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Original Article

Development and Validation of the Academic Self-Handicapping Scale for Nursing and Midwifery Students: A Study of Reliability and Agreement

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ABSTRACT

Background: Academic self-handicapping, as a psychological defense strategy, can lead to reduced academic performance, diminished mental health, and increased stress levels. This study aimed to design and validate a new academic self-handicapping scale tailored for nursing and midwifery students in Iran.

Methods: This mixed-methods exploratory study was conducted in two phases from September 2021 to February 2022 at the nursing and midwifery faculties of 10 medical universities across various cities in Iran. In the qualitative phase, 30 nursing and midwifery students were selected through purposive sampling, and semi-structured interviews were conducted to identify the dimensions of academic self-handicapping. In the cross-sectional quantitative phase, the statistical population consisted of 1,080 students selected through a multi-stage cluster sampling method. Qualitative data were analyzed using thematic analysis, with interviews coded iteratively. Quantitative analysis involved computing Content Validity Ratio (CVR) and Content Validity Index (CVI) for content validity, correlating the new scale with Jones and Rhodewalt's questionnaire (1982) for concurrent validity, and employing Exploratory and Confirmatory Factor Analyses (EFA and CFA) to assess construct validity using SPSS 22 and LISREL 8. Descriptive statistics, Pearson correlation, and Cronbach's alpha were also calculated to evaluate the reliability.

Results: Content validity was confirmed with high CVR and CVI indices (0.80 to 1.00). The EFA revealed five main dimensions: Academic Motivation and Goals, Anxiety and Worries, Communication and Technological Challenges, Time Management Skills, and Social Support, each consisting of four items, resulting in a total of 20 items. These five dimensions accounted for 63.58% of the data variance. The CFA indicated a good model fit (χ^2/df=2.31, RMSEA=0.056, CF=0.94, TLI=0.93, SRMR=0.045). A significant positive correlation (r=0.71, P<0.001) was observed between the new scale and the Jones and Rhodewalt's questionnaire, confirming concurrent validity. Reliability was confirmed with a Cronbach's alpha coefficient of 0.84 for the total scale ranging from 0.75 to 0.78, indicating strong internal consistency.

Conclusion: The newly developed scale is a valid and reliable tool for assessing self-handicapping behaviors among nursing and midwifery students in Iran's virtual learning environments. It can help identify various dimensions of self-handicapping and support researchers and educational administrators in developing effective interventions and strategies to enhance academic engagement and support students' mental health.

Keywords: Academic Self-Handicapping, Scale, Students, Nursing, Midwifery, Education, Distance

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Introduction

Self-handicapping, as a psychological defense mechanism, refers to actions in which individuals create obstacles or excuses before engaging in academic tasks to attribute possible failures to external factors (1). This strategy enables individuals to credit their successes to internal abilities while blaming failures on external circumstances, thereby protecting or enhancing their positive self-image (2). Unlike some other strategies that are employed after performance outcomes or failures, self-handicapping occurs primarily before or during the process of striving for success (3).

The concept of self-handicapping can be better understood through the lens of self-worth theory and attribution theory. Self-worth theory suggests that individuals engage in self-handicapping behaviors to protect their sense of worth, particularly in high-stakes academic environments (4). Attribution theory emphasizes the role of individuals' perceptions of the causes of success or failure, where external attributions, such as a lack of preparation, act as a buffer against failure (5). Both theories provide a solid foundation for exploring self-handicapping, particularly in culturally diverse contexts such as Iran.

Due to its pervasive nature, this phenomenon is widely observed across various cultures and settings, particularly in educational environments (1). Students often adopt self-handicapping behaviors to shield their self-concept from the psychological impact of failure (4). However, this behavior carries far-reaching consequences, including reduced academic performance, compromised mental health, and elevated stress levels (1). Research highlights that a considerable number of students worldwide struggle with self-handicapping and anxiety, leading to decreased motivation, academic decline, and feelings of inadequacy (5, 6).

In Iran, distinct cultural and socio-economic factors significantly influence the emergence of self-handicapping behaviors. Over the past 50 years, Iran has experienced significant events such as the Islamic Revolution, the eight-year Iran-Iraq war, and ongoing economic sanctions. These factors, coupled with rapid population growth during the 1980s, have created challenges such as high unemployment rates among university graduates, inflation, and low income levels (7). These conditions have heightened the pressure on students to perform academically, thereby increasing the prevalence of self-handicapping behaviors. Furthermore, cultural norms in Iran place a strong emphasis on family honor and success, adding extra pressure on students to avoid failure at all costs (8).

Nursing and midwifery students, in particular, represent a unique and critically important population for assessing academic self-handicapping (9). These students not only face demanding clinical responsibilities and rigorous academic requirements but also must adapt to evolving virtual and blended learning environments (10). The combination of these intense professional demands with the broader socio-economic and cultural pressures in Iran underscores the need for a specialized scale that can provide targeted insights into their specific behavioral patterns, support tailored interventions, and ultimately contribute to improved academic performance and mental well-being (11).

Moreover, the shift to virtual learning environments has introduced new challenges that may exacerbate self-handicapping behaviors (12). Nursing and midwifery students, who face demanding clinical responsibilities alongside academic pressures, are particularly vulnerable in this context.

Several tools have been developed to assess self-handicapping, including the questionnaires by Jones and Rhodewalt (1982) (13), Hasse (1990) (1), and Akın (2012) (14). The Jones and Rhodewalt's questionnaire, which focused on evaluative contexts, examines behavioral and claimed self-handicapping dimensions (14). Despite its broad validation, it may overlook key cultural and contextual nuances of student behaviors, especially in specific educational environments. The Hasse questionnaire, with its four-dimensional

structure (behavioral, claimed, positive, and negative self-handicapping), is mainly designed for pre-university levels and may not be entirely suitable for university students (1). The Akın's questionnaire, specifically developed for university students, assesses two dimensions of self-handicapping (behavioral and claimed) (1, 15). However, its development predates significant recent changes in educational practices, limiting its capacity to account for shifts such as the rise of online learning and the increasing role of technology (16).

The limitations of current assessment tools are particularly significant in virtual learning environments, where self-handicapping behaviors differ from those in traditional settings. For instance, nursing and midwifery students may face unique challenges, such as balancing clinical workloads with virtual classes, which existing tools do not adequately address. Additionally, cultural expectations and the stigma associated with failure in Iran highlight the need for the development of a culturally sensitive instrument.

Given the limitations of current tools, particularly in addressing the educational and psychological changes resulting from the COVID-19 pandemic, there is a growing need for a new instrument tailored to address contemporary challenges and specific local contexts. This study aimed to develop and validate a novel questionnaire for assessing academic self-handicapping among nursing and midwifery students in Iran. The research was conducted at 10 medical universities in various cities, and the questionnaire was designed with cultural and contextual considerations to provide deeper insights into this phenomenon and contribute to the development of more effective interventions.

Methods

Study Design and Setting

This study employed an exploratory mixed-method research design, utilizing a two-phase approach for data collection and analysis between September 2021 and February 2022.

The qualitative phase was carried out through semi-structured interviews with students from three medical universities across Iran. The findings from these interviews were used to develop an initial pool of scale items.

The second phase involved a cross-sectional quantitative study aimed at validating the newly developed academic self-handicapping scale among a large sample of nursing and midwifery students from 10 medical universities across various cities in Iran. This phase aimed to assess the scale's validity and reliability through statistical analyses, including factor analyses and measurements of internal consistency.

Participants and Sampling

Qualitative phase: A purposive sampling approach was employed to recruit 30 nursing and midwifery students from both undergraduate and postgraduate programs. Recruitment continued until data saturation was achieved. The inclusion criteria required participants to be enrolled in a nursing or midwifery program, have experience with online classes, and demonstrate a willingness to participate. Participants needed to have completed at least two semesters of their nursing or midwifery program to qualify. All participants provided written informed consent before joining the study. Interviews were conducted during the qualitative phase at the medical universities of Zanjan, Kerman, and Tehran (Figure 1).

Quantitative phase: Participants for the quantitative phase were selected using a multistage cluster sampling method. First, 10 nursing and midwifery schools were randomly selected, including faculties from Tehran, Mashhad, Shiraz, Zabol, Tabriz, Golestan, Hamedan, Sabzevar, Isfahan, and Kashan medical universities. Four classes from each school were then randomly chosen, and all students in these classes were sampled.

Sample size determination - The determination of sample size was conducted using both established rule-of-thumb guidelines and specific formula-based methodologies.

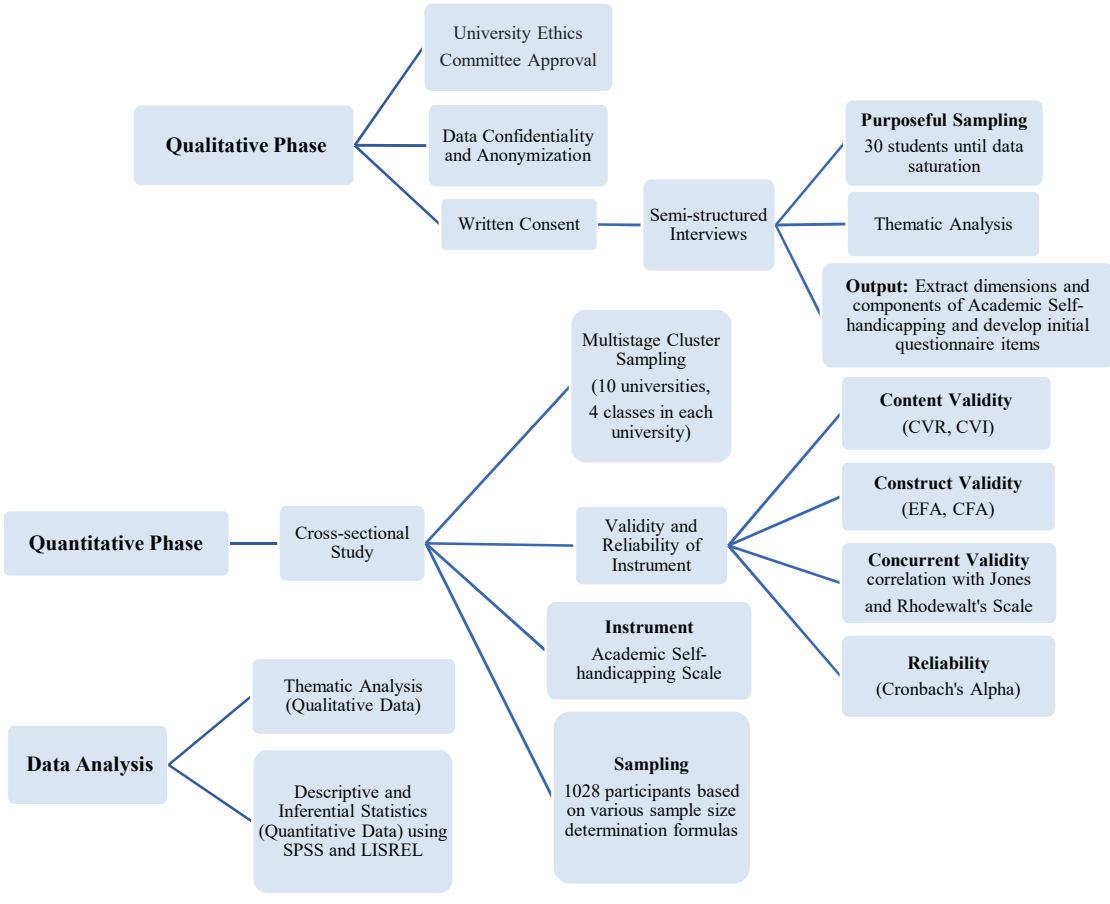

Figure 1: Flowchart of exploratory mixed methods research

For concurrent validity, the sample size was initially estimated using the formula for calculating a mean with a given precision:

Where Z is the critical value for a 95% confidence level (typically 1.96), σ\sigmaσ is the standard deviation of the scale scores based on a pilot study, and E is the desired margin of error. Given the variability observed in previous studies, a range of 100–200 participants was recommended; thus, 250 participants were allocated for concurrent validity analysis (17-19).

For Exploratory Factor Analysis (EFA), following Kyriazos (2018), a minimum of 20 participants per item was required. With 20 items, this resulted in a requirement of 400 participants; however, to ensure robust factor structure detection, 600 participants were employed (20).

For Confirmatory Factor Analysis (CFA), the literature recommends a sample size between 200 and 1000 participants. Accordingly, a sample size of 300 was chosen to test the measurement model adequately (20, 21).

Finally, for the reliability analysis using Cronbach's alpha, guidelines suggest a preliminary sample of 30–50 participants. In this study, 80 participants were considered sufficient. These calculations and recommendations were cross-verified with recent literature and ensured that the overall sample size met the rigorous demands of scale validation studies (22, 23).

A total of 1,028 participants completed the study. The inclusion criteria were similar to those in the qualitative phase, requiring participants to have completed at least two semesters of their nursing or midwifery program. The exclusion criteria included incomplete responses or withdrawal during the study. Participants who failed to complete the interview process or the questionnaires were excluded from the study.

Tools/Instruments

Data were collected using two specially

designed instruments for this purpose. These instruments were carefully selected to ensure accurate and reliable measurements, thereby supporting the study's overall objectives. The qualitative phase involved semi-structured interviews to develop an initial pool of scale items. Subsequently, a questionnaire was created based on the qualitative findings. It comprised 20 items rated on a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree). The questionnaire's general purpose was to assess the extent of academic self-handicapping behaviors among nursing and midwifery students in a virtual learning environment. The scale was organized into five key dimensions derived from the thematic analysis of qualitative data: 1) Academic Motivation and Goals, 2) Anxiety and Worries, 3) Communication and Technological Challenges, 4) Time Management Skills, and 5) Social Support. Each dimension included four items, resulting in a total of 20 items. The minimum total score possible was 20, and the maximum was 100, with higher scores indicating a greater level of academic self-handicapping. For interpretation, cutoff points were established as follows: scores from 20 to 40 indicated low self-handicapping, scores from 41 to 70 indicated moderate self-handicapping, and scores from 71 to 100 indicated high self-handicapping behaviors.

Validity and Reliability - To ensure the validity and reliability of the academic self-handicapping scale, multiple approaches were employed. Face validity was assessed through qualitative feedback and quantitative impact scores, resulting in item revisions based on students' input. Content validity was confirmed by computing the Content Validity Ratio (CVR) and Content Validity Index (CVI) with input from a panel of 10 experts in psychology, education, nursing, and midwifery. These experts, selected based on strict criteria, included psychologists specializing in educational psychology and psychometrics, education specialists with extensive experience in scale development, nursing faculty members with over 10 years of academic and clinical research experience, and midwifery experts with substantial clinical and research backgrounds. Using a 4-point rating scale, they evaluated each item's relevance, clarity, and representativeness, ensuring that all items met the minimum thresholds of 0.62 for CVR and 0.78 for CVI.

Construct validity was examined using EFA and CFA, both of which demonstrated an acceptable model fit. Concurrent validity was evaluated by correlating the new scale's scores with those of Jones and Rhodewalt's (1982) academic self-handicapping scale (13), confirming its effectiveness in measuring the intended construct.

The reliability was established through Cronbach's alpha, which exceeded 0.80, indicating high internal consistency. The Jones and Rhodewalt's scale is a psychometric tool designed to measure academic self-handicapping behaviors among students. This 25-item scale evaluates self-handicapping across four distinct dimensions: concerns related to academic performance, academic stress, communication and technological challenges, and time management issues. Responses are given on a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree). The scoring indicates that higher scores reflect a higher level of academic self-handicapping. The maximum score on this scale is 125, and the minimum score is 25. The validity and reliability of this tool have been confirmed in numerous studies in non-Iranian populations, demonstrating high internal consistency and content and construct validity. In the Iranian context, several studies have also validated its reliability and validity. Higher scores on this scale indicate greater self-handicapping and more significant difficulties in academic performance, while lower scores indicate less self-handicapping and better academic performance (24). In this study, Cronbach's alpha was obtained at 0.89.

Data Collection

Qualitative phase: Data were collected through semi-structured interviews guided by a framework developed from a literature

review (25). The interview protocol focused on dimensions and indicators of academic self-handicapping, such as academic motivation, time management, and social support. Interviews were conducted in two formats: face-to-face and online, using Skype, based on the participants' availability and preferences. Each interview lasted between 50 and 60 minutes, was transcribed verbatim, and analyzed through thematic analysis, involving iterative coding of the interviews.

Quantitative phase: Data were collected over a six-month period using both online and in-person methods, ensuring strict adherence to ethical considerations, including confidentiality and voluntary participation. Online administration was conducted via Google Forms, with a direct link sent to participants' mobile phones. In-person administration was carried out by the researcher, taking into account institutional accessibility and participants' preferences during the pandemic.

To enhance the accuracy and credibility of the qualitative data, several verification procedures were systematically implemented. First, after transcribing the semi-structured interviews verbatim, the transcripts were returned to all participants for member checking. This process enabled them to validate their responses, confirm the accuracy of the transcription, and ensure that their perspectives were faithfully captured while also offering the opportunity to propose revisions or clarifications. Second, five experts in qualitative research reviewed the transcripts, providing professional insights and critical feedback that rigorously validated the interpretation of the data and enhanced the study's credibility. Finally, the research team held regular meetings throughout the analysis phase, fostering dynamic discussions and facilitating comparative interpretations of the data to reach a consensus at every stage. This collaborative approach significantly strengthened the overall reliability and robustness of the study's findings (11).

Data Analysis

Qualitative Phase: The data were manually analyzed using thematic analysis, a process that involved iterative coding and categorization of interview transcripts to identify recurring themes and patterns. This analysis ultimately revealed five primary dimensions of academic self- handicapping, supported by a total of 30 specific indicators. The first dimension, Academic Motivation and Goals, is characterized by a decline in academic interest or engagement, changes in personal educational aspirations, concerns about setting and achieving academic targets, and altered priorities in pursuing academic success. The second dimension, Anxiety and Academic Concerns, encompasses heightened levels of academic stress and worry, concerns over maintaining performance standards, increased anxiety related to adapting to online learning formats, and feelings of uncertainty regarding academic progress. The third dimension, Communication Challenges and Technological Limitations, is defined by difficulties in effectively communicating with instructors and peers in an online setting, limited access to reliable internet or educational technologies, challenges in understanding course material due to technological barriers, and frustration with the lack of real-time interaction in virtual environments. The fourth dimension, Time Management Skills, includes weaknesses in planning and organizing study schedules, difficulties in allocating adequate time for academic tasks, procrastination or inefficient time use during virtual classes, and an inability to balance academic responsibilities with other life demands. Lastly, the fifth dimension, Social Support, is indicated by insufficient support from family, friends, or academic mentors, feelings of isolation during the pandemic, limited access to peer or institutional support networks, and reduced opportunities for collaborative learning and emotional support. Collectively, these dimensions provide a robust framework for understanding the multifaceted nature of academic self- handicapping among nursing and midwifery students in a virtual learning environment.

Quantitative Phase: Quantitative data analysis was conducted using SPSS version 22 and LISREL version 8. The statistical analyses performed included descriptive statistics to summarize demographic data and scale responses, validity analysis through the calculation of CVR, CVI, and Pearson correlation coefficients to assess concurrent validity, EFA and CFA to establish construct validity by retaining factors with eigenvalues greater than one and examining the scree plot to determine the optimal number of dimensions. Reliability analysis was conducted using Cronbach's alpha to evaluate internal consistency.

Ethics - The study was approved by the Ethics Committee of Shahroud University of Medical Sciences. Written informed consent was obtained from all participants, who were assured of confidentiality and the voluntary nature of participation. Data were anonymized and used solely for research purposes.

Results

Demographic Characteristics

This research analyzed data from 1,028 participants. As shown in Table 1, the age distribution revealed that 684 students (66.54%) were under 22 years old, while 344 (33.46%) were 22 years old or older. Additionally, 665 (64.69%) of the participants were female, while 363 (35.31%) were male. Regarding education level, 677 students (65.86%) were enrolled in undergraduate programs, while 351 (34.14%) were pursuing postgraduate studies. The data indicate a predominance of younger students (under 22 years) and a higher proportion of female participants. Undergraduate students constituted the majority of the sample (Table 1).

Thematic Analysis and the Questionnaire Development

The thematic analysis of semi-structured interviews with nursing and midwifery students revealed five key dimensions of academic self-handicapping:

1. **Academic Motivation and Goals** (e.g., concerns about academic performance and reduced interest in studying)
2. **Anxiety and Worries** (e.g., stress from online learning and a perceived lack of control over academic circumstances)
3. **Communication and Technological Challenges** (e.g., difficulties in online interactions and limited access to educational tools)
4. **Time Management Skills** (e.g., weaknesses in planning and allocating appropriate study time)
5. **Social Support** (e.g., insufficient support from family and friends and feelings of isolation)

These findings formed the basis for creating a 20-item questionnaire using a five-point Likert scale, whose validity and reliability were thoroughly assessed.

Table 1: Demographic distribution of the research participants

		Concurrent Validity	Exploratory Factor Analysis	Confirmatory Factor Analysis	Reliability	Total
Age	<22 years	64 (67.37%)	359 (62.76%)	211 (73.78%)	50 (66.67%)	684 (66.54%)
	≥22 years	31 (32.63%)	213 (37.24%)	75 (26.22%)	25 (33.33%)	344 (33.46%)
Gender	Female	64 (67.37%)	368 (64.34%)	184 (64.34%)	49 (65.33%)	665 (64.69%)
	Male	31 (32.63%)	204 (35.66%)	102 (35.66%)	26 (34.67%)	363 (35.31%)
Education Level	Undergraduate/ Associate Students	58 (61.05%)	396 (69.23%)	181 (63.29%)	42 (56.00%)	677 (65.86%)
	Graduate/Doctoral Students	37 (38.95%)	176 (30.77%)	105 (36.71%)	33 (44.00%)	351 (34.14%)

Face Validity: Qualitative face validity was assessed through interviews with 10 students. Quantitative face validity was evaluated by calculating item impact scores from 20 students, which ranged from 2.77 to 4.28, well above the threshold of 1.5 (26) (Table 2).

Content Validity: Content validity was confirmed with CVR values ranging from 0.80 to 1 and CVI values between 0.80 and 0.97, which exceeded the required thresholds (27) (Table 2).

Table 2 confirms that all items exhibit strong face and content validity, supported by substantial impact coefficients, CVR, and CVI values, which ensures that each item is relevant and representative of the intended dimensions.

Concurrent Validity: The newly designed questionnaire was administered alongside a similar instrument to assess concurrent validity. A significant positive correlation was observed between the two measures (r=0.71, P=0.001), indicating that the new scale reliably assesses academic self-handicapping in comparison to established instruments (28-30).

Table 2: Items related to each extracted dimension of the academic self-handicapping questionnaire

Items	Dimension					Impact Coefficient	CVR	CVI
	1	2	3	4	5			
Lack of access to the internet and educational tools	0.74					2.93	0.80	0.87
Challenges understanding online course content	0.73					3.32	0.80	0.87
Difficulty communicating with professors and peers online	0.77					2.77	0.80	0.83
Limited familiarity with educational tools hinders progress	0.75					3.40	1.00	0.90
Insufficient social support from friends and family		0.72				3.57	1.00	0.80
Need for more support to manage academic stress		0.75				3.12	1.00	0.97
Weak support network for addressing academic challenges		0.76				3.96	0.80	0.90
Feeling isolated and unable to rely on others		0.73				3.74	0.80	0.87
Weakened time management skills during the pandemic			0.74			3.57	1.00	1.00
Disruption of academic planning			0.72			3.28	1.00	0.90
Struggles with allocating time for academic activities			0.77			3.24	0.80	1.00
Difficulty managing daily routines effectively			0.69			3.11	0.80	0.87
Concern about academic performance during COVID-19				0.73		3.83	0.80	1.00
Decline in academic abilities due to the crisis				0.71		3.83	1.00	0.90
Difficulty concentrating in online courses				0.74		3.28	0.80	0.80
Increased academic stress during the pandemic				0.77		3.53	1.00	0.93
Changes in academic goals due to the crisis					0.75	4.23	0.80	0.80
Lack of control over education during COVID-19					0.71	4.28	0.80	0.87
Reduced motivation and interest in studying					0.72	2.84	1.00	0.90
Inability to achieve academic goals during the crisis					0.69	3.08	0.80	1.00

CVR: Content Validity Ratio; CVI: Content Validity Index

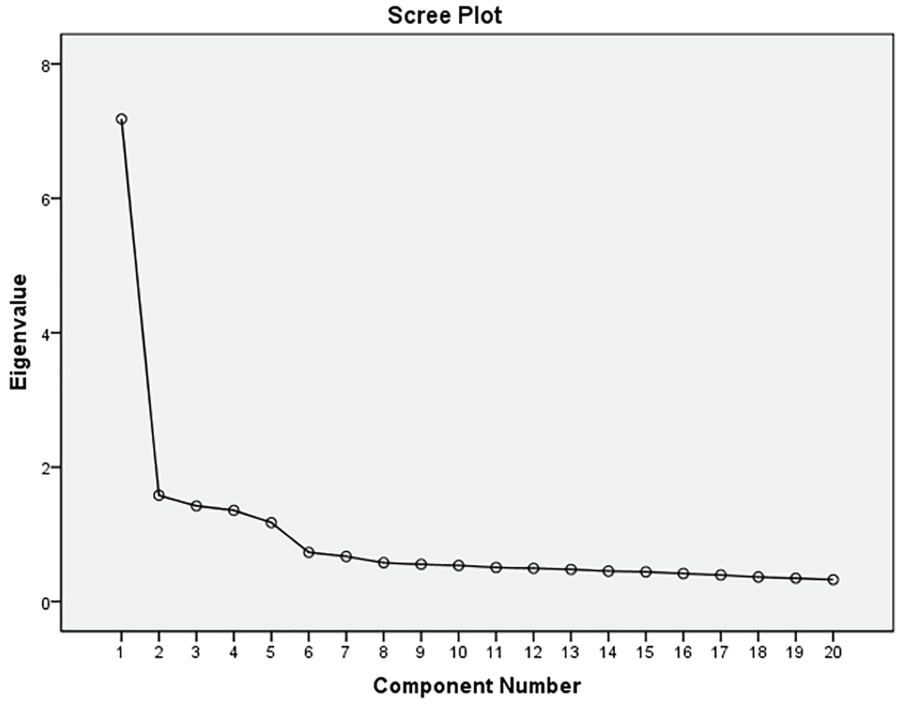

Figure 2: Scree plot

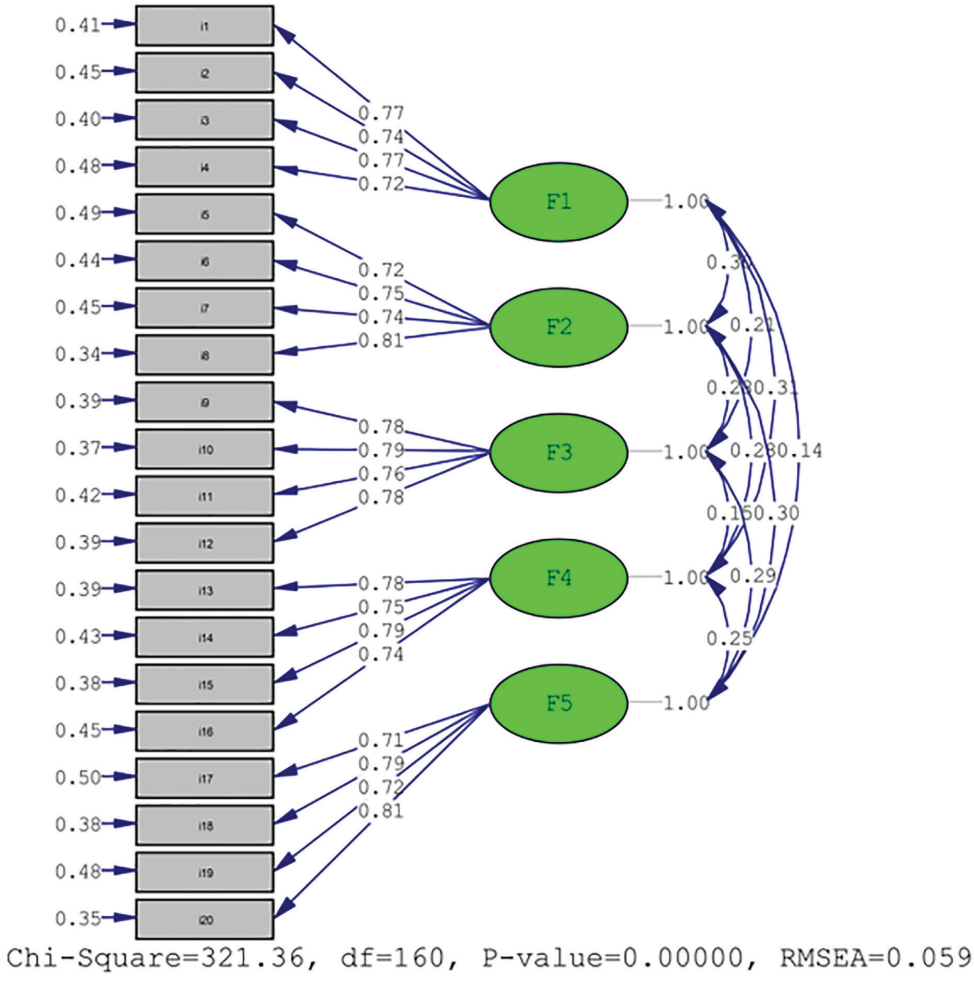

Figure 3: Model of standardized coefficients

Exploratory Factor Analysis (EFA): The EFA was conducted using principal axis factoring with Varimax rotation. The Kaiser-Meyer-Olkin (KMO) measure was 0.915, indicating excellent sampling adequacy, and Bartlett's test of sphericity (χ^2=4492.202, df=190, P<0.001) confirmed the suitability of the data for factor analysis (31, 32). In determining the number of factors to retain, not only were eigenvalues greater than one considered, but the scree plot was also inspected, which indicated a break after the fifth factor, thus supporting the retention of five dimensions (Figure 2). These five factors together explained 63.58% of the total variance and included anxiety and worries, communication and technological challenges, academic motivation and goals, social support, and time management skills (Table 2).

Confirmatory Factor Analysis (CFA): The CFA was performed to verify the factor structure identified in EFA. The model fit indices were acceptable, with a chi-square to degrees of freedom ratio (CMIN/df) of 2.01 (Figure 3), a Goodness-of-Fit Index (GFI) of 0.90, an Adjusted Goodness-of-Fit Index (AGFI) of 0.87, and a Root Mean Square Error of Approximation (RMSEA) of 0.059. Table 3 provides detailed model fit indices (33, 34).

The fit indices confirm that the measurement model is well-fitted to the data. All indices (CMIN/df, GFI, AGFI, NFI, CFI, IFI, PNFI, and RMSEA) are within acceptable ranges, supporting the scale's construct validity.

Reliability: The overall reliability of the questionnaire was demonstrated by a Cronbach's alpha coefficient of 0.84. The subscales exhibited alpha values ranging from 0.75 to 0.78. Additionally, the split-half reliability coefficients for the two halves of the questionnaire were 0.77 and 0.76, respectively, while item-total correlations varied from 0.26 to 0.53, indicating significant positive relationships between individual items and the overall scale (35-37).

Discussion

The present study confirmed the validity and reliability of a newly designed questionnaire that assesses academic self-handicapping among nursing and midwifery students in a virtual learning environment. To provide a more organized and comprehensive discussion, the findings are structured in the following order: validity, reliability, comparison with existing assessment tools, cultural considerations, limitations, and implications for practice.

The questionnaire shows strong face validity, supported by qualitative feedback from students and expert evaluations. Notably, direct feedback from participants and experts was essential in confirming the clarity and relevance of the items. Semi-structured interviews and qualitative assessments ensured that each item accurately represented the construct being measured.

The content validity was established through expert reviews, ensuring that the items comprehensively captured various aspects of academic self-handicapping. The expert panel confirmed that the questionnaire items addressed multiple dimensions of the concept, reflecting students' experiences in online education. Previous research supports validation approaches based on expert opinions in scale development (1, 38, 39), and attention to cultural differences remains crucial to ensure meaningful item interpretation across diverse educational settings.

Table 3: Overall fit indices of the academic self-handicapping questionnaire among students

Metric	CMIN/df	GFI	AGFI	NFI	CFI	IFI	PNFI	RMSEA
Results	2.01	0.90	0.87	0.92	0.95	0.95	0.77	0.059
Acceptable Fit	<5	>0.80	>0.80	>0.80	>0.80	>0.80	>0.50	<0.10

CMIN/df: Minimum Discrepancy of Confirmatory Factor Analysis/degrees of freedom; GFI: Goodness-of-Fit Index; AGFI: Adjusted Goodness-of-Fit Index; NFI: Normed Fit Index; CFI: Comparative Fit Index; IFI: Incremental Fit Index; PNFI: Parsimony-Adjusted Measures Index; RMSEA: Root Mean Square Error

The construct validity was confirmed through statistical analysis, which identified a set of key dimensions related to self-handicapping in a virtual learning environment. These dimensions include academic motivation and goals, anxiety and worries, communication and technological challenges, time management skills, and social support. The structure aligns with established theoretical perspectives on self-handicapping, highlighting the role of environmental and psychological factors in shaping students' academic behaviors (15, 40).

The concurrent validity was demonstrated by the significant correlation between the newly developed questionnaire and an established academic self-handicapping scale, indicating that the tool effectively captures self-handicapping behaviors in online education (41, 42).

The scale demonstrated strong internal consistency, with reliability coefficients indicating its stability across various student groups. Additionally, all items exhibited meaningful correlations with the total scale score, further supporting its reliability (15, 43, 44).

The newly developed questionnaire offers distinct advantages over existing self-handicapping instruments by addressing challenges specific to online education. Unlike previous tools, which typically provide a general assessment of self-handicapping, this new questionnaire specifically addresses the unique challenges encountered in virtual learning environments, including technological issues, reduced social interaction, and increased demands for self-directed learning. In contrast, our instrument incorporates factors directly related to digital learning. Exploratory and confirmatory factor analyses revealed a 5-factor structure, including concerns about the virtual learning environment, communication and IT challenges, academic motivation and goals, social support, and time management skills, that accounts for a substantial portion of the variance in self-handicapping behaviors. This multidimensional approach offers a more comprehensive evaluation compared to instruments developed by Garcia or Török and colleagues (15, 40).

Furthermore, while Schwinger's academic self-handicapping questionnaire (45)—which is based on goal orientation and self-regulation theories—provides a general measure of self-handicapping, it does not capture the specific obstacles related to online education. Similarly, other tools such as those by Midgley and Urdan (46), Garcia (1995) (47), Zarshenas and colleagues (2019) (43), and Török and colleagues (2018) (48) typically assess only a limited range of dimensions, often focusing on self-damaging behaviors and self-acceptance based on self-image theories. Consequently, despite their validated reliability and validity, these instruments provide a narrower perspective on the multifaceted nature of academic self-handicapping. By integrating digital learning-related factors—including access to educational technologies, challenges in online interactions, and diminished social support—the current questionnaire addresses new and emerging aspects of self-handicapping that have been previously overlooked.

A key limitation of previous self-handicapping scales has been their limited adaptability across different cultural and educational contexts. The present questionnaire was developed with particular attention to the experiences of nursing and midwifery students in an Iranian educational setting. Cultural influences, including family expectations, institutional constraints, and disparities in access to online education, were considered during the development of the questionnaire. By incorporating these culturally specific factors, the tool provides a more accurate and meaningful assessment of self-handicapping behaviors among students in this context.

Limitations and Suggestions

One limitation of this study was the specificity of the sample, as it exclusively encompassed nursing and midwifery students. This may restrict the generalizability of the findings to students from other academic

disciplines, who might experience self-handicapping behaviors differently in virtual learning environments. To address this limitation, future studies should aim to expand the sample by incorporating students from various academic fields and educational institutions, as well as from diverse geographical regions. A more varied sample would provide a broader perspective on self-handicapping behaviors and enhance the applicability of the findings across different learning contexts.

Another significant limitation was the absence of well-defined cutoff scores, which constrained the practical use of the questionnaire in categorizing students according to their self-handicapping tendencies. Future research should establish empirically derived threshold values through large-scale studies utilizing statistical methods, such as cluster analysis or Receiver Operating Characteristic (ROC) curves. This would facilitate the development of meaningful categorizations and enhance the instrument's usability in both research and educational contexts.

Moreover, response bias poses a challenge, as some participants may alter their responses due to the sensitivity of certain questionnaire items or concerns about confidentiality. To address this issue, future studies should adopt strategies such as fully anonymous survey administration, indirect questioning techniques, and qualitative follow-ups through interviews or focus groups. These methods could offer deeper insights into students' self-handicapping behaviors while enhancing data reliability and validity.

The strong validity and reliability of this questionnaire underscore its potential as a valuable tool for assessing academic self-handicapping in virtual learning environments. By identifying the key factors contributing to self-handicapping behaviors, the questionnaire offers insights that can inform targeted educational interventions. For instance, institutions can utilize the findings to develop strategies that address technological barriers, enhance student engagement, and provide additional academic support to mitigate self-handicapping tendencies.

Conclusion

The study successfully developed and validated a questionnaire designed to assess academic self-handicapping in virtual learning environments. The tool demonstrates strong psychometric properties and offers significant improvements over previous instruments by incorporating factors related to online education and cultural influences. Future research should focus on refining the tool, expanding its application across different student populations, and further exploring its practical implications for educational policy and intervention strategies.

Abbreviations

AGFI: Adjusted Goodness-of-Fit Index
CVI: Content Validity Index
CVR: Content Validity Ratio
CFA: Confirmatory Factor Analysis
CFI: Comparative Fit Index
EFA: Exploratory Factor Analysis
IFI: Incremental Fit Index
NFI: Normed Fit Index
GFI: Goodness-of-Fit Index
RMSEA: Root Mean Square Error of Approximation
SRMR: Standardized Root Mean Squared Residual
TLI: Tucker-Lewis Index

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Authors' Contribution

FAB and NMA designed the study and drafted the manuscript. SS, AB, GhP, and MRMS did the statistical analysis and validation. AK and ABN reviewed and approved the final manuscript.

Conflict of Interest

The authors declare that there are no conflicts of interest.

Ethical Considerations

The study was conducted in accordance with ethical guidelines and received approval from the Research Ethics Committee of Shahroud University of Medical Sciences, Shahroud, Iran, with the approval code IR.IAU.BA.REC.1402.078. Informed consent was obtained from all participants, and they were fully aware of the study procedures. No risks were posed to the participants during the research. The study design and execution adhered to the university's established rules and protocols.

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Availability of Data and Materials

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

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