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Academic stress among first-year health science students in the VUCA ERA: A grounded theory approach and instrument development

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Abstract

This study aimed to explore the experiences of academic stress and challenges among first-year health science students, particularly in the increasingly unpredictable VUCA era, and subsequently develop a contextually relevant measurement instrument. This study employs a qualitative approach, utilizing a grounded theory framework to investigate key academic stressors, coping strategies, and social support mechanisms. Data were collected through semi-structured interviews with 21 first-year health science students, selected using purposive sampling at a private university in Malang, Indonesia. The qualitative findings informed the development of an academic stress measurement instrument, with data analysis conducted through thematic analysis to ensure the instrument's relevance, clarity, and alignment with the identified stressors, coping strategies, and support mechanisms. The results of the study showed that students reported experiencing emotional dysfunction (e.g., insecurity), psychological and behavioral disturbances (e.g., procrastination), and fatigue due to the overlap of tasks, unclear instructions, rapid changes, and ambiguous expectations. They used both problem-focused and emotion-focused coping strategies, with support from peers, family, and institutional networks. The results highlight the complex and multidimensional nature of academic stress faced by health science students in the VUCA era, a 35-item academic stress measurement addressing VUCA-related stressors, coping strategies, and social support. The study provides a validated tool for assessing academic stress, which can inform targeted interventions and institutional support systems to help students navigate the challenges of higher education in a rapidly changing environment.

Keywords: Academic stress, Coping strategies, First-year students, Grounded theory, Health science education, Instrument development, Social support, VUCA era.

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1. Introduction

The transition to higher education is a critical period marked by significant academic, social, and psychological challenges, particularly for first-year students in demanding fields such as health sciences. In recent years, this transitional phase has been further complicated by the increasing volatility, uncertainty, complexity, and ambiguity (VUCA) of the educational environment [1, 2]. Rapid changes in academic policies, unclear expectations, overlapping responsibilities, and ambiguous instructions have contributed to heightened levels of academic stress among novice learners. This phenomenon is especially pronounced in health science programs, where students face rigorous academic standards, high-stakes assessments, and intense competition from peers all within an evolving technological and pedagogical landscape [3, 4]. Unlike traditional stress models that emphasize workload or personal traits, contemporary studies increasingly recognize the role of contextual and systemic factors in shaping students' experiences [5, 6]. For instance, unpredictable schedules, inconsistent communication, and complex task requirements can overwhelm even the most prepared students, leading to emotional distress, dysfunctional coping behaviors, and fatigue. Understanding these dynamics is crucial for developing targeted interventions that support student well-being and academic success [7, 8].

Academic stress among health science students has been widely documented as one of the leading causes of mental health disorders, burnout, and decreased academic performance. However, most of the existing research still focuses on common stressors and has not adequately addressed the typical pressures that arise in the context of the VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) era. First-year students are the most vulnerable group, as they are still in the process of adapting to the university environment and do not yet have mature coping strategies to face complex and ever-changing academic challenges.

Despite increasing awareness of academic stress in health education, a lack of comprehensive, context-specific frameworks remains, which fail to capture the multidimensional nature of stress in the VUCA environment. Most existing instruments fail to incorporate the nuanced interplay between external stressors and internal responses, particularly among first-year students who are still adapting to university life [9, 10]. Furthermore, few studies have employed qualitative methodologies such as grounded theory to explore how students conceptualize and manage their stress. This gap limits the effectiveness of assessments and support systems in addressing students' life experiences and contextual realities related to academic stress.

Based on this background, this study aims to identify the primary sources of stress, coping strategies, and forms of social support employed by first-year students in the health sciences study program to manage academic pressure in the VUCA era. In addition, this study also aims to develop contextual and empirical evidence-based academic stress measurement instruments.

To address these gaps, this study employs a qualitative method that utilizes a grounded theory approach to explore the dynamics of academic stress in depth. Data were collected through semi-structured interviews with first-year students and then analyzed using thematic analysis and coding, following the approach outlined by Strauss and Corbin. The findings from this phase were used to compile the items of the academic stress instrument. By combining theoretical insights and empirical data, this research is expected to make a tangible contribution to educators, policymakers, and institutions in designing more targeted interventions to improve students' academic resilience and success amid an uncertain educational landscape.

2. Literature Review

The VUCA era encompasses volatility, uncertainty, complexity, and ambiguity to promote sustainability. Bob Johansen developed the VUCA Key Model, which suggests that the most effective VUCA leaders are characterized by "vision, understanding, clarity, and agility" in managing change or crises. Furthermore, this model can be understood as a continuum of skills that leaders need to develop to lead organizations effectively in a VUCA environment.

Lawrence in Millar et al. [11] emphasized that VUCA Prime can be used by professionals to generate skills and abilities so that they can develop development plans. So, this model suggests different strategies to deal effectively with VUCA situations. Volatility. This component illustrates that today, there is no longer an organization that can run stably due to the rapid pace of technological advancement. This condition is influenced by many innovations that are based on rapid and ever-changing technological developments.

Volatility. In response to this condition, universities are compelled to adapt to technological advancements. Whether accepted or not, the process of "natural selection" will occur. Flexibility and adaptability are essential for survival in

industry competition. Lawrence stated that volatility can be managed with vision and even becomes an important guideline in volatile situations. Bennett and Lemoine in Damri [12] write that volatility has the power to trigger catalysis (the process of accelerating change). These can be large-scale changes that occur suddenly and result in hasty decision-making. Therefore, universities are required to learn to respond to and manage changes more effectively.

Uncertainty. This component illustrates that nothing can be certain in the operation of a university's dynamic environment. In response to this condition, many universities have decided not to make changes despite the uncertainty that occurs. Generally, this action is taken due to feelings of insecurity about change in a constantly evolving situation. However, navigating uncertain situations while determining learning directions is essential for colleges to adapt effectively. Lawrence states that uncertainty can be overcome through understanding. College leaders need the ability to stop, observe, and listen. Furthermore, leaders must lead with vision and learn to see and listen beyond their functional areas of competence to understand volatility. Bennett and Lemoine also write that uncertainty can be managed by collecting, analyzing, interpreting, and disseminating information.

Complexity. The increasingly complicated challenges of higher education are described in this element. Currently, there are many factors that must be considered to maintain a sustainable college in the face of competition. Chaos occurs quickly, which is hardly the case in the VUCA world. As such, college leaders must be quick and able to adjust to the various details of chaos to make more informed and better decisions. Bennett and Lemoine, writing that complexity is a long-standing problem faced by colleges, suggest that organizations are required to address this complexity by connecting the problem points. All you have to do is solve these problems one by one with the developed specializations. Restructure the internal part of operations to handle the external complexity of the university as effectively and efficiently as possible in addressing the complex elements of VUCA.

Ambiguity. One of the aspects highlighted in this element is the depiction of the organizational field that is becoming increasingly blurred. In this era, there are many new players whose presence is unpredictable. Old players will have to innovate and change their strategies if they want to survive. Lawrence stated that ambiguity can be overcome with agility. College leaders must have the ability to communicate across the organization and be quick to implement solutions. Understanding, clarity, and agility are not mutually exclusive but are interrelated elements that help leaders become strong VUCA leaders. Bennett and Lemoine write that ambiguity is an obscurity of reality that can trigger misunderstandings under various conditions. The risk that universities will face due to ambiguity is decision-making based on limited understanding. For this reason, colleges need to conduct experiments, simulate, test hypotheses, and create prototypes to obtain an accurate picture of the results. This can help avoid incorrect steps in decision-making.

However, during the VUCA era, students face various new sources of stress, such as the uncertainty of the future, with rapid technological advances making the future more unpredictable. Additionally, the excessive information burden causes students to feel overwhelmed and find it difficult to focus on their studies. Academic stressors in the VUCA era have several differences, including more diverse sources of stress, wider impacts, and more complex coping strategies required. Therefore, students need to develop various coping strategies to overcome academic stressors in the VUCA era [13]. The following is a Table 1 of journals that examine academic stressors and problems related to academic stress through coping strategies in the era before VUCA:

Table 1.
Journal Table Academic Stress Problems through Coping Strategies.

Journal Title	Writer	Year	Key Findings
<i>Coping Strategies In Overcoming Academic Stress Among High School Students</i>	Handayani et al. [14]	2024	This study found that academic stress has a significant impact on the mental health of students in Indonesia. Factors that contribute to academic stress include assignment load, pressure to achieve high grades, and fear of failure. Coping strategies that students use to manage academic stress include social support from peers, sports, and relaxation techniques such as meditation [14]
<i>The mediating role of coping strategies between depression and social support and the moderating effect of the parent-child relationship in college students returning to school: During the period of the regular prevention and control of COVID-19</i>	Wang et al. [15]	2023	The study found that problem-focused coping strategies and social support-focused coping strategies may mediate the relationship between academic stress and depression in college students [15]
<i>The associations between academic stress and depression among college students: A moderated chain mediation model of negative affect, sleep quality, and social support</i>	Liu et al. [16]	2023	The study found that problem-focused coping strategies, emotion-focused coping strategies, and social support-focused coping strategies can moderate the relationship between academic stress and mental health in college students in China [16]

From the results of some of the studies above, there has been no research focusing on the VUCA era, so in order to understand and support students' coping strategies in the VUCA era, further research is necessary to address the academic stressors faced by students.

3. Material and Methods

3.1. Research Design

This study employs a qualitative method that utilizes a grounded theory approach. This approach was used to explore in depth the experiences of academic stress experienced by first-year students in the health sciences study program in the context of the VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) era. The qualitative method was selected as it facilitates inductive examination of intricate and contextual phenomena, while also elucidating the interplay between external stressors and the internal reactions that influence the perception of academic stress. The grounded theory approach also enables inductive and in-depth data mining regarding how academic stress is understood, coped with, and managed by first-year students [17].

Qualitative data were gathered through semi-structured interviews and analyzed to identify principal themes, coping techniques, and social support systems. The results from this phase provide the foundation for assembling the specifics in the creation of contextual academic stress measurement tools.

3.2. Setting and Participants

The study was conducted at a private university in Malang, Indonesia, focusing on first-year undergraduate students enrolled in health science programs, including Medicine Education, Dentistry, Nutrition Science, Public Health, and Pharmacy. Purposive sampling was used to select participants who were currently experiencing academic stress and were able to articulate their experiences. A total of 21 informants participated in semi-structured interviews. The demographic characteristics of the participants are summarized in Table 2, indicating that the majority were female (71.4%), aged between 19 and 20 years (95.2%), and received monthly allowances exceeding IDR 2,000,000 (52.4%). Most participants were enrolled in the Faculty of Medicine (42.9%) and were in their first semester (76.2%).

Table 2.
Demographic Characteristics of Participants.

Age (Years)	19	6	28.5
	20	14	66.7
	21	1	4.8
Gender	Male	6	28.6
	Female	15	71.4
Monthly Allowance (IDR)	< Rp500,000	0	0
	Rp500,001 – Rp1,000,000	3	14.3
	Rp1,000,001 – Rp2,000,000	7	33.3
	> Rp2,000,000	11	52.4
Place of Origin	Java	15	71.4
	Outside Java	6	28.6
Study Program	Medicine Education	9	42.9
	Dentistry	2	9.5
	Nutrition Science	2	9.5
	Public Health	1	4.8
	Pharmacy	2	9.5
	Others	5	23.8
Academic Semester	1st	16	76.2
	3rd	2	9.5
	Not specified	3	14.3

3.3. Data Collection

Qualitative data were collected through semi-structured interviews conducted individually with each participant. The interview guide was developed based on preliminary observations and literature review, covering topics such as perceived academic stressors, coping strategies, social support systems, and contextual influences. Interviews were audio-recorded, transcribed verbatim, and translated into English for analysis. The interviews continued until theoretical saturation was reached, when no new themes emerged from the data. All interviews were conducted in Indonesian, ensuring cultural and linguistic sensitivity while maintaining the richness of participants' narratives.

3.4. Data Analysis

The qualitative data were analyzed using Strauss and Corbin's grounded theory framework, which includes open coding, axial coding, and selective coding. Open coding was used to identify initial concepts and categories from the transcripts. During axial coding, relationships between categories were explored, linking causes, contexts, strategies, and consequences of academic stress. Selective coding was then applied to integrate and refine the core category, forming a

coherent theoretical model of academic stress in the VUCA era. NVivo software was used to assist in organizing and managing the coded data. Thematic validation was achieved through member checking and peer debriefing to ensure credibility and trustworthiness.

3.5. Instrument Development

Based on the findings from the qualitative phase, a draft instrument was developed to measure academic stress among health science students in the VUCA era. The items were derived directly from the identified themes and subthemes, particularly those related to stress symptoms, stressors, coping strategies, and social support. An initial pool of Likert-scale items was constructed, reflecting the dimensions of Volatility, Uncertainty, Complexity, and Ambiguity (VUCA). Face and content validity were assessed by three experts in psychology, education, and nursing. Revisions were made based on expert feedback to enhance clarity, relevance, and coverage of the construct. Subsequently, the instrument underwent pilot testing with a separate sample of 30 first-year health science students to assess readability, comprehension, and internal consistency.

4. Result

The following Table 3 presents the key findings of the qualitative phase of the study, which explored academic stress among first-year health science students in the VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) era. Using a grounded theory approach, five main themes were identified: Academic Stress in the VUCA Era, Academic Stressors in the VUCA Era, Coping Strategies, Social Support, and Contextual Factors Influencing Stress. Each theme includes subthemes supported by direct quotes from participants, reflecting their lived experiences and perceptions regarding academic pressure, adaptation strategies, and support systems.

Table 3.
Main Themes, Subthemes, and Illustrative Quotes from the Study.

Theme	Sub Theme	Illustrative Quotes
1. Academic Stress in the VUCA Era	1.1. Dysfunctional Emotional Symptoms	"I feel insecure because I think I'm not as smart as my classmates."
	1.2. Dysfunctional Psychological and Behavioral Symptoms	"I keep procrastinating because I can't handle all these deadlines anymore."
	1.3. General Fatigue	"I'm mentally exhausted. Even small tasks feel overwhelming now."
2. Academic Stressors in the VUCA Era	2.1. Volatility (Rapid Change)	"The schedule changes suddenly without any prior notice. It's hard to keep up."
	2.2. Uncertainty	"I don't know when the quizzes will come or how to prepare for them."
	2.3. Complexity	"There are so many overlapping tasks that it's impossible to finish them all on time."
	2.4. Ambiguity	"Sometimes the instructions are unclear. I don't even know what is expected of me."
3. Coping Strategies	3.1. Problem-Focused Coping	"I try to manage my time better by making a to-do list every day."
	3.2. Emotion-Focused Coping	"I talk to my friends when I'm stressed. It helps me feel better."
4. Social Support	4.1. Peer Support	"Studying with friends makes it easier to understand difficult material."
	4.2. Family and Close Relationships	"My parents always remind me to take care of myself, even when I'm busy."
	4.3. Institutional Support	"Sometimes I ask teachers or counselors for advice when things get too tough."
5. Contextual Factors Influencing Stress	5.1. Socio-Demographic Background	"Coming from a different region made it harder to adjust at first."
	5.2. Motivation for Choosing the Major	"I chose this major because I love helping people, but sometimes the pressure gets too much."

These findings illustrate that academic stress among first-year health science students is deeply influenced by the dynamic and unpredictable nature of the VUCA environment. The interplay between external stressors such as rapid changes, uncertainty, complexity, and ambiguity and internal responses, including dysfunctional symptoms, coping strategies, and reliance on social support, highlights the multidimensional nature of academic stress. Furthermore, socio-demographic backgrounds and personal motivations significantly shape how students perceive and manage stress. These insights provide a foundational understanding for developing targeted interventions and measurement tools tailored to the needs of health science students navigating today's complex educational landscape.

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Table 4.
Development Instrument Question

		1	Old friends no longer care about me.
		2	I don't have many new friends on campus because of language differences
		3	I don't have many new friends on campus because of the constraints of lifestyle differences.
		4	A sudden change in the values or practices of religious organizations has made me reconsider my involvement on campus.
		5	The use of AI in learning actually adds to my learning load.
		6	I'm more comfortable working on tasks without the help of AI or advanced technology.
		7	I am experiencing a drastic change in the learning system at my university.
	Uncertainty	8	I find it difficult to use the web and the applications used in academic assignments.
		9	I had a hard time adjusting to the self-paced learning system in college
		10	I am not comfortable with the uncertain lecture schedule from the lecturer.
		11	I find it difficult to accept lessons in class because the lecturer is too quick to deliver learning materials.
		12	I was stressed about whether I would take an impromptu quiz.
		13	I was worried when imagining the future that it was difficult to plan a career
		14	I'm looking for further clarification if the task instructions are unclear.
	Complexity	15	I had to complete group assignments independently because the group was unresponsive.
		16	I had a hard time coordinating the completion of group assignments with the group members.
		17	I am anxious every time I face a massive academic evaluation.
		18	I was depressed because it was difficult to understand the increasingly complex lecture material
		19	I find it difficult to understand the assignment given because the outline of the work or examples is not provided.
		20	I didn't understand the assignment, but was confused to ask it
COPING STRATEGY	Problem-Based Coping	21	Collaborating with classmates.
		22	Working on assignments with classmates.
		23	Studying or discussing topics with classmates.
		24	Working together to find solutions with classmates.
		25	I asked my classmates for help with the subject matter or tasks.
		26	Reviewing material I have not yet understood on my own.
	Emotion-Based Coping	27	Staying up late to finish tasks.
		28	Acceptance of unpleasant situations can prevent me from conflicts with the people around me
		29	My "very stupid" attitude towards things that I can't control makes me happier going to college.
Social Support		30	Verbal encouragement from parents.
		31	Verbal encouragement from university classmates.
		32	Verbal encouragement from long-time friends.
		33	No pressure from parents to meet certain standards.
		34	Moral support from classmates.
		35	Feeling supported by parents when facing difficulties.

These findings illustrate that academic stress among first-year health science students is deeply influenced by the dynamic and unpredictable nature of the VUCA environment. The interplay between external stressors such as rapid changes, uncertainty, complexity, and ambiguity and internal responses, including dysfunctional symptoms, coping strategies, and reliance on social support, highlights the multidimensional nature of academic stress. Furthermore, socio-demographic backgrounds and personal motivations significantly shape how students perceive and manage stress. These insights provide a foundational understanding for developing targeted interventions and measurement tools tailored to the needs of health science students navigating today's complex educational landscape.

Instruments developed to measure academic stress, coping strategies, and social support produced a comprehensive set of 35 questions (See Table 4). These questions are systematically categorized to capture the different dimensions of the student experience. The questions aim to assess key academic stressors, such as volatility, uncertainty, complexity, and ambiguity, as well as how students cope with these stresses and the social support they receive.

The academic stress section explains how challenges students face, ranging from significant life changes and difficulties in building relationships (Volatility) to uncertainty about academic assignments, career paths, and learning environments (Uncertainty). The complexity of managing overlapping academic tasks and the ambiguity surrounding academic policies and expectations are also key areas discussed in this section.

In the coping strategy section, this is described as problem-based coping (such as collaborating with peers, using technology, and managing deadlines) and emotion-based coping (such as meditating, seeking emotional support, or engaging in recreational activities).

Finally, the social support section can be used to examine the different types of support students receive, including verbal encouragement, praise, and the support of peers, family, and institutions in listening and offering guidance. Together, these 35 structured question instruments provide a framework for assessing how academic stress affects students, how they cope with these challenges, and the role of social support in reducing stress.

5. Discussion

5.1. Academic Stress and Challenges Among First-Year Health Science Students

The findings of this study reveal that academic stress among first-year health science students is deeply influenced by the characteristics of the VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) era. Students reported experiencing high levels of emotional distress, including feelings of insecurity, anxiety, and mental fatigue, often triggered by rapid changes in academic schedules, unclear expectations, overlapping tasks, and ambiguous instructions. These findings align with previous studies indicating that uncertainty and unpredictability in educational environments significantly contribute to psychological strain among novice learners [18-21]. The grounded theory approach enabled the identification of a multidimensional model of academic stress, which integrates both external stressors and internal coping mechanisms.

One of the key contributions of this study is the detailed mapping of academic stressors within the VUCA framework. Volatility was primarily manifested through sudden changes in class schedules, assessment formats, and teaching methods, leaving students struggling to adapt [22, 23]. Uncertainty stemmed from inconsistent communication regarding deadlines and evaluation criteria, while complexity emerged from the simultaneous demands of multiple academic responsibilities. Ambiguity, particularly in task instructions and grading policies, further exacerbated confusion and frustration. These findings extend existing literature on student stress by contextualizing it within a rapidly evolving academic landscape shaped by technological advancements and shifting institutional practices [24, 25].

The coping strategies employed by students reflected a combination of problem-focused and emotion-focused approaches. Problem-focused strategies included time management, collaboration with peers, and the use of digital tools to streamline academic tasks. In contrast, emotion-focused strategies such as seeking social support, spiritual coping, and temporary escape behaviors were commonly used to manage emotional distress. This dual strategy mirrors the transactional model of stress and coping [26, 27], suggesting that students dynamically adjust their coping mechanisms based on situational demands. However, reliance on avoidance strategies such as procrastination or excessive screen time was also observed, highlighting the need for more adaptive coping interventions [28, 29].

Social support played a critical role in buffering the effects of academic stress. Peer support, family encouragement, and institutional guidance were frequently cited as sources of comfort and motivation. Notably, students who received consistent emotional and instrumental support exhibited greater resilience and better stress management [10, 30]. These results underscore the importance of fostering supportive academic environments that include mentorship programs, peer-led study groups, and accessible counseling services. Such initiatives can help mitigate the negative impacts of VUCA-related stressors and promote student well-being [31, 32].

5.2. Instrumentation

The development of a Likert scale instrument comprising 35 items to measure academic stress in the VUCA (Volatility, Uncertainty, Complexity, and Ambiguity) era represents a significant step in understanding the multidimensional nature of academic stress experienced by first-year health science students. The instrument is designed to capture three core dimensions, namely academic stressors in the VUCA era, coping strategies, and social support. This structure enables a comprehensive understanding of the factors that contribute to academic stress and the various ways students manage it [33, 34].

5.2.1. Stressor Academic by VUCA Era

The first dimension, the academic stressor in the VUCA era, reflects the challenges students face during their academic journey. Academic stressors in the VUCA era provide insight into how students experience emotional, psychological, and behavioral responses to academic stress, including feelings of insecurity, burnout, and procrastination. These symptoms are essential for understanding how students perceive and internalize stress in their environment.

The academic stressors of the VUCA era highlight the unique challenges students face in today's academic climate. The VUCA framework, which encapsulates volatility, uncertainty, complexity, and ambiguity, is highly relevant to students' experiences in today's rapidly changing and unpredictable educational environment. Stressors such as transitioning to a new academic system, pressure to build relationships with new peers, and adjustments to unfamiliar technologies (e.g., AI applications and digital tools) have consistently been identified as major sources of stress. These stressors reflect broader social and academic shifts that technological advances and global uncertainty have accelerated.

5.2.2. Coping Strategy

The coping strategy dimension provides a comprehensive view of how students manage their stress. This instrument distinguishes between problem-focused coping and emotion-focused coping, acknowledging that students employ a range of strategies to address the root causes of their stress or mitigate its emotional effects. Problem-focused coping strategies, such as collaborating with peers, using technology, and organizing tasks, focus on actively managing the stress itself. These strategies aim to regain control over academic tasks and improve academic performance.

On the other hand, emotion-based coping strategies, including reflective practices, social withdrawal, and seeking emotional support, focus on managing emotional responses triggered by stress. This balance between problem-focused and emotion-focused coping highlights the complex ways in which students cope with academic pressure. It also suggests that both types of coping are necessary, with students needing practical solutions and emotional support to manage stress effectively.

5.2.3. Social Support

The social support dimension emphasizes the importance of supportive social networks in helping students manage academic stress effectively. The instrument evaluates various forms of support, including verbal encouragement, praise for achievements, and a willingness to listen without judgment. Both family and peers play a significant role in providing this support, offering reassurance and a sense of belonging. Support from academic institutions is also crucial, highlighting the importance of institutional backing in reducing stress. Findings from this dimension suggest that students with stronger social support networks are more likely to experience lower levels of academic stress, underscoring the need to foster supportive academic and social environments.

The 35-item instrument developed in this study provides a comprehensive tool for measuring academic stress in the VUCA era, encompassing symptoms of stress, coping strategies, social support, and contextual factors. By examining the interaction of these elements, these instruments help institutions and educators better tailor support services to the specific stresses students face. This tool is invaluable for researchers and practitioners who aim to assess academic stress and enhance student well-being, providing a foundation for further research on academic stress in the VUCA era, the effectiveness of coping strategies, and the role of social support in navigating today's complex academic environment [14-16, 35].

6. Conclusion

6.1. Implication

This study offers insights into the academic stress experienced by first-year health science students in the VUCA era. Using a grounded theory approach, it identifies key stressors, coping strategies, and social support systems. Findings show that academic stress is influenced by external factors such as changing demands and unclear expectations, along with internal responses such as emotional distress and dysfunctional behavior. Students employed both problem-focused and emotion-focused coping strategies, supported by peers, family, and institutions. Based on these findings, a 35-item academic stress measurement instrument was developed, addressing VUCA-related stressors, coping strategies, and social support. This tool provides a foundation for assessing and addressing academic stress, underscoring the need for targeted interventions and institutional support to enhance student resilience.

6.2. Limitation

This study has several limitations that should be considered when interpreting the results. The first samples were taken from one private university in Malang, which may limit the generalizability of the results to the educational context or other student populations. Second, despite using basic theory to ensure theoretical depth and accuracy, reliance on self-reported data through semi-structured interviews can lead to response bias, as participants may report their experiences less accurately due to a desire to provide answers that match social expectations or memory bias. Third, the development of academic stress measurement instruments is still in its early stages; therefore, advanced psychometric testing, such as confirmatory factor analysis and reliability of retests, is necessary to ensure their validity and applicability across various groups. Finally, this study focused on first-year students in the health sciences, so the experiences of senior students or students in non-health disciplines may differ significantly.

6.3. Future Research

The study contributes to the development of an academic stress measurement instrument, which requires further psychometric testing for reliability and validity. Future research should consider longitudinal designs to assess how academic stress evolves and examine the role of institutional reforms in reducing stress among first-year health science students.

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