Post-COVID-19 Assessment of Time Management in Malaysian University Students: A Psychometric Exploration of the Time Management Behaviour (TMB)

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Abstract

Effective time management is crucial for students to optimize their academic performance. However, many university students struggle with inadequate time management skills, particularly in the context of the post-pandemic COVID-19 era. This study aims to address this issue by developing and validating an instrument that examines the factors influencing students' time management skills. Drawing on the Time Management Behavior (TMB) proposed by Macon et al. (1994), this research seeks to gain deeper insights into the specific factors that contribute to effective time management in the current educational landscape. The cross-sectional study collected 126 responses for a pilot study, which underwent exploratory factor analysis (EFA) using SPSS. The findings of the EFA identified six (6) items for deletion. Subsequently, 269 responses were gathered during the actual data collection phase, and the data were subjected to confirmatory factor analysis (CFA) using AMOS. The results confirmed that the TMB instrument met the requirements for CFA and demonstrated validity in measuring university students' time management skills in the post-pandemic COVID-19 era. The TMB instrument provides valuable insights for educational institutions to support students in improving their time management skills, enabling targeted interventions for better academic outcomes and personal growth. It empowers institutions to develop effective strategies and resources to address time management challenges, ultimately promoting student success and facilitating personal and professional development.

Keywords: *time management skills, university students, post-pandemic era, TMB instrument and academic outcomes.*

INTRODUCTION

The COVID-19 pandemic has fundamentally disrupted traditional methods of education across the globe, leading to unprecedented challenges in managing time for students, and Malaysian universities are no exception. The abrupt transition from classroom-based learning to online platforms demanded students adapt rapidly to a new way of learning (Adnan & Anwar, 2020; Dhawan, 2020). Time management, a critical skill in academic success, has gained even more importance in this transformed landscape of education. Online learning requires students to independently structure their learning time, increasing the need for effective time management skills.

This sudden shift may have led to issues such as procrastination, irregular study schedules, and difficulty in balancing academic and personal life, thus highlighting the need for robust interventions and support systems in time management (Besser & Zeigler-Hill, 2020). However, any intervention's efficacy is predicated on the ability to measure the issue accurately. Currently, assessing time management skills in the university student population, particularly in a post-COVID-19 context, presents its own set of challenges (Kerres, 2020; Sahu, 2020). It is crucial that the measures employed capture the unique circumstances that the pandemic has created, such as blended learning environments and increased digital interactions.

In this regard, the pressing need for a strong, reliable, and context-specific time management behaviour (TMB) model becomes apparent. A robust psychometric scale would provide an accurate assessment of students' time management skills, allowing for targeted interventions. By recognizing the nuances of the post-COVID-19 learning environment, it could provide the necessary insights to empower students with better time management strategies. Moreover, understanding the time management skills of Malaysian university students in a post-pandemic era could offer valuable insights not only for Malaysian education stakeholders, but for other regions with similar experiences as well. It is an essential step towards fostering academic resilience in students, equipping them to navigate the evolving education landscape effectively (Besser et al., 2020; Croucher & Davydenko, 2021).

LITERATURE REVIEW

Time management, a vital skill in academic settings, requires students to adeptly handle multiple tasks and deadlines (Abraham et al., 2018; Adams, 2019). To measure these competencies, researchers have developed various scales over the years, each with its unique strengths and challenges. One of the earliest tools to be developed is the Time Structure Questionnaire (TSQ) by Bond and Feather (1988), which evaluates how individuals perceive their use of time. It measures purpose, structure, and achievement concerning time but does not address practical time management behaviors, making it a less appropriate choice for assessing practical academic skills.

In the same vein, another notable scale is the Time Management Behavior Scale (TMBS) created by Macan et al. (1990). The researchers conducted an Exploratory Factor Analysis on this scale, yielding four key dimensions: goal setting and

prioritization, mechanics of time management, preference for organization, and perceived control of time. While this scale has found extensive application in professional settings, its validity and reliability in academic populations have been questioned (Britton & Tesser, 1991). It has been criticized for its narrow focus, overlooking vital aspects such as procrastination and planning for leisure.

These components are particularly relevant to student populations, as evidenced by the work of Claessens et al. (2004). In addition to these critiques, researchers have challenged the factorial validity of the scale. Studies, such as those conducted by Hellsten and Rogers (2009), have been unable to confirm the original four-factor structure posited by Macan et al. This inconsistency raises questions about the robustness of this scale when employed in academic contexts. In simpler terms, while the TMBS by Macan et al. serves as an important stepping-stone in understanding time management, it appears to have significant limitations in its application to student populations. The criticisms surrounding its validity, reliability, and factorial structure necessitate a cautious approach to its use and interpretation in academic settings.

Additionally, the Time Management Inventory (TMI) developed by Britton and Tesser (1991) provides an in-depth evaluation of time management. It explores dimensions such as short-range planning, time attitudes, long-range planning, and goal setting and prioritization. Despite demonstrating strong internal consistency (as evidenced by a high Cronbach's alpha value), the inventory's validation process has been critiqued due to its shortcomings. Specifically, it lacks robust evidence of construct validity and does not provide a factor analysis to support its proposed factor structure (Kelly, 2002). This absence of factorial validation presents significant challenges in consistently interpreting results and subsequently generalizing them across diverse populations. In simpler terms, this scale may encounter generalizability issues, suggesting that its applicability might be compromised when deployed across different cultural contexts or time periods. The essence of these critiques underscores the pressing need for rigorous validation processes when developing and employing such inventories, to ensure their reliability, validity, and broader relevance.

Subsequently, another tool came into existence: the Time Management Questionnaire developed by Lahmers and Zulauf (2000), specifically tailored for student populations. This scale gauges dimensions such as goal setting, time management mechanics, and preference for organization. Despite the merits of a student-centric approach, the TMQ's factorability has not been extensively validated across diverse student populations (Kearns & Gardiner, 2007). Moreover, its validity and reliability in digital learning environments, particularly post-COVID-19, remain unexplored. These existing measures, while invaluable, emphasize the importance of validating time management scales within the intended population and context. Several scales lack thorough validation for student populations, despite students being a primary demographic requiring time management skill. The factorial validity of these scales is often unclear, complicating the consistent interpretation of results. Furthermore, the evolution of learning environments, particularly the rise of online

learning during the COVID-19 pandemic, accentuates the need for scales capable of assessing time management in digital contexts. Traditional scales may not fully encapsulate the nuances and demands of online learning, underscoring the need for more relevant tools.

In the same vein, Suzanne et al. (2013) introduced another novel scale: The Adolescent Time Management Scale (ATMS). Designed to assess time management in adolescents, it comprises dimensions such as planning, time wasting, and punctuality. While the ATMS is a beneficial tool for younger populations, it carries significant limitations. Primarily, its validity and reliability have not been extensively tested outside its developmental context. This constraint raises questions about its generalizability to different cultural contexts and age groups, including university students in Malaysia. Additionally, the scale was developed before the COVID-19 pandemic and does not consider the unique time management challenges posed by remote learning, which has become commonplace since the pandemic's onset. Given these gaps, there exists an urgent need for a comprehensive time management scale that is valid and reliable across diverse student populations, particularly in a post-COVID-19 context.

The study conducted by David et al. (2019) focused on investigating the mediating role of TMB. While the findings of the study yielded fruitful insights, it is important to note that the researchers did not validate the suitability, validity, and reliability of the TMB instrument used in their research. This raises concerns about the generalizability of the findings and the overall robustness of the instrument.

The TMB instrument, which has been in use for the past 30 years, lacks sufficient validation and has not undergone rigorous testing to establish its psychometric properties. This raises questions about the validity of the items, the reliability of the instrument, and its factorability in different contexts. Without proper validation, it is challenging to ascertain the accuracy and generalizability of the findings derived from the TMB instrument. To ensure the reliability and validity of research outcomes, it is crucial to utilize measurement instruments that have been thoroughly validated and proven to be suitable for the specific context of the study. The lack of validation in the case of the TMB instrument calls for further research to establish its psychometric properties, including its suitability, validity, reliability, factorability, and generalizability. Such research will contribute to a better understanding of time management behaviors and enhance the overall quality of research in this field.

Recently, Judith et al. (2022) embarked on a study to investigate time management during the COVID-19 pandemic. They adapted and adopted Britton and Tesser's (1991) Time Management Questionnaire (TMQ), originally created over 30 years ago. While the study delivered insightful findings, it is important to spotlight a few methodological considerations. Firstly, the TMQ may not capture the intricacies of time management in today's drastically changed environment, especially during the COVID-19 pandemic, when life largely moved online. Secondly, the researchers did not employ Exploratory Factor Analysis (EFA) to validate the TMQ's factor

structure for their sample. Cultural and contextual variations could significantly influence time management, making it challenging to confirm the TMQ's applicability in the present context without an EFA. Lastly, the researchers did not establish the psychometric properties of the TMQ for their sample, raising concerns about the questionnaire's reliability and validity within this context. In simpler terms, the study reveals potential knowledge and practical gaps that warrant attention. Researchers should emphasize the importance of using updated, culturally relevant, and psychometrically validated tools when studying time management in rapidly evolving post-pandemic landscape.

Hence, the current landscape of time management scales exhibits substantial limitations, particularly in aspects of validity, reliability, and factorability. This assessment underscores the need for future research to prioritize the development of psychometrically robust, contextually pertinent scales validated for the specific demographic and environment they aim to serve. These novel scales should integrate contemporary aspects of time management, such as digital proficiency, aligning better with the evolving academic landscapes, especially in the wake of the COVID-19 pandemic. The need for reliable and valid scales becomes more pressing in a post-pandemic context in Malaysia, where educational practices have dramatically shifted towards online learning (Alias, 2020).

METHODOLOGY

This research utilizes a cross-sectional study design, as recommended by Sekaran and Bougie (2016), collecting data at a single point in time. The data was sourced from students at three public universities in the bustling areas of Kuala Lumpur and Selangor. The fast-paced nature of city life brings its own challenges. Several studies have pointed out that students living in larger cities often face a crowded job market, longer work hours, extensive commutes, and a wide range of social and cultural activities (Chatzitheochari & Arber, 2009; Peen, 2010). These factors may increase the perceived need for effective time management among city students. Thus, exploring time management in this specific context of city students is particularly important. A simple random sampling technique was used to select respondents from the university's student population.

This approach ensures that all individuals within the target demographic have an equal chance of being selected, enhancing the representativeness of the study and minimizing sampling bias. For this study, Macan et al. (1994) time management behaviour (TMB) instrument was adapted and adopted. The model consists of four dimensions: perceived control of time, setting goals and priorities, mechanisms of time management behaviour and preference for organization. The questionnaire was validated by five experts, including professors and lecturers from various local universities, to establish content validity.

After the validation process, the TMB questionnaire was pre-tested on five (5) randomly selected respondents. This allowed for the assessment of response consistency, identification of any ambiguous terms, evaluation of question clarity, and

feedback on the questionnaire design. These issues were addressed and resolved before the pilot study and actual data collection (Zikmund & Babin, 2010). Following the revisions based on expert panel comments and the pre-test, a pilot study was conducted, and 126 valid responses were obtained. This exceeded the required minimum sample size of 100 (Awang, 2015; Bahkia et al., 2019). The pilot study data were then subjected to exploratory factor analysis (EFA) before the actual survey was conducted. These steps were taken to ensure the reliability and validity of the research instrument and to refine the questionnaire for the subsequent survey phase.

The final version of the TMB instrument consisted of 34 items, excluding demographic questions. A 10-point interval scale was used, ranging from 'strongly disagree' (1) to 'strongly agree' (10), following the recommendation of Awang (2015) and Coelho & Esteves (2007) to ensure data independence. A total of 298 responses were collected during the survey, and after data screening and cleaning, 269 responses were considered valid and included in the analysis. The sample size was deemed sufficient for robust structural equation modeling (SEM) (Kline, 2011). Data analysis was conducted using the Statistical Package for Social Sciences (SPSS) for data screening and exploratory factor analysis (EFA), and Analysis of Moment Structures (AMOS) was used to validate the measurement model through confirmatory factor analysis (CFA) to assess construct unidimensionality, validity, and reliability (Awang, 2015; Awang et al., 2018; Afthanorhan et al., 2019).

RESULTS AND DISCUSSION

EXPLORATORY FACTOR ANALYSIS (EFA)

The primary objective of conducting EFA was to analyze and summarize the data by identifying underlying dimensions and grouping together variables that exhibit correlation (Zikmund & Babin, 2010). In this study, EFA was performed using the data collected from the pilot study to identify the four dimensions related to perceived control of time, setting goals and priorities, mechanisms of time management behaviour and preference for organization. To ensure the appropriateness of the EFA, several conditions were taken into consideration. First, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) value should exceed 0.50, indicating a satisfactory level of sampling adequacy. Additionally, Bartlett's test of sphericity results should be significant at $p < 0.001$, as recommended by Hair et al. (2014). By adhering to these criteria, the EFA process helped uncover the underlying dimensions and relationships among the variables in the study, shedding light on the factors influencing critical reading participation. The findings derived from EFA will contribute to a better understanding of the constructs and guide further analyses in the subsequent stages of the research (Awang, 2015; Bahkia et al, 2019).

Table 1 presents the KMO values and Bartlett's test of sphericity results for perceived control of time, setting goals and priorities, mechanisms of time management behavior, and preference for organization. All constructs had KMO values exceeding 0.5, indicating sampling adequacy. The Bartlett's test of sphericity

for all constructs yielded significant results ($p < 0.001$), aligning with the recommendations of Hair et al. (2014), Bahkia et al. (2019), Rahlin et al. (2019), and Shkeer and Awang (2019).

Table 1: Results of KMO and Bartlett's Test of Sphericity

Construct	KMO (>0.50)	Bartlett's Test of Sphericity (p<0.001)
Perceived control of time (PCOT)	0.826	0.00
Setting goals and priorities (SGAP)	0.796	0.00
Mechanisms of time management behavior (MTMB)	0.863	0.00
Preference for organization (PFOR)	0.829	0.00

In the exploratory factor analysis (EFA), the principal component analysis was employed to extract factors and determine which items to retain or eliminate. For enhanced interpretability, varimax rotation, the most widely used orthogonal factor rotation method, was applied (Hair et al., 2014; Shkeer & Awang, 2019). Factor loadings below 0.50 were removed, while loadings exceeding 0.50 were retained for analysis (Hair et al., 2014). Table 2 displays the results of the EFA, including the number of items for each construct before and after analysis. Furthermore, Table 1 indicates that a total of 6 items need to be removed from the analysis, with 2 items each from the constructs of setting goals and priorities, mechanisms of time management behavior, and preference for organization. All the results have been presented in Table 2 below:

Table 2: Item Retention Result after EFA

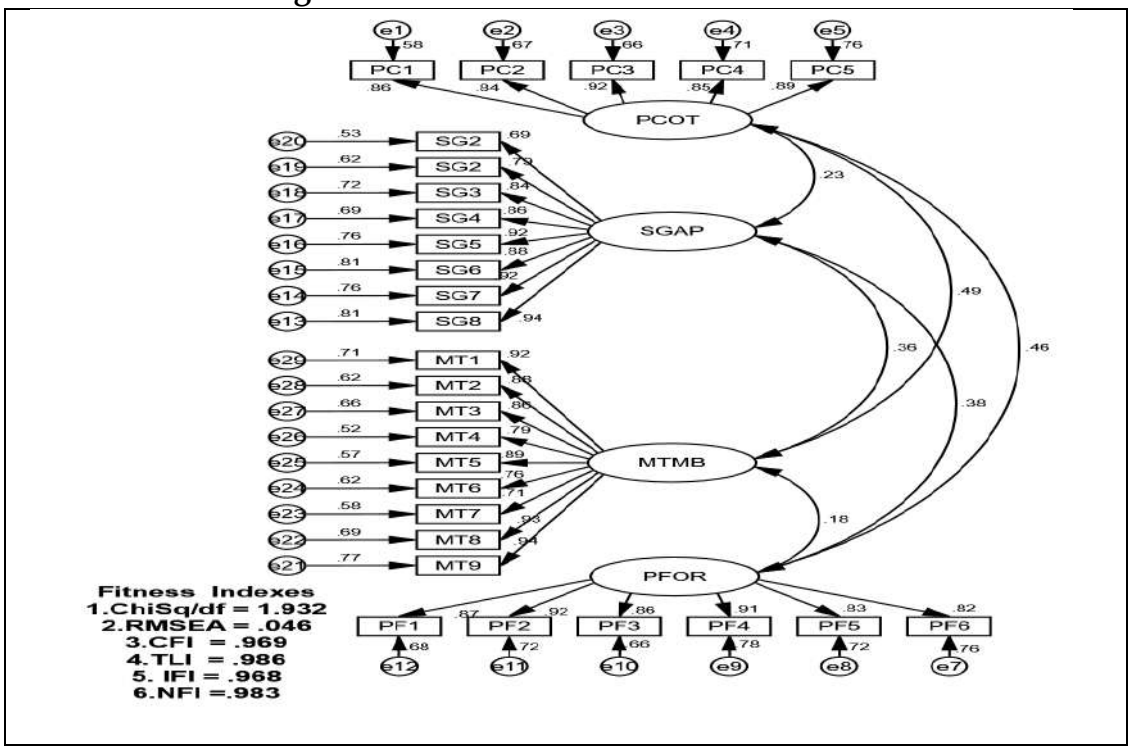
No	Construct	Items before EFA	Number of Items Dropped	Number of Items Retained after EFA
1	Perceived control of time (PCOT)	5	-	5
2	Setting goals and priorities (SGAP)	10	2	8
3	Mechanisms of time management behavior (MTMB)	11	2	9
4	Preference for organization (PFOR)	8	2	6

CONFIRMATORY FACTOR ANALYSIS (POOLED-CFA)

The study aimed to validate the measurement models of latent constructs, focusing on its unidimensionality, validity, and reliability (Afthanorhan et al., 2017; Aimran et al., 2017; Awang, 2015; Hair et al., 2014; Kashif et al., 2016; Mohamad et al., 2018). This validation process involved conducting CFA. The measurement model was subjected to three types of validity assessment: convergent validity, construct validity, and discriminant validity (Awang, 2015; Hair et al., 2014; Yusof et al., 2017). Convergent validity was evaluated using the average variance extracted (AVE). Construct validity was assessed by examining the fitness indices of the measurement model. Discriminant validity was established through the development of the Discriminant Validity Index Summary. To evaluate the reliability of the Time Management Behavior (TMB) construct, Composite Reliability (CR) was utilized as a more suitable alternative to the traditional method of computing Cronbach's Alpha (Awang, 2015; Aziz et al., 2016; Hair et al., 2014; Noor et al., 2015; Yusof et al., 2017).

Figure 1 illustrates the simultaneous validation of all constructs in the model using a pooled confirmatory factor analysis (Pooled-CFA). The constructs are represented by double-headed arrows to indicate the pooling process. As highlighted by Awang (2015) and Awang et al. (2018), model identification is not a concern when employing Pooled-CFA, even if certain constructs have fewer than four items (Awang, 2015). This is because combining the constructs increases the degree of freedom for the model. In this study, the Pooled-CFA approach was chosen for its efficiency in validating the measurement models, eliminating the need to run separate CFA for each construct.

Figure 1: Result from Pooled CFA Procedure



Unidimensionality

Unidimensionality refers to the ability of a set of variables to be explained by a single construct (Hair et al., 2014). Achieving unidimensionality requires that all the measuring items for each construct obtain acceptable factor loadings (Awang, 2015). In the context of confirmatory factor analysis (CFA), items with low factor loadings should be removed from the measurement model until the fit indices reach acceptable levels (Afthanorhan et al., 2017; Asnawi et al., 2019; Awang, 2015; Hair et al., 2014; Kashif et al., 2016). Awang (2015) and Awang et al. (2018) identified two conditions that must be met before considering item deletion.

For newly developed items, the factor loading should be 0.5 or higher. This indicates that the item is strongly associated with the underlying construct and contributes significantly to its measurement. For established items that have been previously validated, the factor loading should be above 0.6 or higher. This higher threshold reflects the expectation that established items should demonstrate a stronger association with the construct. These conditions help ensure that only items with strong and meaningful relationships to the construct are retained in the measurement model, enhancing the validity and reliability of the scale.

Table 3: Factor Loading of All Items

No	Construct/Item	Factor Loading
	Perceived Control of Time (PCOT)	
1	I underestimate the time that it will take to accomplish tasks (Reverse scored).	.86
2	I feel in control of my time.	.84
3	I must spend a lot of time on unimportant tasks (Reverse scored).	.76
4	I find it difficult to keep to a schedule because others take me away from my work (Reverse scored).	.86
5	I find myself procrastinating on tasks that I do not like but that must be done (Reverse scored).	.89
	Setting Goals and Priorities (SGAP)	
1	When I decide on what I will try to accomplish in the short term, I keep in mind my long-term objectives.	.69
2	I review my goals to determine if they need revising.	.79
3	I break complex, difficult projects down into smaller manageable tasks.	.84
4	I set short-term goals for what I want to accomplish in a few days or weeks.	
5	I set deadlines for myself when I set out to accomplish a task.	.92
6	I finish top priority tasks before going on to less important ones.	.88
7	I review my daily activities to see where I am wasting time.	.92
8	I set priorities to determine the order in which I will perform tasks each day.	.94
	Mechanisms of Time Management Behaviour (MTMB)	
1	I carry a notebook to jot down notes and ideas.	.92
2	I schedule activities at least a week in advance.	.88
3	When I find that I am frequently contacting someone, I record that person's name, address, and phone number in a special file	.86
4	I block out time in daily schedule for regularly scheduled events.	.79
5	I write notes to remind myself of what I need to do.	.89
6	I make a list of things to do each day and check off each task as it is accomplished.	.76
7	I carry an appointment book with me.	.71
8	I keep a daily log of my activities.	.93
9	If I know I will have to spend time waiting, I bring along something I can work on.	.94
	Preference For Organization (PFOR)	
1	At the end of the workday, I leave a clear, well-organized workspace.	.87
2	When I make a things-to-do list at the beginning of the day, it is forgotten by the end of the day. (Reverse scored)	.92
3	I can find things I need for work more easily when my workspace is messy (reverse scored)	.86
4	The time I spend scheduling and organizing my workday is time wasted. (Reverse scored)	.91
5	My workdays are too unpredictable for me to plan and mange my time to any great extent. (Reverse scored)	.83
6	When I am somewhat disorganized, I am better able to adjust to unexpected events. (Reverse scored)	.82

Table 3 demonstrates that all items within each construct have exceeded the recommended factor loading values, as suggested by Awang (2015) and Awang et al. (2018). Consequently, no items were eliminated from the survey, signifying that all items have exhibited a strong association with their respective constructs. This outcome reinforces the validity and reliability of the measurement model utilized in this study.

Convergent Validity

Convergent validity refers to the degree to which a set of indicators accurately measures a specific construct (Hair et al., 2014; Kline, 2011; Awang, 2015; Awang et al., 2018). It indicates the strength of the relationships among items that are expected to represent a single latent construct (Brown, 2006). Convergent validity is typically assessed by calculating the average variance extracted (AVE), with a threshold value of 0.5 often considered acceptable (Awang et al., 2018; Awang, 2015; Fornell & Larcker, 1981; Hair et al., 2014). Table 4 displays the AVE values for all the constructs, with each construct surpassing the minimum threshold of 0.5.

Table 4: Average Variance Extracted for All Constructs

Codes	Construct	AVE (Above 0.5)
PCOT	Perceived Control of Time	0.711
SGAP	Setting Goals and Priorities	0.737
MTMB	Mechanisms of Time Management Behaviour	0.734
PFOR	Preference For Organization	0.772

CONSTRUCT VALIDITY

Construct validity is established when all the fitness indices for a model meet the required criteria (Awang, 2015; Awang et al., 2018). To assess construct validity, three categories of model fit indices are commonly considered: absolute fit indices, incremental fit indices, and parsimonious fit indices (Awang et al., 2015, 2018; Kashif et al., 2015, 2016; Yusof et al., 2018; Asnawi et al., 2019). The most widely used indicators for evaluating model fit are the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the normed chi-square (χ^2/df) (Awang, 2015; Awang et al., 2018).

According to Table 5, the TMB scale demonstrated satisfactory performance across all three categories of fitness indices: (1) the root mean square error of approximation (RMSEA) value of 0.046 indicated a good absolute fit; (2) the comparative fit index (CFI) value of 0.969 exceeded the recommended threshold of 0.90, confirming a strong incremental fit; and (3) the normed chi-square (χ^2/df) value of 1.932 met the criterion of being below 3.0, demonstrating a satisfactory

parsimonious fit as suggested by Bentler (1990). Therefore, the construct validity of the CRIS model has been successfully established in this study.

Table 5: Fitness Indices

Name of category	Name of index	Level of acceptance	Result	Status
Absolute Fit Index	RMSEA	RMSEA < 0.08 (Hu & Bentler, 1999)	0.046	Achieved
Incremental Fit Index	CFI	CFI > 0.90	0.969	Achieved
	TLI	TLI > 0.90	0.986	
	IFI	IFI > 0.90	0.968	
	NFI	NFI > 0.90 (Awang, 2012)	0.983	
Parsimonious Fit Index	Chi-Square/df	Chi-Square/df < 3.0 (Hu & Bentler, 1990)	1.932	Achieved

DISCRIMANT VALIDITY

To assess the discriminant validity of the survey, the discriminant validity index summary (Table 6) was developed. The diagonal values, indicated in bold, represent the square root of the average variance extracted (AVE) for each construct. The other values in the table represent the correlation coefficients between pairs of constructs. The discriminant validity index summary allows us to evaluate whether there are any redundant constructs in the model by examining the correlation coefficients (Awang, 2015).

If the correlation coefficients between constructs are higher than the square roots of the AVE, it suggests a lack of discriminant validity and the presence of redundant constructs. Based on Table 6, it can be observed that the correlation coefficients between constructs are lower than the square roots of the AVEs for each respective construct. This indicates that there is sufficient discriminant validity among the constructs, as all items not highly correlated with each other. Therefore, the survey successfully establishes discriminant validity, ensuring that no redundant constructs or items are present in the model.

Table 6: Discriminant Validity Index Summary

Construct/ Codes	PCOT	SGAP	MTMB	PROR
Perceived Control of Time	***0.711***			
Setting Goals and Priorities	0.233	***0.737***		
Mechanisms of Time Management Behaviour	0.492	0.363	***0.734***	
Preference For Organization	0.461	0.384	0.182	***0.772***

The discriminant validity of each construct was successfully achieved, as evidenced by the square root of its average variance extracted (AVE) being higher

than its correlation value with other constructs in the model (Table 6) (Awang et al., 2018; Awang, 2015; Hair et al., 2014). The diagonal values (in bold) in the table represent the AVE for each construct, and they are higher than any other value in their respective rows and columns.

The achievement of discriminant validity is demonstrated by the fact that the diagonal values in Table 6 meet the threshold for discriminant validity. This indicates that the constructs in the TMB are distinct from each other and do not share substantial common variance. Therefore, the survey has successfully established discriminant validity for all the constructs, ensuring their independence and contributing to the robustness of the measurement model.

COMPOSITE RELIABILITY

Composite reliability is a measure utilized to assess the reliability of constructs within a structural equation model (Awang et al., 2018; Awang, 2015; Hair et al., 2014). A composite reliability value of 0.7 or higher indicates good reliability, while a value between 0.6 and 0.7 is considered acceptable (Awang, 2015; Hair et al., 2014). According to Hair et al. (2017), when employing structural equation modeling (SEM) with AMOS, composite reliability (CR) is regarded as a more appropriate measure of reliability compared to Cronbach's alpha. This is because CR considers the factor loadings of the latent variables and provides a more accurate estimation of internal consistency reliability in SEM. Therefore, the researcher has emphasized the use of CR over Cronbach's alpha in this study.

The analysis conducted in this study reveals that the composite reliability scores for all the constructs in the TMB exceeded the minimum threshold of 0.6 (Table 7). The construct with the highest composite reliability was mechanisms of time management behaviour (0.961), indicating strong reliability of the measurements within this construct. On the other hand, the perceived control of time obtained the lowest composite reliability score (0.925), but it still met the acceptable threshold. Overall, the TMB demonstrated satisfactory composite reliability across all constructs. These findings suggest that the measurement items within each construct are reliable and can be used with confidence in further analyses. The high composite reliability scores support the overall internal consistency and dependability of the TMB instrument, providing researchers with reliable data to determine the effects and hypotheses of interest.

Table 7: Composite Reliability

Codes	Construct	CR (Above 0.6)
PCOT	Perceived Control of Time	0.925
SGAP	Setting Goals and Priorities	0.951
MTMB	Mechanisms of Time Management Behaviour	0.961
PFOR	Preference For Organization	0.944

NORMALITY ASSESSMENT

In the final step of the analysis, the normality distribution of the items measuring the constructs in the TMB was evaluated. It is important for the skewness values of the items to fall within an acceptable range, indicating a normal distribution (Asnawi et al., 2019; Awang, 2015; Hair et al., 2014; Kashif et al., 2015, 2016; Mohamad et al., 2016, 2018). Typically, skewness values ranging from -2 to 2 are considered acceptable.

By examining the skewness values of the items in the TMB, it can determine whether the data significantly deviate from normality. If the skewness values fall within an acceptable range, it indicates that the data distribution is relatively symmetrical and does not violate the assumption of normality. This is crucial for conducting statistical analyses and accurately interpreting the results. Assessing the skewness values of the items in the TMB ensures that the data conform to the assumption of normality, establishing a robust basis for further analysis and interpretation of the study findings. The results of the skewness analysis are presented in Table 8, demonstrating the adherence of the data to the assumption of normality.

Table 8: Factor Loading of All Items

No	Construct/Item	Skewness
	Perceived Control of Time (PCOT)	
1	I underestimate the time that it will take to accomplish tasks (Reverse scored).	-0.326
2	I feel in control of my time.	-0.266
3	I must spend a lot of time on unimportant tasks (Reverse scored).	-0.169
4	I find it difficult to keep to a schedule because others take me away from my work (Reverse scored).	-0.368
5	I find myself procrastinating on tasks that I do not like but that must be done (Reverse scored).	-0.696
	Setting Goals and Priorities (SGAP)	
1	When I decide on what I will try to accomplish in the short term, I keep in mind my long-term objectives.	-0.268
2	I review my goals to determine if they need revising.	-0.568
3	I break complex, difficult projects down into smaller manageable tasks.	-0.679
4	I set short-term goals for what I want to accomplish in a few days or weeks.	-0.866
5	I set deadlines for myself when I set out to accomplish a task.	-0.903
6	I finish top priority tasks before going on to less important ones.	-0.755
7	I review my daily activities to see where I am wasting time.	-0.509
8	I set priorities to determine the order in which I will perform tasks each day.	-0.786
	Mechanisms of Time Management Behaviour (MTMB)	
1	I carry a notebook to jot down notes and ideas.	-0.671
2	I schedule activities at least a week in advance.	-0.547
3	When I find that I am frequently contacting someone, I record that person's name, address, and phone number in a special file	-0.832
4	I block out time in daily schedule for regularly scheduled events.	-0.995
5	I write notes to remind myself of what I need to do.	-0.817
6	I make a list of things to do each day and check off each task as it is accomplished.	-0.904

7	I carry an appointment book with me.	-0.846
8	I keep a daily log of my activities.	-0.893
9	If I know I will have to spend time waiting, I bring along something I can work on.	-0.978
	Preference For Organization (PFOR)	
1	At the end of the workday, I leave a clear, well-organized workspace.	-0.762
2	When I make a things-to-do list at the beginning of the day, it is forgotten by the end of the day. (Reverse scored)	-1.226
3	I can find things I need for work more easily when my workspace is messy (Reverse scored)	-1.348
4	The time I spend scheduling and organizing my workday is time wasted. (Reverse scored)	-1.181
5	My workdays are too unpredictable for me to plan and mange my time to any great extent. (Reverse scored)	-0.995
6	When I am somewhat disorganized, I am better able to adjust to unexpected events. (Reverse scored)	-1.066

Based on table 8, the skewness values for all the components in the model were within the acceptable range of -2 to 2 (Hair et al., 2022). This indicates that the distribution of the data did not deviate significantly from normality. Therefore, the data distribution in the TMB met the requirement of normality distribution.

CONCLUSION

In conclusion, this study aimed to develop and validate a survey instrument for assessing students' time management skills in the post-COVID-19 era. The findings from the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) indicate that the instrument successfully captures the factors influencing students' intention in time management and planning, referred to as the Time Management Behaviour (TMB). The EFA revealed the removal of six items from the initial version, specifically two items each from the constructs of setting goals and priorities, mechanisms of time management behavior, and preference for organization. These items were eliminated due to their failure to meet the minimum factor loading requirement of 0.50 based on the pilot study data. The CFA results further confirmed the convergent validity, construct validity, and discriminant validity of the TMB instrument. Additionally, the assessments of unidimensionality and normality provided evidence of the instrument's validity. Based on these findings, it can be concluded that the TMB instrument is reliable for measuring students' time management skills in the post-pandemic COVID-19 context. The instrument provides a valuable tool for researchers and educational institutions to assess and enhance students' time management abilities, ultimately promoting their academic success and personal development.

This study recommends applying time management behaviour (TMB) in various research settings, including universities located in semi-urban areas, particularly those situated far away from major cities. Future research should explore additional factors influencing students' time management skills, such as self-

discipline, learning environment, and life circumstances (Richardson et al., 2012; Galla, & Duckworth, 2015). Investigating the role of moderating variables like gender, ethnicity, and university policies can enhance the understanding of how these factors interact with time management behaviors. Moreover, incorporating a mixed-methods approach combining qualitative and quantitative data can provide a more comprehensive understanding of students' time management skills. By expanding the scope of the TMB instrument and considering different contexts and variables, future research can contribute to enhancing students' time management skills and academic performance in the post-COVID-19 era.

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