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Measurement Validation for Money Management Intention Based on the Transtheoretical Model of Behavior Change

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This study aims to validate an instrument to measure money management intention based on six processes and three cognitive stages of change according to the transtheoretical model of change. A total of one thousand sixty-three Thai undergraduate students from three public and three private universities in Bangkok and Nakorn Pathom provinces in Thailand were randomly recruited in the various validation steps including confirmatory factor analysis, test-retest reliability method, concurrent validation, convergent validation and discriminant validation. The results confirmed the validity and reliability of the eighteen items based on the six components among the general university students; CFA showed acceptable fit indices; $\chi 2$ = 331.65, $\chi 2/df$ = 2.88, *CFI* = .91, *GFI* = .87, *RMSEA* = .06, scoring separately in each process of change. Moreover, saving from Saving Scale and Machiavellianism from SD3-TH indicated the most robust relationships with all developing measures significantly. Convergent and discriminant validations were met the critical criteria. This validated measure was labeled as MMIQ-TTM. The present study confirms the usefulness of six processes and three stages in measuring money management intention at the early cognitive stage before performing behavioral changes in the future action stages among undergraduate students.

Keywords: money management, intention, Processes of Change, Transtheoretical model

Recently, the financial decisions taken by young adults have become a growing research interest worldwide. Current research demonstrated that attitude and intention positively influence individuals' financial patterns (Aydin & Selcuk, 2019). Notably, spending or saving behaviors tend to show similarity with a family behavioral background where children learn from their parents. So, financial literacy would ultimately involve a process of monetary socialization of the children from their early pre-school stage (Akinyede et al., 2017); however, in reality, some university students reported difficulties or lacking financial ability to manage their money because money management was not taught to them, or it was unknown in their families.

In Asian countries, like Thailand, there is an increasing number of debt-ridden students and non-repayment debtors. Approximately almost half of Thai loan students have never made repayment after graduation (Boonroungrut & Huang, In press 2020). Some of them reported problems of multiple borrowing and over-in debt. Although, many money management curricula have been implemented in schools or universities, the increasing in-debt rate still exists among undergraduate students including the employment stage after their graduation (Boonroungrut et al., 2018). Evidence from a famous bank in Thailand showed that Thais hold a high level of debt since they were young. Their loans could bring about

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directly to the high risk of household debt which did not subside when they were about to retire (Srisamarn & Fernando, 2019). Bankruptcy among students represented an outcome of financial mismanagement since the end of the last century (Altman & Hotchkiss, 2006). This factor is a concern and a threat in future investment (Chichaibelu & Waibel, 2017; Lau et al., 2011; Lewis & Lewis, 2017; Sereetrakul, 2014).

Regarding the failures and limitations of several money management interventions, the intention of money management was one of those missing. The previous reports indicated that the course makers did not consider how better financial behavior was. Adequate progress among young students indicated readiness for being involved in some family financial activities, including starting credit experience or learning to improve managing skills (Lau et al., 2011). To be more effective in changing budgeting tendencies in young adults, it may require concern not only to the financial knowledge but also the individuals' feelings, habits, perception of control, beliefs toward intention (Kidwell & Turrisi, 2004). The interactivity, enjoyment, appropriate contents and needs of participants should be included as one of the core design considerations (Black & Rosen, 2011). These mentioned contents could be stated in the early stage of behavior change which was generally recognized as an intention, especially in one of the well-known behavior change models as the transtheoretical model of change (TTM). Therefore, the main objective was to validate an instrument to measure money management intention based on 3 cognitive stages of change in the precontemplation stage, the contemplation stage, and the preparation stage which included only 6 recommended processes of changes.

Theoretical Framework

TTM is one of the most acceptable behavioral change models in preventing some unhealthy behaviors and supporting healthy activities, such as smoking avoidance, dietary, and physical activities (Bezner et al., 2017; Leem et al., 2017; Tseng et al., 2017). Initially, it was first applied in healthcare, then widely adapted in another behavior including financial issues, such as indebt status and budgeting failure (Magendans et al., 2017; Prochaska et al., 1992). Additionally, TTM was used in measuring the progress of various financial training programs and interventions, for example, to increase the participation rate of a good financial retirement plan (Horwitz et al., 2019). As same as other behavior change, in financial counseling, Shelton et al. (2019) explained that this model was accepted as a basis for understanding the readiness of change, and it suggested how to move the client forward by each approach.

The discrete stages of TTM described how individuals progress their changes consequently. TTM elucidates 5 stages: precontemplation stage (PC) with no consideration of any change within 6 months, contemplation stage (C) which is beginning to start consideration within 6 months, preparation stage (P) which is making the plan to change within the next 30 days, action stage (A) which is initiating a new goal of behavior less than 6 months, and maintenance stage (M) which is consolidating changed behavior for a period more than 6 months. According to the stage theory, people could identify the presumption of their behavior change in each stage progression (Adams & White, 2005; Kreuter et al., 1999).

Particularly, the TTM confirmed that behavior change is not an event but a process. The model developers indicated 10 processes of change as strategies categorized into 5 cognitive and 5 behavioral processes: (1) consciousness raising (CR) with finding new idea

for change, (2) dramatic relief (DR) with experiencing the negative emotion or risks, (3) environment reevaluation (ER) with realizing the negative or positive impact on proximal environment, (4) self-reevaluation (SR) with realizing the important of change, (5) self-liberation (SL) with commiting to change, (6) social liberation (SO) with realizing the supportive social norm, (7) counterconditioning (CO) with substation of alternative behavior, (8) stimulus control (SC) with adding the positive cue of change, (9) contingency management (CM) with increasing rewards for positive change, and (10) helping relationships (HR) with seeking social support of change. Occasionally, as the original recommendation, it is not necessary to apply all processes. Fewer change processes might be used for some changes (Prochaska, 2013; Prochaska & Velicer, 1997). In this study, intention was focused. Thus, the 6 processes (CR, DR, ER, SR, SL, and SO) recommended in precontemplation, contemplation, and preparation were selected to validate in this proposed measure. Under the umbrella of the TTM conceptual model, Table 1 shows the practical implication to help people to make their behavioral changes.

Table 1

Relationship between TTM stages and processes of change

Change Stages:	Precontemplation	Contemplation	Preparation	Action	Maintenance
Change Processes:	Consciousness raising (CR) Dramatic relief (DR) Environmental re-evaluation (ER) Social liberation (SO)	Self-reevaluation (SR)	Self-liberation (SL)	Contingency - management (CM) Counterconditioning (CO) Stimulus control (SC) Helping relationships (HR)	

According to Table 1, consciousness raising should be applied in the early stage from the precontemplation to the contemplation stage. Theoretical, empirical and practical mistakes could be occurred when applying unmatched processed and stages. Across TTM processes, one of the empirical studies involved TTM-tailored experts' system communication managing that increased the effectiveness of the intervention. People in the precontemplation could receive feedback to raise the concern in change and help progress to the contemplation. Applying some strategies based on the TTM structure showed the potential to maintain participants on the intervention program better than the conservative method. It could indicate concerning or relying only on the beginning stage of change practically (Prochaska, 2013; Prochaska et al., 1992). To fulfill the research gap in the evaluation of money management intention, a self-rating measure based on the 6 processes of change to clarify university students' different strategic determinants of their money management was developed.

Method

All items were created based on the concept of 6 processes of change. They were developed in Thai language. The data were examined through 4 main steps: item reduction and item selection in step I, item confirmation in step II, concurrent validation in step III and convergent and discriminant validation in step IV. Undergraduate students were targeted because they were in the last studying period before entering the workforce. All 1,063 undergraduate students were selected by a simple random sampling technique and assigned to submit their answer through the online platform in their computer classroom during mid-2018 in step I to step III and at the beginning of 2020 through the paper-based questionnaire in step IV. They were from 3 public and 3 private universities in Bangkok and Nakorn Pathom provinces, Thailand. An uncompleted dataset was removed. The participants were recruited from step I to IV, respectively, not at the same time. Notes for step II, sample II and III were the same group of students because of applying test-retest reliability. The overall characteristics of the samples were presented in Table 2.

Table 2

Demographic information

Characteristics		Sample I (N = 116)[a]		Sample II (N = 260)[b]		Sample III (N = 229)[c]		Sample IV (N = 314)[d]		Sample V (N = 144)[e]	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%
Gender	Male	36	31.0	66	25.4	60	26.2	142	45.2	32	22.3
	Female	80	69.0	194	74.6	169	73.8	172	54.8	112	77.7
Age	< 20 years	44	37.9	209	80.4	191	86.4	187	59.6	20	13.9
	≥ 20 years	72	62.1	51	19.6	30	13.6	102	40.4	124	86.1
Financial Status	Loan	85	73.3	73	28.1	64	27.9	103	32.8	8	5.6
	Self-support	31	26.7	187	71.9	165	72.1	211	67.2	136	94.4

Note. a: participated in step II, b: participated in step III, c: participated in step III (for test-retest), d: participated in step III, e: participated in step IV

Step I: Item Reduction & Selection

The pool of 24 items designed covered the concept from the precontemplation stage to the preparation stage as an intention which included 5 cognitive and 1 behavior processes of change. The 40-item alcohol version and 40-item drug version were used as an item order guideline because they were ones of the validated and well-known TTM measures applying in various research settings and populations. Moreover, other measures developed in other field including financial, referred to these original versions (Prochaska et al., 1988; Tejero et al., 1997; Von Sternberg, 2005).

As shown in Table 3, each 4-item component represented each process of change. Notably, declarative statements, resented in both positive and negative meanings, were normally designed instead of negative statements. In content validation, the index of item object congruence (IOC) was used at this item development stage according to the acceptable

value of Turner and Carlson (2003)'s study. Three psychologists and 4 inter-disciplinary university lecturers were assigned to evaluate. The results revealed that items Q3, Q5, Q7, Q8, Q15, and Q19 indicated low scores. After discussing with the experts, items Q3, Q15, and Q19 were advised to be removed leaving the set of 21 items for validating in the next step. Toward rigor and parsimony, the content of those removed items seemed to uncover the cognitive processes. For example, Q15 seemed to be behavior, not an intention while Q3 and Q19 could be conceptually replaced by the other items within the same component. This step was a delicate combination of rational and empirical considerations.

Table 3

The original of the 24-item version based on the Transtheoretical Model

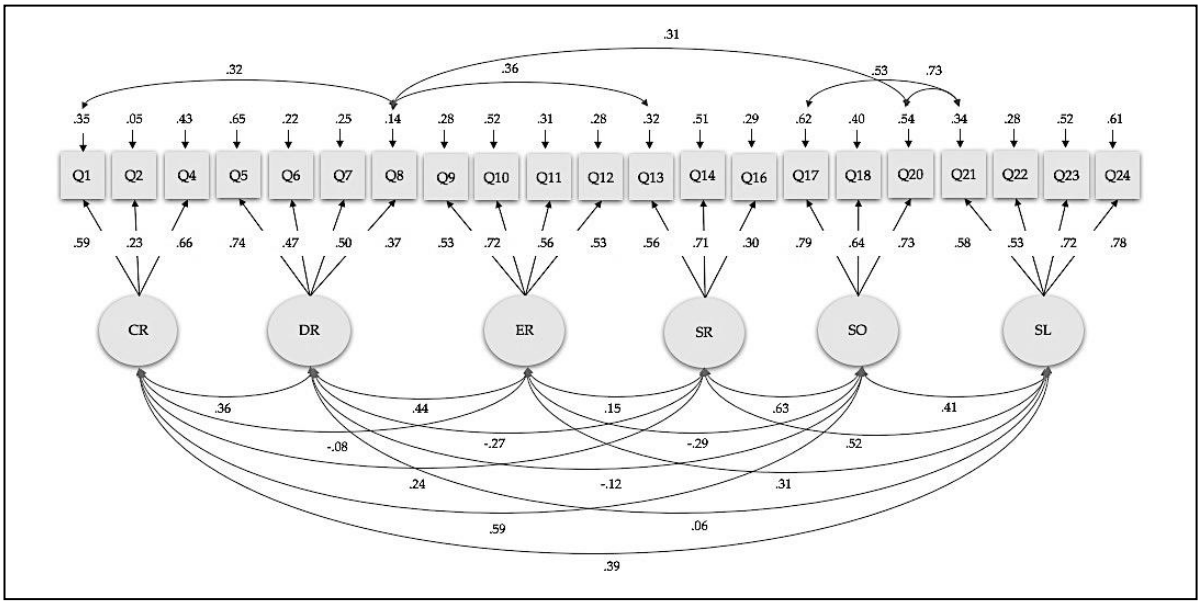
1.1 Cognitive Process	1.1.1 Consciousness Raising	Q1. I have ever found the method to control revenue & expenditure.
		Q2. I have known some methods of money management.
		Q3. I have ever heard of the money-saving method.
		Q4. I have received the news or media about money management.
	1.1.2 Dramatic Relief	Q5. Any story of an overspending person affects my mind.
		Q6. I am afraid to be a poor person in the future.
		Q7. Money management successors can be my role model.
		Q8. I feel happy when I imagine myself financially successful.
	1.1.3 Environmental Re-evaluation	Q9. I realize that having more income than spending is good for myself and the surrounding people.
		Q10. I realize that saving money is good for myself and others.
		Q11. I realized that financial planning helped me to have enough income.
		Q12. I realize that financial planning can help me to have my own savings.
	1.1.4 Self-Reevaluation	Q13. I feel good if I am known as the one who knows how to use the money appropriately.
		Q14. I feel bad if I am in debt.
		Q15. I feel good when I have my own savings.
		Q16. I feel bad when someone sees me as an extravagant person.
	1.1.5 Social Liberation	Q17. I found some role models who can be my examples of systematic financial management.
		Q18. I found that a teenager like me could create a financial plan.
		Q19. I found that working-age adults could face a problem if their financial management is not good enough.
		Q20. I found that people of all ages can have left over money, if you know the availability of financial plans.
1.2 Behavioral Process	1.2.1 Self Liberation	Q21. I began to think of scheduling financial planning.
		Q22. I started spending money on my own.
		Q23. I started creating short-term goals to keep my savings.
		Q24. I started to be confident in myself that I could make a good money plan.

To confirm the item selection from IOC, 116 undergraduate students, sample I, received the pool of 21-item version with 5 Likert-scale as the preliminary study. This number of samples covered the minimum sample size that could determine the power of this primary step of study theoretically. The item indicating problematic corrected item-total correction item or alpha higher if deleted was considered to be removed. Confirmatory factor analysis (CFA) using maximum likelihood estimation was analyzed to propose the good model fit judgment based on the following indices: *CFI* and *GFI* greater than .90 and *RMSEA* around .06 or lower, χ^2/df lower than 3, better with ≤ 2 (Diamantopoulos & Winklhofer, 2001; Hair et al., 2010).

Generally, the internal consistency of 21 items was acceptable. Cronbach's alpha estimated the reliability at .74. Corrected item – total correlation ranged from .15 (Q6) to .54 (Q21). Dropping items Q6 and Q9 could improve alpha value slightly. In CFA analysis, we compared the alternative models in terms of model fit. The fits for the initial 21-item version were less acceptable with factor loading lower than .30 in items Q2 and Q16. Consequently, 5 observed variable error pairs were set the correlation free. The fit generally improved, but still indicated more and less acceptable, showing $\chi 2$ = 322.06, *df* = 169; *CFI* = .76; *GFI* = .79; *RMSEA* = .08. The judgment was based on the general rule of thumb that this first alternative model of the 21-item version did not fit with the data as shown in Figure 1. Based on this results, item Q6, Q12 and Q22 were removed because of low loading factors, but item Q9 was kept in the item pool. The reason was a part of those items addressing environmental re-evaluation. Item Q16 was also kept because it was considered a negative outcome of self-refection in self re-evaluation. These 2 items would not be covered by the others if they were discarded. The remanding 18 items were regarded as the alternative set of selected items.

Figure 1

CFA estimation of the 21-item modified model



Step II: Items Confirmation

The 18 items were validated again by 2 experts. For better performance, the experts suggested indicating the specific time according to the TTM stages of behavior change. This addition could show dynamic movement from one stage to another stage as the following.

The revised 18-item version structure and properties were mainly examined in this study. To make the set of 18 items more practical in implication, we decided to indicate the stages in this revised version for identifying progress toward termination as the following: never or ever in the past 6 months for CR, DR, ER, and SO (items Q1 - Q12) to the immediate future within the next 30 days for SR and SL (items Q13 - Q18). All 260 students from other universities, sample II, completed the 18-item version. In the test – retesting method, 260 students were required to return the same questionnaires after 4 weeks. The returned response rate was 88.07% or 229 samples, identified as sample III.

Under the same judgment criteria, CFA estimation values of the revised 18 items showed higher acceptable fit indices than the previous study. It indicated that the factor loading values ranged from .49 to .88. The overall squared multiple correlation values were medium-to-high, indicating the lowest value at .20 (Q20) in Social Liberation and the highest at .87 (Q14) in self-reevaluation. When examining the fitness of the 18-item structure, it showed acceptable fit with the data $\chi 2 = 331.65$, $df = 115$; $CFI = .91$; $GFI = .87$; $RMSEA = .06$ as presented in Table 4. Cronbach's alpha measured across all components ranging from .66 (CR) to .84 (SL). The test-retest reliability revealed good-to-excellent in all components from .65 (CR) to .77 (SR); all $p < .001$. In conclusion, the revised 18-item version with the stage of behavior change indicators presented valid and reliable values. It was abbreviated form as MMIQ-TTM, and it would be validated with other self-rating questionnaires in the next step.

Table 4

CFA estimation of 18-item MMIQ-TTM

Latent	Manifest	β	*SE*	*t*	R^2
Consciousness	Q1	.88			.69
raising	Q2	.53	.08	7.36**	.64
	Q4	.49	.08	6.85**	.69
Dramatic	Q5	.45			.43
raising	Q7	.81	.12	7.25**	.62
	Q8	.81	.11	7.23**	.53
Environmental	Q9	.82			.43
re-evaluation	Q10	.93	.05	18.01**	.32
	Q11	.67	.06	11.82**	.71
Self	Q13	.84			.45
re-evaluation	Q14	.57	.07	9.33**	.87
	Q16	.65	.08	10.95**	.67
Social	Q17	.73			.66
liberation	Q18	.78	.08	12.14**	.65
	Q20	.65	.08	10.11**	.20
Self	Q21	.83			.24
liberation	Q23	.80	.06	14.55**	.28
	Q24	.83	.06	15.39**	.77
18 items (TTM)					
χ2	331.65	*df*	115	*GFI*	.87
RMSEA	.06	*CFI*	.91	*TLI*	.88

Note. ** $p < .01$ (2-tailed)

Table 5

MMIQ-TTM subscale correlations, mean, SD and test-retest reliabilities

	TTM					*M*	*SD*	α[a]	*test-retest*[b]
	CR	DR	ER	SR	SO				
CR						3.69	.77	.66	.65
DR	.45**					4.19	.72	.71	.67
ER	.45**	.69**				4.32	.74	.83	.77
SR	.41**	.69**	.65**			4.12	.82	.76	.72
SO	.47**	.55**	.58**	.60**		4.00	.77	.77	.68
SL	.41**	.43**	.46**	.50**	.74**	3.82	.87	.84	.76

Note. ** $p < .01$ (2-tailed), a: analysis from sample II, b: analysis from sample III, CR: consciousness raising, DR: dramatic relief, ER: environment reevaluation, SR: self-reevaluation, SO: social liberation, SL: self-liberation

Step III: Concurrent Validation

This step focused on validation between the money management intention questionnaire and a related self-reported measure to address their concurrent validity. This study followed the scale development measuring monetary intention in Ksendzova et al. (2017) applied a personality test and another financial related measure. The criteria to select the measure in this step were measuring monetary management intention, valid measure testing among undergraduate students and original Thai language measure. Among the measures found in the Thai database, the limitations were that most measures questioned on behaviors holding the higher portion comparing between intention and behavior. Thus, Sereetrakul (2014)'s Saving Behavior Scale was selected as one of the common attitude-related prototypes in money management with higher portion in measuring intention, and it was developed among undergraduate students. Additionally, Dark Triad, a 3-trait human dark personality, is one of the researchers' interesting new paradigm in exploring several issues related to financial activities, for example, indebtedness, non-repayment and gambling (Almenberg et al., 2016; Boonroungrut et al., 2018; Boonroungrut et al., In Press 2020; Boonroungrut & Toe, 2017; Wang et al., 2011).

In brief, Furnham et al. (2013) pointed out that Dark Triad helped people "get ahead of" over "get along with." So, there were unethical behavior ways which were shown in several studies. In contrast, the dark personality seems to be positive with some variables, such as intelligent and physical attractiveness. Moreover, a review of Boonroungrut and Huang (2018) explained that individuals with higher narcissism scores trended to approach financial loans in general. Individuals with high psychopathy and narcissism scores always presented a problematic relationship with planning ability. They were at risk in investment to gain financial success faster, and it was a risk factor to run up debt (Foster et al., 2009). Similarly, individuals with higher psychopathy could not make a decision effectively, and they seemed to show impulsive behavior in spending. Machiavellianism higher score persons presented less risk to run up debt from their long-term selfish (Jones & Figueredo, 2013). They showed the ability in planning better than another trait. Machiavellianism was against extroversion; it defined as a personal saving and supportive factor to be at less risk in debt from spending behaviors (Jones, 2013).

Participants

A total of randomly selected 314 undergraduate students, sample IV, completed 3 measures including MMIQ-TTM, Saving Behavior Scale and Short Dark Triad (SD3-TH) through the online platform. Apart from Table 2, 42.3% were from Art, Law & Politics, and Social Sciences while 57.7% from Medicine, Mathematics, and Sciences.

Measures

Saving Behavior Scale was developed in the Thai urban context. This self-reported 17-item questionnaire was 5-Likert scales from 1 (strongly agree) to 5 (strongly disagree) questioning in 3 attitude components: 6 items in saving, 3 items in indifference and 8 items in spending. The original Cronbach's alpha reliability was acceptable at .69, .73, and .64 respectively. Notably, although this scale was called saving behavior in Thai, most of the items were on intention and attitudes. The examples of the items were "I am interested in finding ways to save money in various methods." or "I think that money is for using, not for keeping." (Sereetrakul, 2014).

Short Dark Triad (SD3-TH) was 15 items questioning in 3 dark personality traits: Machiavellianism, narcissism, and psychopathy using the 5-Likert scale. In the translated version, 2 items: Machiavellianism and psychopathy, were reconstructed. The Cronbach's alpha reliability of the Thai version was .87, .73, and .80 respectively (Boonroungrut & Huang, 2018).

Results

As noted in Table 6, each MMIQ-TTM subscale indicated the strongest correlations between saving and ER at .81 and the lowest between spending and SL at .18. However, indifference attitude showed strong correlations surprisingly with all MMIQ-TTM counterparts ranging from .62 (CR) to .83 (SL). In contrast, the SD3-TH showed a more modest correlation with MMIQ-TTM, ranging from .13 (psychopathy) to .55 (Machiavellianism). Machiavellianism was the strongest correlation among 3 Dark Triad traits. In sum, all MMIQ-TTM measures showed a clear correspondence with those supportive variables.

Table 6

Concurrent validation analysis

	M (*SD*)	α	MMIQ-TTM					
			CR	DR	ER	SR	SO	SL
Saving Scale								
Saving	3.69 (.89)	.91	.59**	.76**	.81**	.73**	.77**	.79**
Indifference	3.67 (.90)	.71	.62**	.70**	.77**	.78**	.79**	.83**
Spending	3.02 (.78)	.84	.31**	.27**	.24**	29**	.19**	.18**
Short Dark Triad (SD3-TH)								
Machiavellianism	3.31 (.78)	.81	.43**	.50**	.54**	.48**	.48**	.46**
Narcissism	3.01 (.85)	.88	.21**	.38**	.31**	.30**	.31**	.28**
Psychopathy	2.79 (1.0)	.90	.18**	.15**	.13**	.19**	.18**	.18**

Note. **: $p < .01$ (2-tailed), CR: consciousness raising, DR: dramatic relief, ER: environment reevaluation, SR: self-reevaluation, SO: social liberation, SL: self-liberation

Step IV: Convergent and Discriminant Validation

This step aimed to define the convergent and discriminant validity of MMIQ-TTM. To access the convergent validity, factor loading, *t*-values of the items, composite reliability (CR), and variance extracted (AVE) and correlation among MMIQ-TTM constructs were analyzed. To access discriminant validity, the Fornell and Larcker criterion (1981) among MMIQ-TTM constructs were addressed. The AMOS with Master Validity Tool plugin (Gaskin & Lim, 2016) was applied.

Participants

A group of randomly selected 144 undergraduate students, sample V, completed the MMIQ-TTM. All samples were studying in the 3rd and 4th years. They were 7 3 .3% from education, and 36.7% from other majors. Notably, the data in this step was collected at the beginning of 2020.

Procedures

To define sufficient convergent validity, the criteria of Carlson and Herdman (2012), Hair et al. (2007), and Fornell and Larcker (1981) were applied. In sum, convergent validity was examined by factor loading, composite reliability (CR), and variance extracted (AVE). All items should declare the factor loading higher than .50. All *t*-value should be significant and > ± 1.96. The AVE and CR values should exceed .50 and .70 respectively, or AVE could be accepted at .04 when CR was higher than .60. Importantly, the CR value should be higher than the AVE. To define the adequate discriminant validity, the square root of the AVE among MMIQ-TTM constructs was compared. The Maximum Shared Variance (MSV) should be lower than the AVE value of the target constructs.

Results

The results from the analysis presented that the factor loading ranged from .54-.82 and *t*-values were above the critical point. The AVE was examined presenting values ranging from the acceptable limit .40 (SR) to .64 (ER). The CR was examined presenting values ranging from .65 (SR) to .84 (ER). The CR values were higher than AVE in all constructs which met the recommended criteria of the convergent validity.

To define the adequate discriminant validity, the square root of the AVE between MMIQ-TTM constructs was compared. The results presented that the square root of the AVE of MMIQ-TTM was ranging from .63 (SR) to .80 (ER). The correlations between those constructs were significantly positive; however, they were lower than the square root of the AVE in all constructs. The Maximum Shared Variance (MSV), presenting < .01 in all constructs, was lower than the AVE values. The findings from this analysis ensured that the discriminant validity was met.

Discussion

The study has provided support for MMIQ-TTM implication in general university students. All subscales showed good reliability in all four sub-groups of samples. When applying the test-retest over 4 weeks, the measures possibly indicated a chang from

immediate future to preparation stages. Although, integrating TTM to some activities seemed to be difficult because of its complexity of stage discriminated identification, MMIQ-TTM in this study showed good validity. That is, it demonstrated the alternative structures for describing students' money management intentions.

The critique of the poor CFA performance in step I might be attributed to the complexity of its stage identification in applying the model. The 6 processes of change in this study seemed to measure better when duration was specified in each process, over 6 months to 30 days before any actions; however, the exact time integration between the processes and stages from the model developers was unidentified. This was the only suggestion from the TTM developers. Nevertheless, there was a question of how researchers integrate all processes into 5 stages of behavior change properly (Prochaska, 2013; Prochaska & Velicer, 1997). Some areas of behavior indicated the same complicated situations, such as in dietary (Mastellos et al., 2014; Mhurchu at al., 1997) and clinicians' perceptions (Vilela et al., 2009). Although the assumption of the model showed that people generally make a plan with their logical decision-making processes, it is not always accurate due to humans' far too complex behavior. Admirably, this study illustrated the benefit of integrating the processes and stages of behaviors in explaining the intention of managing money. Thus, the findings supported a critical assumption of the developer of TTM with emphasized processes at specific stages to maximize efficacy although some studies reported the soundness of using processes of change without emphasizing different stages of change such as in heroin addicts (Prochaska, 2013; Tejero et al., 1997). This gap of knowledge still requires basic research.

In the correlation study, ranging medium-to-high on average, social liberation and self-liberation, showed the highest values; on the contrary, consciousness raising indicated the lowest value among the TTM measures. Surprisingly, consciousness raising, which increases concrete awareness raising of the problematic cause, consequence, and cures, was expected to show association as same as another 4 cognitive processes, but it only pointed out low-to-medium. It was also ranked as the lowest variable in this study. Some education related-studies indicated the same situation with consciousness raising, for example, the therapeutic education study among patients with obesity. It reported the lowest points in consciousness raising in all groups of patients from the beginning, sustained, and inaction groups (Romain et al., 2014). Massey et al. (2015) also found the lowest values of consciousness raising in the precontemplation stage, and it declared no significant differences between the contemplation and the action stages. Importantly, consciousness raising presented the lowest point in the test-retest reliability testing. In this point, Nidecker et al. (2008) explained the critical solutions that people might begin using the processes of change and be aware of negative impacts in their change progress during contemplation instead of precontemplation. These could be one of the concerning points when adapting consciousness raising in the first stage of change in any target behaviors.

No previous study directly tested the relationship between those measures in step III. This study would be advantageous to the literature with some discussed points. One interesting finding was that the MMIQ-TTM measure shared a positive direction with saving and lower positive in spending logically; however, indifference, an unambitious person, who does not care about being rich or poor in the future, also shared a positive association with another measure suspiciously. Boonroungrut et al. (2018) found that individuals tended to be careless with money, especially with expenditure, when they had a higher saving in both Machiavellianism and narcissism. It might be a reason why indifference correlated with saving and spending components positively as same as the result in the present study.

Expectedly, Machiavellianism showed the strongest correlation among MMIQ-TTM measures. Straightforwardly, Machiavellianism performed ability in planning better than narcissism and psychopathy (Jones, 2013; Jones & Figueredo, 2013; Li-Ping et al., 2008; McLean & Jones, 1992). In the review of Rauthmann and Will (2011), it declared the evidence that Machiavellianism had a substantial shared-environment component to adjust to the surrounding environment whereas narcissism and psychopathy, originally in psychiatric diseases, seemed to be accounted by genetic and non-shared environmental factors (Jones & Paulhus, 2009). Thus, it was not surprising why Machiavellianism indicated the strongest association with those money management related variables in this study.

Regarding validation, the results showed that the correlation values were medium-to-high and significant. The point on the lowest limit AVE including the lowest CR value on self-reevaluation construct should be concerned in applying this measure although the test showed adequate to confirm convergent validity. The poor performance of Q14 might be the cause of this weakly acceptable limit point of loading in many study steps (Bacon et al., 1995), and it should be noted for any future study to apply or develop this measure. Furthermore, the discriminant validation represented by the square roots of the AVE was valid enough because the AVE values were higher than those construct correlation values and MSV.

Limitation, Implication and Conclusion

These findings highlighted the usefulness of 6 processes and 3 stages of the Transtheoretical Model of Change. The results indicated that those processes of change could be applied in money management intention in the 3 early stages before any management actions occur. There were some considerations. It was important to note for implication that consciousness raising process indicated participants' change perception well during the contemplation stage, not in the precontemplation stage. It presented less effective comparing with another process within the early stage of behavior change. Besides, there was no valid measures related to monetary intention in the past studies. The concurrent validation applied a measure in which some parts contained behavioral context. In implications, this measure could be used for indicating students' cognitive stages before providing any money management training program, especially for loan students under Thai Student Loan Fund. In conclusion, the MMIQ-TTM scale, measuring money management intention, was valid and reliable among undergraduate students. It contains 18 items in 6 components scoring separately.

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