

Construct Validity and Reliability of the Career Thoughts Inventory Test among First Degree Students

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Abstract

This study examined the construct validity and reliability of the Malay version of the Career Thoughts Inventory (CTI) among undergraduate students. Developed based on Cognitive Information Processing (CIP) theory that measures dysfunctional career thoughts through three subscales: decision-making confusion, commitment anxiety and external conflict. A total of 42 undergraduate students participated as respondents. Construct validity was assessed using item the total correlations while reliability was evaluated with Cronbach's Alpha Coefficients. Results indicated that most items showed moderate to high correlations with the overall reliability coefficient of .946. The subscales yielded values of .874 for decision-making confusion, .840 for commitment anxiety and .623 for external conflict. These findings are consistent with the original validation and supported by recent studies highlighting the stability and internal consistency of CTI. Overall, the Malay version of CTI is a valid and reliable tool for assessing career readiness among Malaysian undergraduates and demonstrates strong potential as a pre and post assessment instrument in evidence-based career interventions.

Keywords: Cognitive Information Processing, Career Thoughts Inventory, Construct Validity, Reliability, First Degree Students

Introduction

Career readiness is influenced by external factors such as family, social environment, economic conditions and organizational contexts (Sampson et al. 2013). Some students pursue fields of study that are not their personal choices but are determined by other influences such as parents and family members (Sampson et al. 2013; Fan, Cheung, Leong & Cheung 2014), peer influence as well as academic qualifications and achievements at the secondary school level. Career decision-making ability is closely related to career thoughts which involve feelings, cognitions, attitudes and expectancy beliefs (Bullock-Yowell et al. 2013).

Several studies from recent years report that undergraduates often exhibit low to moderate levels of career readiness (Maznizam & Abdullah 2013; Kaur 2012). More contemporarily, a meta-analytic review indicates that parental support especially career related support and socioeconomic status are significant predictors of youth career adaptability and readiness (Gustina et al 2023). Additionally, cross-contextual research shows that both internal and external systematic factors influence student's career decision-making processes in higher education (Fernandes & Rawatlal 2024).

To measure such career-related cognitive processes, the Career Thoughts Inventory (CTI) was developed from the Cognitive Information Processing (CIP) model. The CTI provides a robust measure of dysfunctional career thoughts through its three subscales which are Decision-Making Confusion, Commitment Anxiety and External Conflict. Empirical validation of the Malay version of the CTI has shown strong construct validity and reliability among undergraduates in Malaysia (Mahmud et al., 2021). However, while Mahmud et al. (2021) provided an important foundation, recent research suggest that students' career decision-making is increasingly shaped by dynamic and evolving contextual factors such as socioeconomic pressures, shifting parental expectations and cross-cultural considerations (Gustina et al. 2023; Fernandes & Rawatlal, 2024). These developments raise the need to re-examine whether the CTI continues to demonstrate robust psychometric properties among current undergraduate populations.

Building on this foundation, the present study seeks to determine the construct validity and reliability of the CTI among undergraduate students. Specifically, this study focuses on examining whether the CTI maintains its psychometric properties within the current Malaysian higher education context. By doing so, the study not only contributes to the existing literature on career readiness but also provides practical implications for the use of CTI as an evidence-based assessment tool for counsellors, educators and researchers working with university students.

Dysfunctional Career Thoughts

The Cognitive Information Processing (CIP) theory was developed through collaborative efforts by researchers at the Florida State University (FSU) Career Center to examine how individuals engage in career problem solving and decision-making processes. Originally introduced in 1991 by Peterson, Sampson and Reardon and further refined in subsequent publications. The theory provides a cognitive framework for understanding career development and decision-making. CIP theory is grounded in cognitive psychology and emphasizes: (i) problem-solving and career decision-making, (ii) understanding the positive and negative effects of metacognitions in decision-making and (iii) designing interactions that enhance individuals' ability to solve problems and make informed decisions (Sampson et al. 2013; Fernandes & Rawatlal 2024).

The theory rests on eight core assumptions: (i) career choices emerge through the interaction between thoughts and emotions, (ii) career decision-making is essentially a problem-solving activity, (iii) decision-making capacity is based on cognitive knowledge, (iv) career choice reflects the relationship between self-knowledge and occupational knowledge, (v) motivation to choose careers derives from understanding oneself and the world of work, (vi) career development is continuous due to changes in both the individual and the external

environment, (vii) career choice is unique to each individual depending on their level of self-knowledge and (viii) career decision-making capacity depends on problem-solving ability, information processing and decision-making skills (Sampson et al. 2022; Milot-Lapointe & Le Corff 2023).

Cognitive theory also posits that beliefs formed from past experiences can become dysfunctional when disrupted, leading to distorted or unhelpful thinking patterns. Such belief systems are manifested through emotions and behaviors. In the context of career development, past negative beliefs may impair information processing, reduce exploration of career opportunities and lower job-seeking behaviors (Soares et al 2022). The CIP approach assumes that career problem-solving is essentially a rational process situated within socio-emotional contexts. A rational process implies that individuals can define their careers through learning and reflection, making career development a process that integrates systematic career decision-making models (Gustina et al 2023).

The conceptual framework of CIP is illustrated through the Information-Processing Pyramid consisting of three domains which are Knowledge Domain, Decision-Making Skills Domain and Executive Processing Domain (Sampson et al. 1996; Sampson et al. 2022). At the knowledge level, individuals develop self-knowledge and occupational knowledge. At the decision-making skills level, individuals engage in the CASVE cycle- communication (C), analysis (A), synthesis (S), valuing (V) and execution (E) which reflects cognitive processes in decision-making. At the highest level, executive processing (metacognitions) enables individuals to reflect upon their own thinking, monitor their career decisions and adjust strategies accordingly. Through this framework, individuals can make career decisions that are rational, systematic and well-informed.

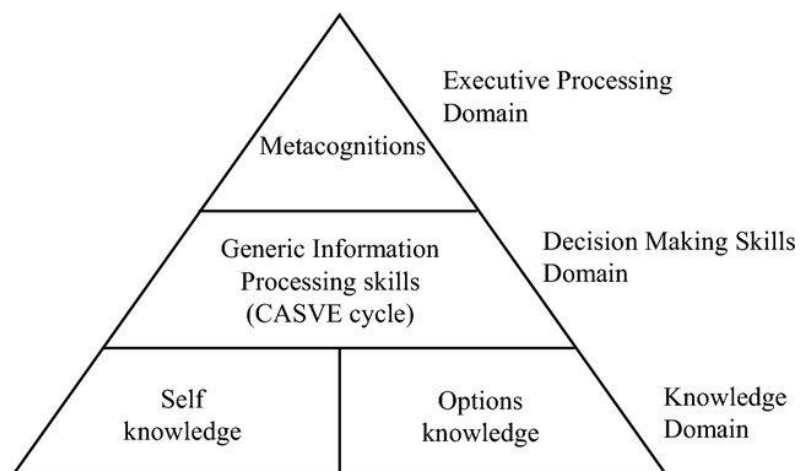


Figure 1 Pyramid of Information Processing Domains in Career Decision Making
(Source from Career Development and Services: A Cognitive Approach by G.W. Peterson, J.P.Sampson, and R.C.Reardon. Copyright 1991 Brooks/Cole Publishing Company, Pacific Grove, CA 93950, a division of International Thompson Publishing Inc.).

Accordingly, the CIP pyramid and CASVE cycle offer a structured strategy for career counselling and guidance interventions, allowing counselors to help clients restructure dysfunctional career thoughts and improve their decision-making capacity. Recent studies continue to support this application showing that negative career thoughts significantly affect

decision-making ability and that targeted interventions focusing on cognitive restructuring are effective in improving career readiness and adaptability (Bullock-Yowell et al. 2013; Mahmud et al. 2021).

Conceptual Framework of CIP and Career Dysfunctional Thoughts

The Cognitive Information Processing (CIP) framework explains that career problem-solving can be disrupted by dysfunctional thoughts which interfere with rational decision-making (Sampson et al. 2013; Fernandes & Rawatlal 2024). According to Peterson et al. (1996), a career problem occurs when there is a discrepancy between an individual's realistic self and ideal self which manifests as a gap in decision-making capacity. Negative career thoughts are defined as maladaptive cognitions such as dysfunctional assumptions, attitudes, beliefs, emotions, planning or strategies that hinder the process of career problem-solving and decision-making (Sampson et al. 2013; Soares et al. 2022). These negative thoughts create barriers that prevent individuals from making effective and timely career-related decisions.

To measure such dysfunctional career thinking, the Career Thoughts Inventory (CTI) was developed by Sampson, Peterson, Lenz, Reardon and Saunders (1996) based on CIP theory. The CTI assesses dysfunctional career thought within the five stages of the career decision-making process: communication, analysis, synthesis, valuing and execution (CASVE cycle). It consists of 48 items and measures three subscales: Decision-Making Confusion (DMC), Commitment Anxiety (CA) and External Conflict (EC).

The Decision-Making Confusion (DMC) subscale reflects an individual's difficulty in initiating or sustaining the decision-making process due to emotional distress and lack of understanding of the decision-making process. Example items include: *"I do not know which major or occupation is appropriate for me"* and *"I cannot find a field of study or job that interests me"*.

The Commitment Anxiety (CA) subscale refers to the inability to commit to a specific career choice due to generalized anxiety about the anticipated outcomes of the decision. Example items include: *"There are many majors or occupations that seem suitable for me but I cannot decide which one is best for me"* and *"I become very anxious when I have to choose a field of study or occupation"*.

The External Conflict (EC) subscale measures the inability to balance self-perceptions with external expectations from significant others, resulting in reluctance to take personal responsibility for decisions. Example items include: *"I know what occupation I want, but there are always barriers from other people"* and *"Whenever I want to do something, important people in my life do not agree with me"*. (Sampson et al. 1996). The CTI uses a four-point Likert scale ranging from 0 (Strongly Disagree) to 3 (Strongly Agree). The subscales are represented by specific items: DMC includes items 1, 3, 4, 5, 11, 12, 13, 16, 20, 27, 28, 36, 43 and 44; CA includes items 17, 21, 22, 26, 29, 30, 32, 38 and 47 while EC includes items 6, 9, 14, 23 and 46. This structured approach enables researchers and practitioners to identify dysfunctional patterns in career decision-making and design interventions to restructure negative thoughts (Mahmud et al. 2021; Milot-Lapointe & Le Corff 2023).

Table 1

Sub scale Career thought Inventory (CTI)

Bil	Sub scale	Item Number
1.	Decision-Making Confusion (DMC)	1, 3, 4, 5, 11, 12, 13, 16, 20, 27, 28, 36, 43, 44
2.	Commitment Anxiety (CA)	17, 21, 22, 26, 29, 30, 32, 38, 47
3.	External Conflict (EC)	6, 9, 14, 23, 46

According to Sampson et al. (1996), the development of the Career Thoughts Inventory (CTI) was carried out in three phases. In the first phase, the number of items was reduced from 195 to 80. In the second phase, the 80 items were administered to 196 undergraduate students enrolled in an introductory psychology course at Florida State University (FSU). The findings from this phase led to a further reduction of items resulting in a 48-item version. In the third phase, the 48-item CTI was administered to a sample of 145 undergraduate students and the results confirmed that the items represented three subscales: Decision-Making Confusion (DMC), Commitment Anxiety (CA) and External Conflict (EC).

The CTI has been tested across different populations including adults, university students and high school students. Content validity studies were conducted to ensure the alignment and consistency of the CTI items. The instrument was developed based on the Cognitive Information Processing (CIP) theory which emphasized the core components of career decision-making: self-knowledge, occupational knowledge, communication, analysis, synthesis, valuing, execution and executive processing. The intercorrelation analysis between the CTI and the content dimensions of CIP is presented in Table 2 below.

Table 2

Intercorrelation between CTI and content dimensions CIP

Content Dimensions	CTI	Decision-Making Confusion	Commitment Anxiety	External Conflict
Self Knowledge	.88	.81	.77	.71
Occupational	.87	.78	.75	.62
Communication	.92	.92	.78	.65
Analysis	.92	.97	.74	.64
Synthesis	.89	.86	.80	.62
Valuation	.87	.72	.87	.78
Action	.85	.72	.73	.72
Executive Processing	.90	.81	.81	.66

(Source: Sampson, Peterson, Lenz, Reardon & Saunders. (1996) *Career Thoughts Inventory: Professional Manual*. Florida Ave. PAR).

Nur Liyana Ibrahim (2016) translated the Career Thoughts Inventory (CTI) from English into Malay with formal permission obtained from Psychological Assessment Resources (PAR). Following the translation process, content validity was established through expert consensus. The data were analyzed using item-total correlation values. The findings indicated that the overall CTI correlation was $r = .788$ with the subscales showing the following coefficients: Decision-Making Confusion (DMC) $r = .927$, Commitment Anxiety (CA) $r = .788$ and External Conflict (EC) $r = .788$.

The reliability of the CTI was originally tested on normative groups such as adults, college students, high school students and clients (Sampson et al. 1996). Internal consistency testing showed that Cronbach's alpha values for the overall scale ranged from .93 to .97. For the subscales, reliability coefficients were .93 to .94 for Decision-Making Confusion (DMC), .79 to .91 for Commitment Anxiety (CA) and .74 to .81 for External Conflict (EC). Test-retest reliability was also conducted to determine score stability across two administrations of the CTI to the same sample. A total of 73 undergraduate students completed the CTI twice within a four-week interval. The results revealed high coefficients with CTI overall $r = .86$, DMC $r = .82$, CA $r = .79$ and EC $r = .74$.

The Malay version of the CTI translated by Nur Liyana Ibrahim (2016) was further tested for reliability among Form Four secondary school students. Findings demonstrated strong reliability with coefficients of .903 for the overall CTI, .875 for DMC, .801 for CA and .758 for EC. However, the Malay version of the CTI has not yet been validated for construct validity and reliability within the undergraduate student population. This limitation is important as the original CTI was validated in college and university populations outside Malaysia (Sampson et al. 1996).

Objective

The objective of the present study is to determine the construct validity and reliability of the CTI among undergraduate students.

Methodology

The research design employed in this study was a descriptive study aimed at determining the construct validity and reliability of the Career Thoughts Inventory (CTI). A total of 42 undergraduate students participated in the pilot study. The instrument used was the CTI which comprises 48 statements measuring dysfunctional career thoughts across three subscales: Decision-Making Confusion (DMS), Commitment Anxiety (CA) and External Conflict (EC). The CTI used in this study was the Malay-language version translated by Nur Liyana Ibrahim (2014) with formal permission from Psychological Assessment Resources (PAR), the original publisher of the instrument. Data were analyzed descriptively using SPSS.

Construct validity of a questionnaire is typically measured using the correlation values between each item score and the total score of the scale (Ghazali Darusalam & Sufean Hussin, 2016; Fraenkel et al., 2012; Sidek Mohd Noah, 2005; Mohd Majid Konting, 2009). In this study, construct validity of the CTI was assessed using Pearson correlation analysis between each item score and the corresponding total score of its designated construct. This approach is consistent with established measurement theory (Abu Bakar, 1987; Nunnally, 1967). According to Abu Bakar (1995), the minimum acceptable correlation coefficient is 0.30. Nunnally (1967, 1978) and Nunnally and Bernstein (1994) considered values above 0.25 as strong, while Cohen (1988) classified correlation coefficients between 0.10–0.29 as small, 0.30–0.49 as moderate, and 0.50–1.00 as high. Similarly, Norusis (1977) emphasized that the validity of an instrument can also be examined using Corrected Item-Total Correlation, where the correlation of each item is computed against the total score excluding that item.

A pilot study was conducted to determine the reliability of the instrument. Reliability refers to the extent to which a measurement tool produces consistent scores when the same

individuals respond to the same test at different times (Sidek Mohd Noah, 1990; Fraenkel et al., 2012). Reliability coefficients greater than .60 are often considered acceptable (Mohd Majid, 1990; Pallant, 2001), while Fraenkel et al. (2012) suggested that coefficients above .70 are preferable for social science research. In this pilot study, 42 final-year undergraduate students at a Malaysian public university were selected as participants using purposive sampling. The questionnaire was distributed to students before class sessions with a clear briefing provided regarding the purpose of their participation in the pilot test.

Results

Finding 1: Construct Validity of CTI

Table 3 presents the correlation values between each item score and the total score, as well as the corrected item–total correlations for the subscales of Decision-Making Confusion (DMC), Commitment Anxiety (CA), and External Conflict (EC). The results show that all items had corrected items–total correlation values exceeding .25, except for item 46, which was slightly below .25; however, its item–total correlation value remained greater than .25. This indicates that the CTI demonstrates acceptable and satisfactory item correlations.

Based on the correlation values suggested by Cohen (1988), all items under the Decision-Making Confusion subscale displayed high item–total correlations ($r > .50$), except for items 3 and 4, which demonstrated moderate correlations ($r = .30$ to $.49$). Similarly, all items under the Commitment Anxiety subscale had high item–total correlations ($r > .50$), except for item 32, which showed a moderate correlation ($r = .405$). For the External Conflict subscale, items 6, 9, 14, and 23 yielded high item–total correlations ($r > .50$), while item 46 showed a moderate correlation ($r = .474$).

Table 3

The correlation between the item and the total score for each sub-time for Career Thoughts Inventory

Sub scale	Item	Correlation of Item score to total score	Item correlation corrected with the sum of the score
Decision-Making Confusion	1	.559	.475
	3	.426	.307
	4	.645	.576
	5	.713	.640
	11	.548	.447
	12	.752	.696
	13	.649	.576
	16	.760	.700
	20	.403	.314
	27	.722	.665
	28	.680	.593
	36	.699	.637
	43	.502	.417
	44	.606	.539
Commitment Anxiety	17	.800	.726
	21	.559	.448
	22	.731	.634

	26	.613	.494
	29	.790	.706
	30	.803	.715
	32	.405	.251
	38	.642	.562
	47	.616	.476
External Conflict	6	.745	.529
	9	.690	.488
	14	.635	.358
	23	.650	.447
	46	.474	.139

Finding 2: Reliability Coefficients of CTI

Table 4 shows that the overall reliability coefficient of the Career Thoughts Inventory (CTI) was .946. For the subscales, the reliability coefficients were .874 for Decision-Making Confusion (DMC), .840 for Commitment Anxiety (CA), and .623 for External Conflict (EC). The reliability analysis of the CTI and its subscales indicates that the coefficients are generally high, demonstrating that this instrument possesses good internal consistency and stability.

Table 4

Cronbach Alpha Reliability Coefficient of Career Thoughts Inventory (CTI) and Career Decision Self-efficacy-Short Form (CDSE-SF)

Instrument	Sub scale	Alpha Cronbach	Alpha Cronbach
<i>Career Thoughts Inventory (CTI)</i>		.946	0.93-0.97
	Decision-Making Confusion	.874	0.90-0.94
	Commitment Anxiety	.840	0.88-0.94
	External Conflict	.623	0.74-0.77

Discussion

Comparison of Construct Validity of the Original CTI and the Translated CTI

The findings of this study indicate that the construct validity of the Malay version of the Career Thoughts Inventory (CTI) translated by Nur Liyana Ibrahim (2016) is satisfactory and acceptable. The item - total correlations across the three subscales which are Decision-Making Confusion (DMC), Commitment Anxiety (CA) and External Conflict (EC) exceeded the minimum threshold of 0.30 as suggested by Abu Bakar (1995) and Cohen (1988). Most items demonstrated moderate to high correlations that reflect good alignment within each construct.

When compared to the construct validity reported in the original validation by Sampson et al. (1996), the present findings are consistent in terms of the strength of correlations between items and their underlying constructs. The original study also reported high intercorrelations among CTI subscales and dimensions of the Cognitive Information

Processing (CIP) theory, reinforcing construct consistency. Although the original validation was conducted among U.S. undergraduate students, while the present study involved Malaysian undergraduates, the findings suggest that translation and cultural adaptation did not significantly compromise construct validity. This provides evidence that the Malay version of CTI retains the same conceptual structure as the original version, demonstrating its appropriateness for use in Malaysian higher education contexts. Thus, the construct validity of the translated test may be considered stable and comparable to the original instrument (Mahmud, Bakar, Amat, & Zam Hasri, 2021).

Comparison of Reliability Coefficients of the Original CTI and the Translated CTI

The results revealed that the reliability coefficients of the Malay version of the CTI were high and within acceptable ranges. The overall Cronbach's alpha was .946, with subscale coefficients of .874 for DMC, .840 for CA, and .623 for EC. While the value for the External Conflict subscale was slightly lower than the other two subscales, it remained acceptable within pilot study contexts (Pallant, 2001). In comparison, the original instrument by Sampson et al. (1996) reported overall reliability ranging from .93 to .97, with subscale coefficients of .93–.94 for DMC, .79–.91 for CA, and .74–.81 for EC. This demonstrates that the Malay version mirrors the reliability levels of the original CTI, particularly for the two core subscales—Decision-Making Confusion and Commitment Anxiety. The slightly lower reliability of External Conflict in this study may be attributed to the smaller sample size ($n = 42$), cultural differences, or varying interpretations of translated items. Nonetheless, the overall findings support the internal consistency of the Malay CTI, confirming its suitability for undergraduate populations in Malaysia.

Utility of the CTI in Measuring Career Readiness

The Career Thoughts Inventory (CTI), grounded in the CIP theory, is a valuable instrument for assessing career readiness by identifying dysfunctional career thoughts. Career readiness encompasses clarity of goals, understanding of career opportunities, and confidence in making career decisions aligned with self-knowledge. In the present study, the strong validity and reliability indicators suggest that the Malay version of CTI can accurately identify dysfunctional career thinking among undergraduates. This provides insight into their career readiness in areas such as academic program selection, career planning, and transition to the workforce. The three subscales of CTI serve as useful indicators: for example, students with high scores on DMC may not yet be ready to make concrete career choices. Therefore, CTI functions not only as a screening tool but also as a foundation for designing targeted interventions to enhance career readiness (Gustina, Dhanpat, & Geldenhuys, 2023).

Utility of the CTI as an Evaluation Tool in Career Intervention Programs

Beyond screening, the CTI has significant potential as an evaluation tool in career interventions. Given its strong psychometric properties, the Malay version can be employed by career counselors and guidance professionals to identify students with substantial dysfunctional thoughts such as confusion, anxiety about commitment, or overreliance on external opinions. The CTI can also be applied in pre- and post-intervention evaluations to assess the impact of career counseling or guidance programs. For instance, a decrease in EC scores following intervention would reflect improved autonomy in decision-making. This aligns with evidence-based counseling practices, where validated instruments provide empirical support for intervention effectiveness (Fernandes & Rawatlal, 2024; Milot-Lapointe

& Le Corff, 2023). Thus, the CTI is not only diagnostic but also instrumental in evaluating program outcomes, enabling interventions to be evidence-based, focused, and culturally relevant.

Recommendation

Correlating the CTI with Other Career-Related Constructs

Given the high construct validity and reliability demonstrated in this study, it is recommended that future research explore correlations between CTI scores and other career-related constructs such as Career Decision Self-Efficacy (CDSE-SF), career values (MVS), career attitudes, career anxiety, and satisfaction with academic program choices. Establishing such correlations would strengthen the convergent validity of the Malay CTI and provide a more comprehensive understanding of psychosocial factors influencing career development among Malaysian undergraduates (Soares, Ferreira, & Santos, 2022; Walker, 2024).

Developing Career Interventions Using the CTI

A further recommendation is the development and evaluation of structured career intervention programs using CTI as both a pre- and post-assessment tool. Such programs could focus on restructuring negative career thoughts, reducing commitment anxiety, and fostering independence in career decision-making. Interventions may take the form of career guidance workshops, individual counseling sessions, group interventions, or structured career development modules. By measuring changes across the CTI subscales before and after intervention, researchers and counselors can generate empirical evidence of program effectiveness in enhancing career readiness and reducing dysfunctional thoughts (Mahmud et al., 2021; Nordic Journal of Transitions, Careers and Guidance, 2023). This would not only validate the utility of CTI in local contexts but also support the development of culturally adapted, theory-driven intervention models for Malaysian undergraduates.

Conclusion

The Career Thoughts Inventory (CTI) has been shown to be suitable across diverse groups, including:

- (i) secondary school students making higher education or career decisions,
- (ii) college and university students choosing majors or exploring career pathways and
- (iii) adults considering career transitions, re-employment, or re-entry into the workforce after periods of unemployment (Sampson et al., 1999).

Findings from this study confirm that the Malay version of CTI demonstrates strong construct validity and reliability, consistent with the original validation by Sampson et al. (1996). This reinforces its suitability for evaluating career readiness among undergraduates in Malaysia (Mahmud et al., 2021). Beyond screening, the CTI is also a valuable tool for assessing the effectiveness of career interventions through pre- and post-test evaluations, particularly in measuring changes in dysfunctional career thoughts such as confusion, anxiety, and external conflict.

Furthermore, future studies are recommended to examine correlations between CTI and other constructs such as Career Decision Self-Efficacy (CDSE-SF) and career values (MVS) to strengthen cross-validation and better understand psychosocial factors influencing career development (Walker, 2024; Soares et al., 2022). Overall, the CTI has strong potential not only

as a measure of career readiness but also as a central instrument in building evidence-based, holistic, and culturally relevant career interventions for Malaysian undergraduates and adults.

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