (Chinese and English) skills to translate back into English. The CVI was 0.87.

Task Characteristics Subscale

The Task Characteristics subscale of the traditional Chinese version of the Work Design Questionnaire (TC-WDQ; Chiou et al., 2010), which was translated from Morgeson and Humphrey's (2006) WDQ, was used to examine students' perceptions of the task characteristics of the OSCE. The TC-WDQ consists of 24 items that are divided into five dimensions: task autonomy, task variety, task significance, task identity, and feedback from job. Each subscale score comprises the sum of the scores for each dimension. Each item is scored from 1 (strongly disagree) to 5 (strongly agree). Previous research has verified that this scale has good internal consistency in terms of assessing nursing

students' reactions to clinical examinations (Pai et al., 2018). In this study, we apply three dimensions (task variety, task significance, and task identity) and 12 items to collect students' data. Final scores range from 12 to 60.

Taiwan Critical Thinking Disposition Inventory

The Taiwan Critical Thinking Disposition Inventory (TCTDI) was used to assess students' perceived critical thinking nature or disposition (Yeh, 1998, 1999). The TCTDI contain 20 items and four dimensions: systematicity/analyticity, open-mindedness, inquisitiveness, and reflective thinking. Each item is scored from 1 (less matched) to 6 (highly matched). Final scores range from 20 to 120, with higher scores' indicating higher levels of critical thinking disposition.

Holistic Nursing Competence Scale

The Holistic Nursing Competence Scale (HNCS), developed by Takase and Teraoka (2011), was used to assess students' nursing ability, and the Chinese version has good reliability and validity (Eng & Pai, 2015). It contains 36 items and five dimensions: general aptitude, staff education and management, ethically oriented practice, nursing care in a team, and professional development. The participants of the study were not involved in the education and management of personnel in clinical practice; thus, staff education and management were not included in this study. A total of 27 items were used in this study. Each item was scored from 1 (not at all) to 7 (almost all). Final scores range from 27 to 189, with higher scores' indicating higher nursing ability (Takase & Teraoka, 2011).

Statistical Analysis

In this study, a structural equation modeling (SEM) approach with partial least squares (PLS) was used in the data analysis, as SEM can simultaneously examine a measurement and a structural model. Moreover, PLS can be used with a relatively small sample size, provides optimal prediction accuracy, and is suited for testing theories in the early phase of development (Urbach & Ahlemann, 2010). For the sample size, recommendations range from 30 to 100 cases (Urbach & Ahlemann, 2010). In this study, 91 nursing students completed the questionnaire at three time points; thus, the sample size was considered adequate for the generalization of the results. Structural equation modeling was based on the research conceptual mode, using Smart/PLS (v. 3.2.8; Ringle et al., 2015). The validity of our research model was evaluated in terms of prediction relevance (Q^2) with blindfolding. Q^2 values of 0–0.24, 0.25–0.49, and 0.50 and above indicate small, medium, and large predictive relevance for endogenous constructs (Hair et al., 2019). An effect size (f^2) value of 0.02–0.14, 0.15–0.34, and 0.35 and above indicate a small, medium and large effect of an exogenous construct's contribution to an endogenous latent variable's R^2 value (Hair et al., 2014, 2019). In the present study, all indicators of absolute skewness and kurtosis are below 2 and 4, respectively, which indicates that the research data have a normal distribution (Mishra et al., 2019).

Ethical Considerations

The Institutional Review Board of Chung-Shan Medical University Hospital (Approval No: CS2-19071, Date: December 8, 2019) approved the study. At the beginning of semester, the primary researcher explained the purpose of this study and informed the students that they could withdraw from the study at any time with no penalty. The primary researcher also explained that students' involvement would not affect their examination score. To ensure the student's privacy, the data analysis provides overall results. The students completed a self-report questionnaire at three time points, according to the research procedure, each of which took approximately 15–20 minutes to complete. At the completion of the study, we gave an NT$200 gift certificate to thank students for completing the questionnaires.

Results

Participants' Professional Growth-Need Strength

Table 1 provides the descriptive statistics for the study variables. The first measurement of professional growth-need strength of the 91 students ranged from 44 to 110 ($M = 94.52$, SD = 12.86), showing that the professional growth-need strength of students is above medium to high.

Construct Reliability and Discriminant Validity

As shown in Table 2, the value of the Cronbach's alpha and composite reliability (CR) are above 0.70 for all latent variables, which indicates that the data are reliable (Hair et al., 2014). In addition, the loading of all items (indicators) exceeds 0.70, which means that latent variables explain at least 50% of the variance. The values of the average variance extracted (AVE) exceed 0.50 for each variable, which indicates that convergent validity was achieved (Hair et al., 2014). We tested discriminant validity through the heterotrait–monotrait (HTMT) ratio of correlations (Table 1), an approach recommended by Henseler et al. (2015). The values of HTMT are lower than the threshold of 0.85 (Table 1), which indicates the achievement of discriminant validity (Henseler et al., 2015). Based on these findings, the measurement model is reliable and valid.

Structural Model

Before performing the overall full-model test, we perform SEM analysis to understand the effects of growth-need strength between task characteristics and critical thinking on holistic nursing competencies. As shown in Figure 1 (A), greater perceptions of task characteristics are associated with better nursing competencies ($\beta = .30$, $t = 3.44$), and greater growth-need strength is associated with more task characteristics and better competencies ($\beta = .25$, $t = 2.17$; $\beta = .39$, $t = 4.47$). The standardized root mean square residual (SRMR) = 0.040, which is less than 0.080, and the normed fit index (NFI) = 0.92. Overall,

Table 1.
Mean, Standard Deviation, and Discriminant Validity of the Heterotrait–Monotrait Ratio of Correlations

Variable	M	SD	1	2	3
1. Professional growth-need strength	94.52	12.86			
2. Task characteristics	43.78	7.46	0.26		
3. Critical thinking	92.47	10.87	0.54	0.42	
4. Holistic nursing competencies	143.57	24.82	0.47	0.42	0.77

Table 2.
Factor Loading, Reliability, and Convergent Validity for the Measurement Model

Measure/Variable	Standardized factor loading	Cronbach's alpha	CR	AVE
Professional growth-need strength	Single measure variable			
Task characteristic		0.91	0.95	0.85
Task variety	0.92***			
Task significance	0.93***			
Task identity	0.93***			
Critical thinking		0.84	0.89	0.67
Systematicity/analyticity	0.89***			
Open-mindedness	0.87***			
Inquisitiveness	0.74***			
Reflective thinking	0.77***			
Holistic nursing competencies		0.95	0.96	0.86
General aptitude	0.91***			
Ethically oriented practice	0.92***			
Nursing care in a team	0.95***			
Professional development	0.94***			

Note: CR = Composite reliability; AVE = Average variance extracted.
*$p < .05$, **$p < .01$, ***$p < .001$.

growth-need strength explained 6.0% ($Q^2 = 0.04$; effect size, $f^2 = 0.064$) of the total variance in task characteristics, and growth-need strength and task characteristics explained 30.1% ($Q^2 = 0.24$; $f^2 = 0.32$) of the total variance in nursing competencies.

Next, we integrated all variables into the full model. The path analysis of structure model was achieved through PLS-SEM with bootstrapping analysis, as shown in Figure 1 (B). The standardized root mean square residual (SRMR) = 0.069, which is less than 0.080, and the normed fit index (NFI) = 0.85, which exceeds the threshold value of 0.80 and is close to 1, indicating that the full model fits the data well (Hair et al., 2014). In addition, the variance inflation factor (VIF) value of both indicators (professional development and nursing care in a team) of holistic nursing competencies are 5.59 and 6.64, respectively. The VIF value of other indicators are lower than 5, which means that there is no multicollinearity for the research variable, as suggested by Hair et al. (2019). In keeping with Hair et al., Dini and Fauzan (2020, p. 59) report that "if the VIF value of the research variable is less than 10, then there is no symptom of multicollinearity." Thus, in this study, these findings indicate that there are no critical levels of collinearity.

The results show that greater growth-need strength is associated with a higher perception of task characteristics and better critical thinking ($\beta = .25$, $t = 2.22$; $\beta = .44$, $t = 6.13$). Similarly, higher perceived task characteristics are associated with greater critical thinking ($\beta = .29$, $t = 2.81$). The effect of growth-need strength on nursing competencies, however, is nonsignificant ($\beta = 0.18$, $t = 1.32$). Overall, task characteristics and growth-need strength explained 33.4% ($Q^2 = 0.20$; $f^2 = 0.38$) of the total variance in critical thinking, and growth-need strength explained 6.0% ($Q^2 = 0.04$; $f^2 = 0.06$) of the total variance in task characteristics.

The effect of task characteristics on nursing competencies also is nonsignificant ($\beta = .14$, $t = 1.78$). Better critical thinking, however, is associated with greater nursing competencies ($\beta = .55$, $t = 4.70$). A moderating effect of growth-need strength on the relationship between care-task characteristics, critical thinking, and nursing competencies was nonsignificant ($\beta = -.09$, $t = 0.75$; $p = .45$; $\beta = .08$; $t = 0.56$; $p = .58$). Growth-need strength, task characteristics, and critical thinking explained 52.4% ($Q^2 = 0.40$; $f^2 = 0.45$) of the total variance in nursing competencies. Overall, H1a, H1b, H2b, and H3 are supported, whereas H1c, H2a, H4a, and H4b are not.

Discussion

In this study, we first tested the effect of professional growth-need strength on the relationships between task characteristics and competencies. The results show that students who had more growth-need strength reported greater nursing competencies. When we added the critical thinking variable into the model, we found that the effect of need strength on nursing competencies was nonsignificant. Similarly, the moderating effect of growth-need strength on task characteristics, critical thinking, and nursing competence relationships could not be established.

These findings show that there may be other mediators that affect these relationships. Using the full model, we show that students who have higher growth-need strength report better perceived care-task characteristics and critical thinking. The f^2 values are 0.06 and 0.38, respectively, which, according to Hair et al. (2014, 2019), suggests that there is small effect of growth-need strength on perceived care-task characteristics and a large effect on critical thinking. These findings are similar to those of other studies in which it was found that individuals with high growth-need strength are more likely to experience their work as meaningful and to be self-aware and responsible (Chiou et al., 2010; Hackman & Oldham, 1975; Oldham & Fried, 2016; Saud, 2020). Our results also echo the work of Mumtaz and Parahoo (2019), who find that growth-need strength had a significant direct effect on employee innovation performance. This also may be because an individual who has more growth-need strength reports greater critical thinking skills and presents more highly innovative ideas.

As noted earlier, the effect of growth-need strength on nursing competencies was nonsignificant. This is inconsistent with the findings of Hackman and Oldham (1980), who note that more growth-need strength is critical in terms of better professional

performance. Perhaps this relationship occurs through a vital mediator (Oldham & Fried, 2016). An organizational management study found that the relationship between the growth-need strength and affective commitment is mediated by attitudes toward organizational change (Elias, 2009). Our study shows that students' perceptions of more task variety, task significance, and task identity reported greater critical thinking, which resulted in the reporting of higher nursing competencies. These results echo the work Peiró et al. (2020), who found that work characteristics indirectly influenced job performance through individual dispositions. These finding also show that individuals' perceived growth-need strength–job outcome relationship is mediated by task characteristics and critical thinking. This outcome is similar to that of Oldham and Fried (2016), who note that research is needed to extend this work, perhaps by identifying the specific individual traits that are particularly relevant for each of a job's core characteristics. To improve students' nursing ability, in addition to understanding the intensity of their growth-need strength, it is important to enhance the diverse meaning and identity of their tasks through the design of skill-testing tasks and by strengthening their critical thinking skills.

In sum, the full model indicates that growth-need strength, task characteristics, and critical thinking explained 52.4% of the total variance in nursing competencies. Blindfolding resulted in a Q^2 value of 0.40 and an f^2 value of 0.45, which, according to Hair et al. (2019), suggests that the full model has medium or above predictive accuracy and a large effect size (Hair et al., 2014, 2019). Therefore, this research model has been validated.

Study Limitations

In the current study, we developed a clinical reasoning program to promote students' learning motivation and learning effectiveness. The results were limited, however, perhaps due to the use of a single-group research design that lacked a control group. In addition, unlike laboratory studies, we could not strictly control interference factors. Thus, our study may have bias, an issue common in the social sciences. Nevertheless, we conducted a longitudinal research design, which provided an understanding of the effect of individual growth-need strength on perceived job characteristics and critical thinking. We also clarified the relationship between growth-need strength, job characteristics, and job performance, which may occur due to a mediator, such as critical thinking.

Conclusion and Recommendations

Critical thinking and holistic nursing competencies are vital for nursing professionals. In this study, we first investigate the professional growth-need strength of students and develop a clinical reasoning program to improve students' learning motivation and efficiency. We test and establish a relationship model among professional growth-need strength, care-task characteristics, and critical thinking through PLS-SEM analysis. Our findings show that professional growth-need strength does not directly affect holistic nursing competencies but rather indirectly affects it through task characteristics and critical thinking. Moreover, our full model shows that the effects of growth-need strength, task characteristics, and critical thinking on nursing competencies have at least medium predictive accuracy.

The results from this study suggest that nursing educators who develop objective structured clinical examinations that focus on task variety, task significance, and task identity, while further increasing students' critical thinking and mediating growth-need strength, can promote students' holistic nursing competencies in clinical practice. In addition, the study of students' nursing ability should pay attention to the correctness of operational skills and the application of clinical care. We designed the CTD-CR program, which involved students' learning how to identify any errors made and then receiving correct information and feedback from the teacher, which provides students with technical learning.

Ethics Committee Approval: Ethical committee approval was received from the Institutional Review Board of Chung-Shan Medical University Hospital (Approval No: CS2-19071, Date: December 8, 2019).

Informed Consent: Written informed consent was obtained from the participants who agreed to take part in the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – H.C.P.; Design – H.C.P.; Supervision – H.C.P. Resource – H.C.P.; Materials – H.C.P.; Data Collection and/or Processing – C.H.Y., P.L.W.; Analysis and/or Interpretation – H.C.P.; Literature Search – H.C.P., C.H.Y., P.L.W.; Writing – H.C.P.; Critical Reviews – H.C.P.

Acknowledgments: We wish to thank Professor Greg Oldham, Haw-Jeng Chiou, Yu-Chu Yeh, and Miyuki Takase, who provided the scales for this study. We also thank the Ministry of Education for funding this study.

Declaration of Interests: The authors have no conflict of interest to declare.

Funding: This research project was supported by grants from the Ministry of Education, Taiwan (Grant number: PMN1080238).

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