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A Parsimonious Model of Nursing Students' Clinical Learning Environment and Self-Directed Learning: Basis for a Self-Directed Learning Development Program

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ABSTRACT

The importance of self-directed learning (SDL) in nursing education has grown as students are ready for independent clinical practice and ongoing professional growth. Understanding the variables that impact SDL preparedness is essential for formulating efficient educational approaches. The present research used a descriptive-correlational methodology to investigate the association between the clinical education environment and nursing students' preparedness for self-directed learning. The Dundee Ready Education Environment Measure (DREEM) and the Self-Directed Learning Readiness Scale (SDLRS) were used to examine data obtained from 300 nursing students. Stratified random selection guaranteed the inclusion of second to fourth-year students. The data was studied using descriptive statistics, correlation analysis, and structural equation modeling (SEM). The findings indicated that most participants were female (82.70%), and their perception of the clinical education setting was generally good, with notably high ratings regarding learning and teaching effectiveness. The students exhibited exceptional preparedness for self-directed learning, displaying outstanding self-management, a strong desire for learning, and self-control. The results of the correlation study indicated strong negative associations between the year level and the clinical education environment and self-directed learning preparation. Conversely, academic performance (GWA) exhibited favorable connections with both variables. SEM analysis revealed that the clinical education setting substantially impacted the preparedness for SDL. Enhanced fit indices of the modified model indicate that a desirable clinical education setting benefits SDL preparedness.

INTRODUCTION

In a clinical learning environment, nursing students' educational experiences go beyond traditional classroom settings, encompassing hospitals, community health centers, and other real-world healthcare settings. These environments play a crucial role in shaping students' competencies and professional readiness. Vasli (2023) Self-directed learning had a significant positive effect on clinical competence As Bates (2015) pointed out, a safe and vibrant learning environment is essential for students to develop competence, motivation, and encouragement, all of which are influenced by interactions with peers and teachers. In clinical education, the environment is further characterized by hands-on learning, exposure to diverse patient care situations, and a need for critical thinking and adaptability (Jamshidi *et al.,* 2016). This distinctive setting requires nursing students to be independent, innovative, and responsive, traits that align with the concept of self-directed learning.

Research has extensively examined the relationship between the clinical educational environment and nursing students' competence, revealing a statistically significant and positive correlation between students' perceptions of their clinical environment and their competence (Visiers-Jiménez *et al.,* 2021). These findings highlight the importance of optimizing clinical settings to support SDL, as students who perceive their environment positively tend to demonstrate greater competency in their clinical practice. Additionally, nursing students' satisfaction with the clinical learning environment has been identified as a key factor contributing to their overall learning experience. Papastavrou *et al.* (2016) emphasized that satisfaction within clinical settings can lead to potential reforms aimed at improving learning activities and achievements. Moreover, the challenges faced by nursing students, such as the need for adequate self-confidence in caregiving, significantly impact their learning (Jamshidi *et al.,* 2016).

The impact of SDL on problem-solving abilities has also been studied, revealing a complex relationship between self-directed learning readiness and problem-solving skills among nursing students (Luo *et al.,* 2019). Although the correlation between these variables is low, the study underscores the necessity of SDL in fostering critical thinking and problem-solving capabilities. Furthermore, Mirzawati *et al.* (2020) observed a positive and significant relationship between self-efficacy, the learning environment, and SDL, emphasizing the interconnected nature of these variables. The learning environment plays a vital role in shaping students' SDL strategies, as demonstrated by Schweder and Raufelder (2021), who found differences in how students engage in self-directed versus teacher-directed learning environments.

The necessity for SDL programs has been recognized in various educational fields, including pharmacy (Unni *et al.,* 2019), pre-medical education (Kim *et al.,* 2022),

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and nursing education (Noh & Kim, 2019). In nursing, the effectiveness of SDL programs utilizing blended coaching has been explored, demonstrating the need for further research on associated variables and long-term effects (Noh & Kim, 2019). Additionally, Vasli (2023) and Asadiparvar-Masouleh (2022) examined the mediating role of the clinical learning environment in the effects of SDL on clinical competence among internship nursing students, reinforcing the significance of clinical settings in supporting self-directed learning approaches.

Another aspect of SDL is its relationship with nursing students' satisfaction and competency self-efficacy. Ibrahim *et al.* (2019) established that students' satisfaction with the clinical learning environment significantly impacts their confidence in their competencies. This finding illustrates the importance of fostering a supportive and engaging clinical education environment where SDL can thrive. Moreover, clinical nursing education aims to develop students' professional skills, critical thinking abilities, independence, and lifelong learning habits (Sebaee *et al.,* 2017). Given these objectives, incorporating SDL into nursing education is imperative for producing competent and self-reliant nursing professionals.

However, despite the significance of the clinical learning environment, a gap has been observed between the skills and traits nursing students need to thrive in these settings and their actual readiness for self-directed learning. Prior research, such as the studies by Ojekou and Okanlawon (2019) and Grande *et al.* (2022), has shown moderate levels of self-directed learning readiness among Nigerian and Southeast Asian nursing students. These findings suggest that, while students may be motivated, there is often a disconnect between the learning environment and their ability to fully engage in self-directed learning. This gap becomes particularly evident in clinical settings, where students must navigate complex and unpredictable situations independently, yet may lack the necessary readiness to do so effectively.

To address this issue, the present study aimed to investigate the relationship between the clinical learning environment and self-directed learning among Filipino nursing students. The objective is to develop a structural equation model that illustrates the interrelationships between these two elements, filling a significant gap in the literature. By understanding these dynamics, this research seeks to contribute valuable insights to educational practices, informing the development of tailored interventions that enhance self-directed learning among nursing students in the Filipino context.

Self-Directed Learning (SDL): History and Concepts

The practice of self-directed learning can be traced back to classical antiquity with the self-study of philosophers such as Socrates, Plato, and Aristotle. In Colonial America, individuals pursued learning independently due to the limited number of formal schools (Hiemstra, 1994). Formal academic interest in SDL emerged in the 19th century, with contributions from Craik (1840) and Smiles (1859), but it was in the 1960s when Houle (1961) and his student Tough (1979) laid the modern foundation of SDL as a field of research. Tough's work examined how adults learn independently, which influenced many studies worldwide. Knowles (1975) introduced the concept of andragogy and emphasized adult learning principles, stating that learners are motivated by internal factors such as self-esteem and curiosity. Guglielmino (1977) developed the Self-Directed Learning Readiness Scale (SDLRS), a widely used tool in SDL research. Further research by Spear and Mocker (1984) and Long & Agyekum (1983) highlighted the role of the learner's environment and led to the establishment of the International Symposium on Self-Directed Learning.

Concepts and Definitions of SDL

SDL is a complex concept defined through multiple lenses. Kerka (1999) described it as a process in which autonomous individuals pursue learning for personal growth and as a social phenomenon influenced by context. Rowland and Volet (1996) also emphasized the cultural influences on SDL, stating that social and cultural contexts shape how learners engage in independent learning. Van der Walt (2012) proposed two approaches: one based on individual understanding and another that redefines SDL beyond Knowles' original framework. Merriam *et al.* (2007) identified three core purposes of SDL: enhancing self-determination, promoting deep learning, and fostering social change. Braman (1998) linked SDL to individualistic values and argued that both personal goals and cultural expectations shape it. Brookfield (2009) added that SDL involves not just actions like goal-setting and strategy use, but also internal changes in how learners perceive knowledge. These insights show that SDL is both a personal and social process requiring autonomy, critical thinking, and adaptability (O'Donnell, 2005).

LITERATURE REVIEW

The Process of Self-Directed Learning

The University of Waterloo outlines SDL as a four-step process: (1) readiness to learn, (2) setting goals, (3) engaging in the process, and (4) evaluating learning (Centre for Teaching Excellence, University of Waterloo, 2023). Readiness involves assessing one's environment and past experiences. Goal-setting requires coordination between student and mentor using tools like learning contracts. Engagement means students must be aware of their learning styles and take responsibility for progress. Evaluation involves self-reflection, seeking feedback, and making necessary adjustments. Robinson and Persky (2020) emphasized that while SDL promotes independence, both students and faculty face challenges in its implementation. Faculty must shift from instructors to facilitators and support students through this transition. Sumuer (2018) noted that students must move away from rote or strategic learning and instead adopt deep, reflective approaches for effective SDL.

Self-Directed Learning in Nursing Education

In nursing, SDL is closely linked to clinical competence.

Studies show that a positive perception of the clinical environment leads to higher competence among nursing students (Visiers-Jiménez *et al.,* 2021). Student satisfaction with the clinical learning setting enhances learning outcomes (Papastavrou *et al.,* 2016), while challenges like lack of confidence can hinder progress (Jamshidi *et al.,* 2016). SDL readiness correlates with problem-solving ability, although the relationship is complex (Luo *et al.,* 2019). Other studies highlight the role of self-efficacy and satisfaction in enhancing SDL (Mirzawati *et al.,* 2020; Schweder & Raufelder, 2021). The need for SDL programs is evident across fields such as pharmacy (Unni *et al.,* 2019), pre-medical (Kim *et al.,* 2022), and nursing education (Noh & Kim, 2019). Vasli & Asadiparvar-Masouleh (2022, 2023) also demonstrated the mediating role of the clinical learning environment in influencing clinical competence through SDL.

Learning Environment of Nursing Students

Bates (2015) defined the learning environment as a combination of physical, cultural, and contextual settings where learning takes place. These include student characteristics, teaching goals, learning activities, evaluation strategies, and institutional culture. For nursing students, physical environments range from traditional classrooms to home setups for online learning, especially during COVID-19. The psychological environment involves motivation, trust, and student-teacher interaction, while emotional environments focus on safety, self-expression, and emotional support. Clinical Education Environments (CEEs) include real-life hospital settings and virtual platforms. These settings allow students to develop practical skills and are influenced heavily by the guidance of clinical instructors (Zhang *et al.,* 2022). The role of CEEs is essential in preparing students for professional nursing roles and reinforces the need for supportive and structured learning environments that foster SDL.

MATERIALS AND METHODS

Research Design

This study used a correlational research design to explore the relationship between clinical learning environment and self-directed learning readiness among nursing students. Correlational designs examine associations but do not imply causation (Polit & Beck, 2017). Structural Equation Modeling (SEM) was used to analyze complex relationships between variables and assess model fit. SEM is commonly used in social sciences due to its ability to represent latent constructs and test hypotheses using empirical data (Beran & Violato, 2010; Hair *et al.,* 2021).

Research Locale

The study was conducted at Luna Goco Colleges in Calapan City, a recognized institution in nursing education. The college offers access to various clinical settings, including hospitals and community centers. Its comprehensive clinical exposure made it a suitable site to study how learning environments influence students' self-directed learning. Findings are expected to benefit the institution and contribute to nursing education practices.

Research Instruments

Two validated tools were used: the Dundee Ready Education Environment Measure (DREEM) and the Self-Directed Learning Readiness Scale (SDLRS). The DREEM (Roff *et al.,* 1997) evaluates students' perceptions of their educational environment across five subscales, with high reliability ($\alpha = 0.91$). SDLRS (Fisher, King, & Tague, 2001) assesses readiness for SDL through self-management, desire for learning, and self-control, with Cronbach's alpha ranging from 0.83 to 0.924.

Population and Sampling

The study employed consecutive sampling, a non-probability method suitable for ordered populations. Eligibility was based on students being enrolled in the nursing program during the data collection year (Bujang & Baharum, 2017). A total of 300 students were targeted to ensure statistical power. Informed consent was obtained, and ethical procedures were followed.

Ethical Considerations

The study complied with ethical guidelines from the university ethics committee. Participants remained anonymous and responses were kept confidential. Consent forms preceded the survey and detailed the study's purpose, procedures, risks, and benefits. Ethical approval was obtained before data collection. No vulnerable groups were included (Gordon, 2020).

Data Collection Procedure

After ethical and administrative approval, questionnaires were distributed during students' free time with teachers' permission. Instructions were provided, and students were free to ask questions. Completed questionnaires were reviewed for completeness before analysis.

Data Analysis Procedure

Data analysis was conducted using IBM SPSS and AMOS version 20.0. A significance level of 0.05 was applied. Normality was assessed using Shapiro-Wilk and Doornik-Hansen tests. Pearson's correlation was used to evaluate linear relationships. Structural Equation Modeling (SEM) was applied to assess model fit using CB-SEM with maximum likelihood estimation (Byrne, 2010). Fit indices included $\chi^2/df \leq 3.00$, RMSEA ≤ 0.08, CFI and GFI ≥ 0.90, and PNFI (Huang *et al.,* 2010). Path analysis determined direct, indirect, and total effects among variables.

RESULTS AND DISCUSSION

This chapter presented the discussion, analyses, and interpretation of the data gathered mainly through survey questionnaires to determine the clinical learning environment readiness and self-directed learning of the nursing students in Luna Goco Colleges.

Demographic Profile of the Participants in Terms of

1. Gender
2. Year Level
3. General Weighted Average (GWA) in the previous semester
4. NCM Courses enrolled

Table 1: Demographic Profile of Participants (N = 300)

Characteristics	Frequency (Percentage)	Mean (SD)
Sex (f, %)		
Male	52 (17.30%)	
Female	248 (82.70%)	
Year Level (f, %)		
Second Year	135 (45.00%)	
Third Year	92 (30.70%)	
Fourth Year	73 (24.30%)	
General Weighted Average ($\bar{x}$, SD)		**83.77 (2.40)**
Enrolled Courses (f, %)		
NCM 109	135 (45.00%)	
NCM 110	135 (45.00%)	
NCM 115	92 (30.70%)	
NCM 116	92 (30.70%)	
NCM 117	92 (30.70%)	
NCM 121	73 (24.30%)	
NCM 122	73 (24.30%)	

Abbreviations: $\bar{x}$ = Mean, SD = Standard Deviation

The demographic profile shows that most nursing students are female (82.70%), consistent with global trends in nursing education (Smith & Leggat, 2007). This gender imbalance is important, as female students often encounter different stressors and learning experiences (Albaqawi *et al.,* 2022). Addressing these differences through gender-sensitive strategies like mentorship can improve learning and well-being (Englund, 2023). Moreover, promoting gender diversity benefits student learning, patient care, and teamwork in clinical settings (Ramjan, 2023; Tekbaş & Pola, 2020). Inclusive practices can enrich the educational environment and prepare students for diverse healthcare teams (Dubs, 2023).

The year level distribution, second year (45%), third year (30.70%), and fourth year (24.30%)—reflects the typical progression in nursing education. Each level represents a unique phase: foundational learning in the second year, specialized training in the third, and final preparation for licensure and practice in the fourth (Smith & Leggat, 2007; Ramjan, 2023). Recognizing these stages helps educators design targeted instruction that supports students' developmental and academic needs (Albaqawi *et al.,* 2022). The pattern of course enrollment aligns with these academic stages. High enrollment in NCM 109 and 110 (45%) emphasizes the focus on foundational nursing care, while NCM 115, 116, and 117 (30.70%) reflect advanced clinical topics (Lee & Thompson, 2019). NCM 121 and 122 (24.30%) likely cover specialized or elective topics (Brown & Miller, 2020). Understanding this structure aids in aligning nursing curricula with healthcare needs and educational standards, ultimately producing competent, practice-ready graduates.

Evaluation of the Nursing Students on the Education Environment in Terms of:

1. Learning
2. teacher
3. academic
4. atmosphere
5. social

Table 2: Descriptive Statistics of Clinical Education Environment among the Participants (N = 300)

Variables	Mean (SD)	Score Range	Interpretation[a]
Overall Clinical Education Environment Score	159.28 (6.15)	0 to 200	Excellent
Student's Perception of Learning	37.73 (1.92)	0 to 48	Highly Positive Teaching
Student's Perception of Teachers	35.74 (2.23)	0 to 44	Model Teachers
Student's Academic Self-Perceptions	26.01 (1.99)	0 to 32	Confident
Student's Perception of Atmosphere	39.06 (2.28)	0 to 48	Good Feeling Overall
Student's Social Self-Perceptions	20.74 (1.41)	0 to 28	Not Too Bad

The evaluation of the clinical education environment among nursing students revealed key insights across five dimensions: learning, teachers, academic self-perception, atmosphere, and social self-perception are shown in Table 2. The overall clinical education environment received an excellent rating, with a mean score of 159.28 (SD=6.15), indicating a highly supportive and effective educational setting (Vaughan *et al.,* 2014).

In terms of learning, students expressed a highly positive perception, with a mean score of 37.73 (SD=1.92), reflecting their satisfaction with the quality of education. This indicated that students find the learning environment conducive to acquiring both theoretical and practical knowledge, crucial for academic engagement and success. Positive perceptions of learning environments are known to enhance student motivation and overall academic performance (Cohen, 2010).

The perception of teachers also received high praise, with a mean score of 35.74 (SD=2.23), categorizing the instructors as "model teachers." This suggests that students view their teachers as effective mentors who provided essential support for professional development. The presence of highly regarded teachers has been shown to positively influence students' clinical confidence and preparedness (Kuh & Hu, 2001). Effective teaching in clinical education is vital, as it shapes students' readiness to apply theoretical knowledge in real-world settings (Smith & Leggat, 2007).

Students' academic self-perception scored 26.01 (SD=1.99), reflecting a strong sense of confidence in their academic abilities, which is crucial for fostering resilience and self-directed learning. Confidence in academic performance has been linked to better student outcomes, including higher persistence and success rates in demanding programs such as nursing (Pascarella & Terenzini, 2005). This level of academic self-efficacy helped students navigate the challenges of their studies, improving both their academic and clinical competencies (Albaqawi *et al.,* 2022).

The atmosphere within the clinical education environment received the highest rating, with a mean score of 39.06 (SD=2.28), signifying a "good feeling overall" (Vaughan *et al.,* 2014). This suggests that students perceived their academic atmosphere as positive and conducive to learning. A positive learning atmosphere has been consistently associated with improved student satisfaction, academic achievement, and retention (Pascarella & Terenzini, 2005). It provides a space where students feel supported, engaged, and motivated to succeed, which enhances their overall educational experience.

However, social self-perception was rated lower than the other dimensions, with a mean score of 20.74 (SD=1.41), indicating a "not too bad" experience. This suggests that while students do not feel overly negative about their social integration, there is room for improvement. Literature suggests that improving social self-perceptions, through initiatives such as peer mentoring and group learning activities, can foster a stronger sense of belonging and support (Strange & Banning, 2001). A supportive social environment is key to mitigating feelings of isolation and promoting students' overall well-being, which can ultimately enhance their academic success and retention.

Lastly, the clinical education environment is viewed positively, particularly in terms of the learning experience and academic atmosphere. While the social aspect required attention, the strong ratings in other areas indicated that students are generally well-supported in their academic journey. Addressing social integration through strategic interventions can further enhance the comprehensive educational experience, ensuring that nursing students are fully prepared for professional practice (Cleary, 2011; Macdonald & Callender, 2010).

SDL Readiness of the Nursing Students in Terms of

3.1. self- management

3.2. desire for learning

3.3. self-control

The self-directed learning (SDL) readiness of nursing students was evaluated across three dimensions: self-management, desire for learning, and self-control. Table 3 presents the descriptive statistics for SDL readiness among the participants. The overall SDL readiness score had a mean of 175.35 (SD=6.42), which falls within the "Ready for Self-Directed Learning" category, as defined by Fisher *et al.* (2001). This indicated that the nursing students are well-prepared for SDL, an essential skill in healthcare education where continuous learning and adaptability are critical.

Table 3: Descriptive Statistics of Self-Directed Learning Readiness among the Participants (N = 300)

Variables	Mean (SD)	Score Range	Interpretation[a]
Overall Self-Directed Learning Readiness Score	175.35 (6.42)	40 to 200	Ready for Self-Directed Learning
Self-Management	49.70 (3.20)	12 to 60	Excellent Self-Management
Desire for Learning	59.26 (2.45)	13 to 65	Excellent Desire for Learning
Self-Control	66.39 (2.74)	15 to 75	Excellent Self-Control

In terms of self-management, the mean score was 49.70 (SD=3.20), interpreted as "Excellent Self-Management." This suggested that students are adept at organizing, planning, and regulating their learning activities. Effective self-management is crucial in SDL as it enables learners to take responsibility for their educational progress, making informed decisions about what and how to learn (Abd-El-Fattah, (2010). With this high level of self-management, students demonstrated the ability to manage their study schedules, set learning goals, and actively engage in learning without needing constant external direction.

For desire for learning, the mean score was 59.26

(SD=2.45), categorized as "Excellent Desire for Learning." This dimension reflects the students' strong motivation and enthusiasm to acquire new knowledge. Desire for learning is an intrinsic drive that pushes students to seek out educational opportunities and deepen their understanding of clinical practices (Deci & Ryan, 2000). The high score in this area indicated that the participants possess a robust internal motivation, which is fundamental for SDL since motivated learners are more likely to engage in self-directed educational activities and sustain learning efforts over time.

The mean score for self-control was 66.39 (SD=2.74), also interpreted as "Excellent Self-Control." This shows that students have a high capacity to regulate their behaviors, emotions, and learning processes. Self-control plays a critical role in SDL readiness by allowing students to stay focused on their goals, resist distractions, and persevere through challenges (Duckworth *et al.,* 2007). The participants' strong self-control suggests that they are capable of maintaining discipline in their studies, which is essential for success in the often rigorous and demanding clinical education environment.

Collectively, these high mean scores across the three dimensions reflected the students' readiness for SDL. With a total SDL readiness score of 175.35, the nursing students demonstrate that they are equipped with the necessary skills to take charge of their learning. These findings aligned with Fisher *et al.*'s (2001) interpretation that individuals with scores above 150 are considered ready for SDL. The readiness for SDL is particularly important in clinical education, where nursing students must continuously update their skills and knowledge to stay current with healthcare advancements.

The high levels of self-management, desire for learning, and self-control indicate that the students have developed the competencies required for SDL. Educators can build upon this readiness by implementing strategies that further promote SDL, such as problem-based learning (PBL) and case-based learning (CBL), which encouraged students to take initiative in solving real-world clinical problems. Moreover, given the strong desire for learning among students, fostering an environment that supports lifelong learning through continuous feedback and opportunities for self-reflection will reinforce these positive SDL behaviors.

Lastly, nursing students in this study exhibit a high level of SDL readiness, with strengths in self-management, desire for learning, and self-control. These findings suggested that students are well-prepared to manage their educational journey independently, and further educational interventions can help sustain and enhance these capabilities. Creating supportive learning environments that encourage self-regulation and intrinsic motivation will be key in fostering continued student success in SDL (Zimmerman, 2002)

Significant Relationship between the Participants' SD Profile and Their Self-Directed Learning

Table 4 presents the correlation coefficients between participants' demographic characteristics, the dimensions of the clinical education environment, and the dimensions of self-directed learning readiness (SDLR). The dimensions of SDLR examined included self-management, desire for learning, and self-control. The

Table 4: Correlation Coefficients of the Correlations between the Demographic Characteristics, the Dimensions of Clinical Education Environment, and the Dimensions of Self-Directed Learning Readiness (SDLR) among the Participants (N = 300)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Sex (Female)													
2. Year Levels	0.07 (0.238)												
3. General Weighted Average	–0.01 (0.890)	–0.35* (0.001)											
4.Course (NCM 109 and 110)	–0.14* (0.020)	–0.14* (0.020)	0.32* (0.001)										
5. Course (NCM 115, 116, and 117)	0.17* (0.003)	0.83* (0.001	–0.08 (0.160	–0.61* (0.001)									
6. Course (NCM 121 and 122)	–0.03 (0.634)	0.85* (0.001)	–0.28* (0.001)	–0.51* (0.001)	–0.38* (0.001)								

7. Student's Perception of Learning (Clinical Education Environment)	0.12* (0.041)	–0.37* (0.001)	0.13* (0.033)	0.21* (0.001)	0.20* (0.001)	–0.46* (0.001	–	–	–	–	–	–
8. Student's Perception of Teachers (Clinical Education Environment)	–0.01 (0.927)	–0.13* (0.021)	0.07 (0.255)	0.05 (0.368)	0.12* (0.001)	–0.19* (0.001)	0.53* (0.001)	–	–	–	–	–
9. Student's Academic Self-Perceptions (Clinical Education Environment)	–0.08 (0.153)	–0.34* (0.001)	0.13* (0.029)	0.36* (0.001)	–0.18* (0.002)	–0.23* (0.001)	0.21* (0.001)	0.16 * (0.005)	–	–	–	–
10. Student's Perception of Atmosphere (Clinical Education Environment)	0.00 (0.997)	–0.29* (0.001)	0.21* (0.014)	0.19* (0.001)	0.09 (0.103)	–0.32* (0.001)	0.21* (0.001)	0.27* (0.002)	0.15* (0.009)	–	–	–
11. Student's Social Perceptions (Clinical Education Environment)	0.05 (0.407)	–0.30* (0.001)	0.10 (0.090)	0.14* (0.013)	0.22* (0.001)	–0.40* (0.001)	0.24* (0.001)	0.21* (0.001)	0.18* (0.002)	0.42* (0.001)	–	–
12. Self-Management (Self-Directed Learning Readiness)	0.03 (0.555)	–0.28* (0.001)	0.13* (0.029)	0.12* (0.036)	0.21* (0.001)	–0.37* (0.001)	0.25* (0.001)	0.19* (0.001)	0.26* (0.001)	0.30* (0.001)	0.34* (0.001)	–
13. Desire for Learning (Self-Directed Learning Readiness)	–0.06 (0.278)	–0.80* (0.001)	0.31* (0.001)	0.77* (0.001)	–0.26* (0.001)	–0.61* (0.001)	0.31* (0.001)	0.19* (0.001)	0.36* (0.001)	0.27* (0.001)	0.27* (0.001)	0.29* (0.001)
14. Self-Control (Self-Directed Learning Readiness)	–0.09 (0.125)	–0.68* (0.001)	0.23* (0.001)	0.74* (0.001)	–0.43* (0.001)	–0.41* (0.001)	0.20* (0.001)	0.11* (0.001)	0.27* (0.001)	0.23* (0.001)	0.23* (0.001)	0.16* (0.007)

*Note: Values are represented as r-value (p-value). *Significant at 0.05*

correlation analysis revealed several key findings regarding these relationships.

Sex demonstrated minimal correlations with both the dimensions of the clinical education environment and SDLR dimensions, with r-values ranging from –0.01 to 0.12. This suggested that sex does not significantly influence the participants' perceptions of their clinical education environment or their readiness for self-directed learning, aligning with previous studies indicating no substantial gender differences in SDL capabilities (Murad *et al.,* 2010).

In contrast, year level exhibited significant negative correlations with various aspects of the clinical education environment and the SDLR dimensions. Specifically, year level had correlations ranging from –0.13 to –0.37 with the clinical education environment and from –0.28 to –0.80 with the SDLR dimensions. This negative association implies that as students' progress through their academic program, their perception of the clinical environment and their readiness for SDL tend to decrease. This could be attributed with the increase academic and clinical pressures faced by upper-year students, leading to higher stress levels and less favorable perceptions of their learning environment. (Fung *et al.,* 2014).

The general weighted average (GWA) showed positive correlations with the dimensions of the clinical education environment, ranging from 0.07 to 0.21, and with the SDLR dimensions, ranging from 0.13 to 0.31. This indicates that students with higher academic achievement tend to have a more positive view of their clinical learning environment and exhibit greater readiness for SDL. This supports the notion that academic success is linked with favorable learning experiences and proactive learning behaviors (Stewart, 2017).

The courses enrolled, specifically NCM 109/110, NCM 115/116/117, and NCM 121/122, showed perfect

correlations among themselves and significant associations with year level, with correlations ranging from –0.89 to 0.85. This multicollinearity issue necessitated their exclusion from the structural equation modeling (SEM) analysis to maintain model validity.

The correlations between the dimensions of the clinical education environment and SDLR were consistently positive and statistically significant, ranging from 0.11 to 0.36. This suggested that a more positive perception of the clinical education environment is associated with higher self-management, greater desire for learning, and improved self-control among the students.

These findings have several implications for educational practice. The negative correlation between year level and both the clinical education environment and SDLR suggested that targeted interventions may be necessary to support upper-year students. Institutions might consider implementing stress management programs, offering additional resources, and creating a supportive learning environment to help mitigate the pressures faced by senior students (Vidal *et al.,* 2020). Additionally, the positive correlation between GWA and SDL dimensions underscores the importance of academic support services. Providing tutoring, mentorship, and other academic support can enhance students' academic performance, which in turn could improve their perceptions of the learning environment and their readiness for SDL.

Lastly, while sex does not significantly impact SDL readiness, year level and GWA do show notable relationships. The findings suggested that academic support and stress management strategies could be beneficial in enhancing SDL readiness, particularly for upper-year students facing increased academic pressures.

Significant Relationship between the Participants' Evaluation of the Clinical Education Environment and Self-Directed Learning

The hypothesized model of the associations of the demographic characteristics, clinical education environment, and self-directed learning readiness are presented in Figure 1. As previously mentioned, only sex and year level were the demographic characteristics included in the modeling analyses due to issues on linearity and multicollinearity of other demographic variables. Initial analysis of the hypothesized model indicated very poor model fit indices (Table 5). Results also showed that the association of general weighted average to clinical education environment (β=0.02, p=0.606) and self-directed learning readiness (β=0.02, p=0.717) were not statistically significant. Modification indices also recommended a covariance term between the error terms of the dimensions of perceptions of learning and teachers (MI=30.85, Par. Change=2.66); perceptions of atmosphere and social self-perceptions (MI=19.03, Par. Change=1.14); and, self-management and self-control (MI=4.06 Par. Change=–0.83). These initial results were used to trim and respecify the hypothesized model.

The initial analysis of the hypothesized model revealed significant limitations, as indicated by the poor model fit indices. The lack of significant associations between GWA and both the clinical education environment and SDLR suggested that GWA may not be a critical factor in understanding these relationships. This finding is consistent with previous studies that have found mixed results regarding the impact of academic performance on learning environment perceptions and self-directed learning readiness (Dunlap, 2005).

The suggested modifications, based on the modification indices, indicated potential improvements to the model through the inclusion of covariance terms between certain error terms. Specifically, the high modification index (MI) and parameter change between the perceptions of learning and perceptions of teachers (MI=30.85, Par. Change=2.66) suggest a significant overlap between these dimensions. This overlap could be due to the integral role that teacher quality plays in shaping students' overall learning experiences (Ginns *et al.*, 2007).

Similarly, the covariance between perceptions of atmosphere and social self-perceptions (MI=19.03, Par. Change=1.14) implies that a positive learning atmosphere is closely linked to students' social well-being and self-perceptions. A supportive and inclusive atmosphere can enhance students' social interactions and their confidence in self-directed learning.

The covariance between self-management and self-control (MI=4.06, Par. Change=–0.83) underscores the interconnected nature of these constructs. Both self-management and self-control are crucial components of self-directed learning, as they involve regulating one's behavior and learning processes (Zimmerman, 2000). These findings align with the theoretical frameworks that emphasize the synergy between different self-regulation strategies (Pintrich, 2004).

The initial poor fit of the hypothesized model and the non-significant associations involving GWA highlight the need to consider other variables that might better explain the relationships among demographic characteristics, the clinical education environment, and SDLR. Educational institutions should focus on enhancing the clinical education environment and supporting students' self-directed learning readiness through targeted interventions rather than relying solely on academic performance indicators.

The modifications suggested by the modification indices offer valuable insights for improving educational strategies. Emphasizing the quality of teaching and creating a positive learning atmosphere can significantly impact students' perceptions and their readiness for self-directed learning. Training programs for educators that focus on effective teaching strategies and creating inclusive learning environments can be beneficial (Hattie, 2009).

Furthermore, the close relationship between self-management and self-control suggests that programs aimed at enhancing these skills should be integrated into the curriculum. Workshops and courses on time management, goal setting, and self-regulation can help students develop the competencies necessary for successful self-directed learning.

Table 5: Model Fit Parameters of the Hypothesized and Emerging Models (N = 300)

Model	CMIN			RMSEA 90% CI			CFI	GFI	PNFI
	χ^2	df	χ^2/df (p-value)	RMSEA (p-value)	Lower Bound	Upper Bound			
Acceptable Threshold	–	–	≤3.00 (>0.05)	≤0.08 (>0.05)	–	–	≥0.90	≥0.90	EM> HM
Hypothesized Model	144.25	31	4.65 (0.001)	0.111 (0.001)	0.093	0.129	0.873	0.916	0.583
Emerging Model	73.90	30	2.46 (0.001)	0.070 (0.051)	0.050	0.090	0.951	0.954	0.614

Abbreviations: χ^2 = Chi-Squared Value; df = Degrees of Freedom; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; GFI = Goodness-of-Fit Index; PNFI = Parsimonious Normal Fit Index; EM = Emerging Model; HM = Hypothesized Model

Parsimonious Model Developed among the Profile, Clinical Education Environment and Self-Directed Learning

Figure 2 depicted the emerging model of the associations of demographic characteristics, clinical education environment, and self-directed learning readiness. After two iterations of model re-specification and trimming, the emerging model showed acceptable model fit parameters (Table 6). It can be noted that year level had a strong, negative influence on both clinical education environment (β=–0.73, p=0.003) and self-directed learning readiness (β=–0.70, p=0.049). These results denoted that as year level increases by 1-unit (e.g., from second year to third year), clinical education environment decreases by 0.73-unit and self-directed learning readiness by 0.70-unit. Results also showed that year level had a negative, indirect effect on self-directed learning readiness (β=–0.22, p=0.036) through the mediation of clinical education environment, indicating an indirect decrease in self-directed learning readiness by 0.22-unit for every 1-unit increase in year level. It can also be noted from the emerging model that clinical education environment had a moderate and positive influence on self-directed learning readiness (β=0.30, p=0.044), which indicates that every 1-unit increase in clinical education environment leads to a 0.30-unit increase in self-directed learning readiness. Analyses also showed that year level alone measured 53.20% of the variance of clinical education environment, while both year level and clinical education environment measured 88.50% of the R^2-value or explained variance of self-directed learning readiness.

Table 6: Path Analyses of the Total, Direct, and Indirect Effects among the Study Variables (N = 300)

Outcomes	Year Level			Clinical Education Environment		
	Indirect Effect	Direct Effect	Total Effect	Indirect Effect	Direct Effect	Total Effect
Clinical Education Environment	–	–0.73* (0.003)	–0.73* (0.003)	–	–	–
Self-Directed Learning Readiness	–0.22* (0.036)	–0.70* (0.049)	–0.92* (0.010)	–	0.30* (0.044)	0.30* (0.044)

*Note: Values are presented as standardized regression or beta coefficient (p-value). *Significant at 0.05 level*

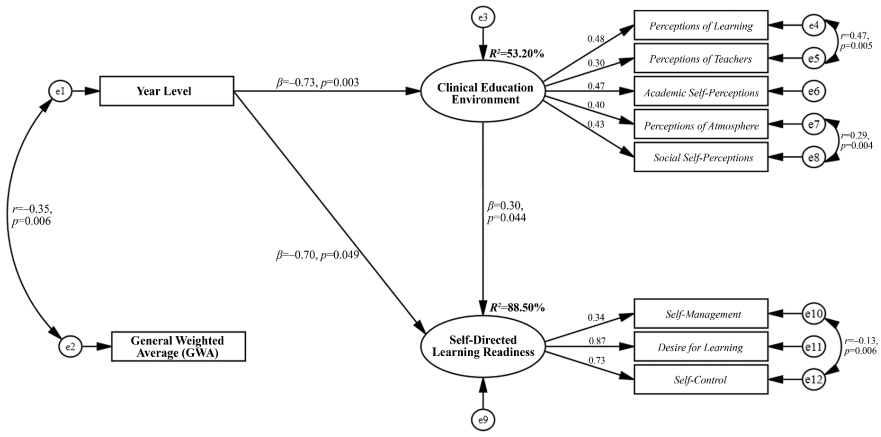

Figure 1: Hypothesized Model of the Associations of Demographic Characteristics, Clinical Education Environment, and Self-Directed Learning Readiness

The hypothesized model, depicted in Figure 3, illustrated the relationships between self-directed learning readiness (SDLR), the clinical education environment, and demographic characteristics. The model suggested that the clinical education environment and SDLR are primarily influenced by demographic characteristics, such as age, gender, and prior educational background. The relationship between SDLR and demographic characteristics is hypothesized to be mediated by the clinical education environment, which includes factors such as mentorship quality, available resources, and institutional support. The model's directional arrows suggested that SDLR is anticipated to be improved by a supportive clinical education environment and favorable demographic characteristics.

The hypothesized model posits that SDLR is substantially influenced by demographic characteristics. The notion that age and prior educational experiences influence learning styles and aptitude for self-directed learning is supported by recent research. As a result of their extensive educational and life experiences, mature pupils frequently demonstrated higher SDLR (Guglielmino & Long, 2011). Furthermore, research has demonstrated that gender differences in learning preferences exist, with certain studies suggesting that female students may be more self-directed than their male counterparts (Murad *et al.,* 2010).

The clinical education environment is proposed to serve as a critical mediator between SDLR and demographic characteristics. Students' motivation and conviction to participate in self-directed learning can be improved by a positive educational environment that includes constructive feedback, supportive mentorship, and adequate resources (Brydges *et al.,* 2012). Williams and Beovich (2019) conducted a study that found that nursing students' SDLR was substantially enhanced by supportive mentorship and access to learning resources. This underscores the significance of a well-structured clinical education environment.

The significance of demographic characteristics in the development of educational strategies is emphasized by the results of the hypothesized model. Mentorship programs that are customized to meet the unique requirements of various age groups and genders may prove to be more advantageous. Additionally, it is imperative to establish a clinical education environment that is supportive and provides sufficient resources and mentorship. To cultivate an environment that is conducive to learning, institutions should allocate resources to mentorship programs of high quality and ensure that there are adequate learning resources (Brydges *et al.,* 2012).

The model depicted in Figure 4 emerged through a series of data-driven refinements and iterations aimed at explaining the relationships between demographic characteristics, the clinical education environment, and self-directed learning readiness (SDLR). Initially, the hypothesized model suggested that demographic factors, such as Year Level and General Weighted Average (GWA), would directly influence both the Clinical Education Environment and SDLR, with the Clinical Education Environment acting as a mediator between these variables.

Data were collected from 300 participants, capturing key variables such as perceptions of the clinical education environment (including perceptions of learning, teachers, academic self-perception, and atmosphere) and SDLR (including self-management, desire for learning, and self-control). The first iteration of path analysis tested these relationships, but non-significant paths were removed in subsequent rounds of model specification.

Through model trimming, Year Level was found to have a significant, negative direct impact on both the Clinical Education Environment ($\beta = -0.73$, $p = 0.003$) and SDLR ($\beta = -0.70$, $p = 0.049$). This indicated that as students advanced in their year levels, both their perception of the clinical education environment and their readiness for self-directed learning decreased. Importantly, the model also revealed an indirect effect of Year Level on SDLR ($\beta = -0.22$, $p = 0.036$) mediated by the Clinical Education Environment, further suggesting that the declining quality of the clinical environment as students progressed had an additional negative impact on SDLR.

The final model highlighted the positive influence of the Clinical Education Environment on SDLR ($\beta = 0.30$, $p = 0.044$), showing that a supportive educational environment could enhance students' readiness for self-directed learning, despite the negative influence of year progression. With these relationships established, the model demonstrated that Year Level accounted for 53.20% of the variance in the Clinical Education Environment, while Year Level and the Clinical Education Environment together explained 88.50% of the variance in SDLR.

This model emerged after refining the initial hypothesis, validating the significant pathways, and trimming non-significant ones, ultimately providing a more focused understanding of how year level and clinical education interact to influence self-directed learning readiness.

The initial hypotheses are expanded upon by the emerging model, which incorporates empirical data to disclose more intricate interactions between the variables. For example, the model implies that SDLR is more strongly associated with antecedent educational attainment than was previously believed. Stewart (2017) has recently discovered that learners with higher educational credentials are more proficient at self-directed learning as a result of their developed critical thinking and problem-solving skills.

The emerging model also identified the quality of clinical placements and the availability of simulation-based learning as critical factors that influence SDLR. SDLR is considerably improved by simulation-based education, which offers realistic and engaging learning experiences (Fey *et al.,* 2014).

The necessity for a more sophisticated strategy to improve SDLR is underscored by the emergent model. Educational interventions should be customized to

the unique demographic characteristics of students, with a particular emphasis on their prior educational achievements. Furthermore, the integration of simulation-based learning and the provision of high-quality clinical placements can substantially enhance SDLR. Simulation-based learning should be incorporated into the curricula of institutions, and clinical placements should provide supportive and enriching learning experiences (Fey *et al.,* 2014; Vidal *et al.,* 2020).

CONCLUSIONS

The demographic profile revealed that most nursing students were female and maintained consistent academic performance. This highlights the need for teaching strategies that consider gender diversity and support learning in clinical settings. The clinical education environment was generally rated positively, though improvements in student social interaction are recommended to enhance the overall learning experience. Nursing students showed a strong readiness for self-directed learning (SDL), indicating the value of incorporating SDL-based activities into the curriculum to develop their independence. The study also found that demographic factors and the clinical environment significantly influence SDL readiness. Therefore, continuous monitoring and customized interventions based on students' year levels are essential. While the original hypothesized model did not fit well with the data, the revised model better reflected the relationship between the clinical environment and SDL readiness. These findings reinforce the importance of creating supportive, student-centered environments and tailoring education strategies to foster self-directed learning among nursing students.

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