

Development of the Theory of Planned Behaviour Questionnaire: Students' Career Choices in STEM

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Abstract: Much effort has been invested to drive students' career choices in the fields of science, technology, engineering and mathematics (STEM), however the targeted outcome of the effort has not yet been fully achieved. The understanding towards the students' career choice intention in STEM is scarce despite the great importance to identify students' career choices. This suggests that there is a need to improve the measurement of the factors in the Theory of Planned Behaviour (TPB) to better explain students' intention towards deciding STEM career choices. Therefore, the objective of the current paper study is to develop a TPB questionnaire to assess secondary school students' career choices in STEM. Questionnaire measures the factors that influence career choices among students in STEM namely attitude towards career choice, subjective norm, perceived behavioural control, and career choice intention. The development of the questionnaire involved three pilot tests, namely Study 1 ($n = 56$), Study 2 ($n = 32$), and Study 3 ($n = 45$). Multiple modifications were done based on the pilot test results to improve the questionnaire so that it is apt for the target sample of the research and suitable for the context of the research. Further research can be done using confirmatory factor analysis and provide external evidence of validity for the questionnaire. This is essentially important as it would help the researchers to develop a valid and reliable research instrument to measure students' career choices in STEM.

Keywords: Theory of Planned Behaviour, Career Choices, STEM, Secondary Schools

1. Introduction

Career choice is unique across individuals in terms of what occupation each individual opts to pursue in life (Lau et al., 2018). According to Razali et al. (2017), there is a high demand for talents in the fields of science, technology, engineering and mathematics (STEM). It is reported that the demand for STEM workers is much higher than other fields in which 80% of the vacancy in the American industries are from the STEM sectors (Razali et al., 2017). Similarly, it was estimated that Malaysia would need eight million people to fill the STEM sectors by 2050 (Academy of Sciences Malaysia, 2017).

In view of the crucial need for STEM workers in the global and local industries, the Malaysian Ministry of Education (MoE) has mapped out a detailed plan in its education blueprint to produce sufficient human capital for the STEM workforce (MoE, 2013). The MoE is aware that students should be educated about career opportunities in STEM in secondary schools. In Malaysia, the STEM curricula in the education system encompass subjects such as Technical Communication Graphics, Medical, Biochemistry, Computing and Information Systems, and Computer Science (Shahali et al., 2017).

The MoE also creates awareness about STEM among students in secondary schools to expose them to the career choices in STEM related industries (MoE, 2013; Razali et al., 2017; Shahali et al., 2017). In the effort to prepare students for STEM careers, the MoE works closely with the private sectors and other government agencies on the complementary STEM initiatives via the National STEM Action Plan (Shahali et al., 2017). The main purpose of these initiatives is to amplify STEM awareness and the diversity of career opportunities in STEM, and to bridge the gap between STEM demand and supply in Malaysia (Shahali et al., 2017).

Outreach Programmes and STEM Mentor-Mentee Programmes are among of the most widely implemented STEM initiatives to increase students' exposure to STEM careers. These programmes are

normally done in collaboration with STEM related agencies and tertiary institutions (Shahali et al., 2017). Besides, there are also other complementary STEM initiatives such as School-Parents Collaboration, STEM conference and colloquiums, and volunteering programmes that involve teachers, parents, educators, industry players and the public. These initiatives do not only focus on students, but also to create STEM awareness among parents and teachers who are important in students' career choices. This also provides platforms for them to be better informed about STEM career opportunities so that they could also play a part to encourage students' involvement in the STEM workforce in the future (Shahali et al., 2017).

Although much effort has been invested to drive students' career choices in STEM, the targeted outcome of the effort has not yet been fully achieved (Academy of Sciences Malaysia, 2017; MoE, 2013; Shahali et al., 2017). In contrast to the initiatives to promote STEM at school level, the number of students in STEM also has dropped since 2010 (Chin, 2017). Therefore, align with the effort of the Malaysian education system to create a STEM-oriented learning environment to produce more STEM talents, there is a need to understand the reasons that lead the students to choose a career more precisely. The theory of planned behaviour (TPB) is among the most prevalent theories that has been widely used to measure students' career choices (Bidin et al., 2012; Sieger & Monsen, 2015; Solesvik, 2011; Wen et al., 2018).

However, the understanding towards the students' career choice intention in STEM is scarce despite the great importance to identify students' career choices. TPB is very much established to assess students' career choices, but it is argued that TPB might not be ideal in all empirical settings (Sieger & Monsen, 2015). According to Sieger and Monsen (2015), although TPB has been widely used across different settings, it remains unclear whether setting variations would affect the usage of the TPB questionnaire particularly for career choice intentions. This suggests that there is a need to improve the measurement of TPB to better explain students' intention towards making STEM career choices (Sieger & Monsen, 2015). As such, this study aimed to develop a TPB questionnaire to assess secondary school students' career choices in STEM.

2. Literature Review

The TPB as shown in Figure 1 is one of the most widely used theoretical models that explains an individual's goal to execute certain behaviour (Ajzen, 1991). Bidin et al. (2012) suggested that TPB is an intention-based model which is powerful in explaining behaviour via intention. The TPB consists of three determining factors of intention, namely attitude, subjective norm and perceived behavioural control (Ajzen, 1991).

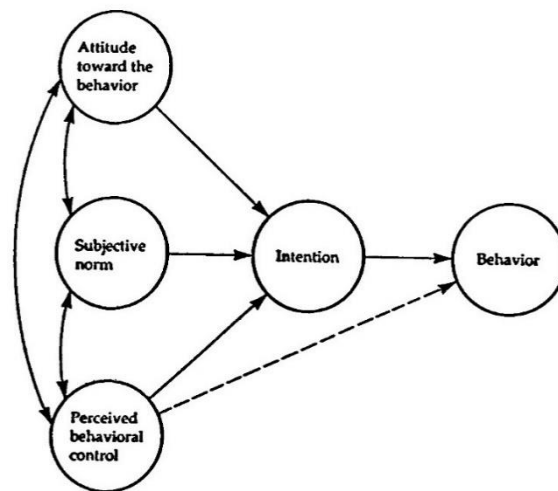


Figure 1. Theory of planned behaviour (TPB), retrieved from Ajzen (1991).

In Ajzen (1991), intention is described as an accurate predictor of actual behaviour in the TPB. In TPB, intention refers to how hard a person is willing to put effort and attempt to execute a particular behaviour (Ajzen, 1991; Bidin et al., 2012). González et al. (2012) defined intention as an individual's decision to perform a behaviour in the future. In this study, intention is operationalised as career choice intention to indicate students' plan to choose a STEM career in the future.

Intention is in turn influenced by attitude, subjective norm and perceived behavioural control. According to Ajzen, attitude refers to an individual's evaluation (positive or negative) towards a behaviour and its outcome. Bidin et al. (2012) explained that attitude is determined by a person's beliefs about the expected outcomes resulting from the intentional behaviour. The present study specifies attitude in TPB as attitude towards career choice to indicate students' student's positive or negative evaluation of their intention of choosing a career in STEM.

The second determinant of intention is subjective norm (Ajzen, 1991). Subjective norm is described as a person's perception of the judgement or expectations of important people in their lives (Ajzen, 1991; Bidin et al., 2012). In other words, it refers to the social pressure that an individual perceives from people around them such as family members, teachers and peers upon performing a certain behaviour. In this study, subjective norm can be denoted as students' perception concerning the judgement of parents, teachers and friends towards their career choices in STEM.

Perceived behavioural control is defined as the perceived ability to conduct a behaviour (Ajzen, 1991). It is referred to as a person's confidence and sense of control over his ability to perform the behaviour (González et al., 2012; Wen et al., 2018). Hence, perceived behavioural control in this study can be explained as a student's perception on the degree of easiness and difficulty, as well as confidence and perceived ability in choosing a career in STEM.

In the literature, most of the studies done using TPB were based on the guidelines provided by the TPB author to construct TPB questionnaire (Ajzen, 2002). It has been a common practice that the TPB scales have been repeatedly adopted and adapted based on the respective needs and contexts of their research according to Ajzen's guidelines. Besides Ajzen (2002), Francis et al. (2004) also provided a detailed manual on how to design a TPB questionnaire. In the manual by Francis et al. (2014), a comprehensive explanation on the TPB psychometrics properties is clearly stated with a step-by-step guideline on how to develop a TPB questionnaire (González et al., 2012).

According to González et al. (2012), TPB has strong empirical evidence to support the relationship between the variables in the TPB and career choices. TPB is one of the most prevalent theories that has been widely employed in a wide range of research areas because it is a practical theory that can be applied in various contexts (Bidin et al., 2012). This theory is particularly popular in research contexts such as education, marketing, banking and finance, information technology, and healthcare (Warsame & Ireri, 2016; Guo et al., 2019). Likewise, there are also many studies in the literature that used TPB in the context of career choices (Shevlin & Millar, 2006; Bidin et al., 2012; Sieger & Monsen, 2015; Wen et al., 2018).

In Malaysia, many studies have also been carried out using TPB in their investigation on topics pertaining to career choices. However, most of these studies in the literature are conducted in the context of entrepreneurship among students from higher learning institutions (Ambad & Dami, 2016; Ariff et al., 2010). The present study argues that the sample of this study is unlike those in the literature, they are adolescents at the secondary school level and students studying in Malaysian secondary schools. Given that there are no specific rating scales that measure students' STEM career choices in Malaysia using the TPB questionnaire, developing the instrument using the samples from the Malaysian student context would be much meaningful to overcome the contextual differences.

Hence, this study aimed to develop a TPB questionnaire that measures the factors that influence career choices among students in STEM that entails the constructs, namely attitude towards career choice, subjective norm, perceived behavioural control, and career choice intention. This questionnaire was developed based on the guideline recommended by the author of TPB in Ajzen (2002) as well as the manual by Francis et al. (2004). In this study, three independent pilot tests (Study 1, Study 2, & Study 3) were conducted to develop the TPB questionnaire for STEM career choices among Form Four secondary school students in Malaysia.

3. Development of TPB Questionnaire for Students' STEM Career Choices

The initial draft of the TPB questionnaire for students' career choices in STEM was designed according to the manual and guideline provided by Ajzen (2002) and Francis et al. (2004). The construct items in the questionnaire were formed based on the variables in the TPB by referring to the guidelines and incorporating the context of this research. It was subsequently reviewed and evaluated by three experts in this field of research with reference to the definitions of the terms and objectives of the research for its content validity. The experts commented on the items and scales to ensure they are suitable for this study and its respondents and changes were done accordingly. Table 1 shows the reliability test results of the three pilot tests. The internal consistency of the scales is presented according to each pilot study to show the development of the questionnaire at each stage, and how each scale was carefully amended after each of the pilot tests .

Scales	Study 1		Study 2		Study 3	
	Number of Items	Cronbach's Alpha	Number of Items	Cronbach's Alpha	Number of Items	Cronbach's Alpha
Attitude towards Career Choice (ACC)	9	.85	9	.87	6	.86
Subjective Norm (SN)	20	.85	19	.93	15	.91
<i>General</i>	5	.06	4	.68	-	-
<i>Teachers</i>	5	.77	5	.82	5	.73
<i>Parents</i>	5	.74	5	.84	5	.85
<i>Friends</i>	5	.76	5	.86	5	.92
Perceived Behavioural Control (PBC)	9	.82	8	.94	6	.85
Career Choice Intention (CCI)	8	.97	7	.97	4	.89

Table 1. Reliability Test Result for the Questionnaire in Study 1, Study 2 and Study 3

3.1 Study 1

Study 1 was conducted in two schools located in Kuala Lumpur, Malaysia. A total of 56 Form Four students aged 16 years old completed the questionnaire. Among the respondents in this study, 39 of them were males (69.60%) and 17 were females (30.40%). The initial TPB questionnaire used in Study 1 consisted of 46 seven-point Likert scale items, ranging from 1 (disagree) to 7 (agree). The questionnaire contained four sections with the TPB constructs, namely attitude towards career choice, subjective norm (general, teachers, parents and friends), perceived behavioural control, and career choice intention.

A reliability analysis was conducted for all the TPB constructs in Study 1 to test their internal consistency. In Table 1, the Cronbach's alpha coefficient values for attitude towards career choice ($\alpha = .85$), perceived behavioural control ($\alpha = .82$), and career choice intention ($\alpha = .97$) were above the recommended value of .70, hence these constructs had good internal consistency. Although the construct subjective norm shows a good overall reliability with $\alpha = .85$, one of its subscales, general subjective norm recorded extremely low Cronbach's alpha coefficient value at .06.

Improvements were done to the initial questionnaire used in Study 1 (as shown in Table 2) internal consistency of the respective constructs and resulted in the second set of TPB questionnaire for students' career choices in STEM which was used in Study 2.

3.2 Study 2

The second set of TPB questionnaire for students' career choices in STEM used in Study 2 is a result from Study 1. Study 2 was conducted in a school located in Selangor, Malaysia. A total of 32 Form Four students aged 16 years old completed the survey. Out of the total respondents from Study 2, 12 were male (37.50%) and 20 were female (62.50%) students.

In Study 2, the TPB questionnaire used contained 43 seven-point Likert scale items. Similar to Study 1, the questionnaire in Study 2 also comprised four sections with the TPB constructs, namely attitude towards career choice, subjective norm (general, teachers, parents and friends), perceived behavioural control, and career choice intention.

Table 1 shows the results of the reliability test for the questionnaire used in Study 2. As shown in the table, all constructs were statistically reliable. The values of Cronbach's alpha coefficient were all beyond the recommended threshold value of .70: attitude towards career choice ($\alpha = .87$), subjective norm ($\alpha = .93$), perceived behavioural control ($\alpha = .94$), and career choice intention ($\alpha = .97$).

However, the reliability of the subscale general subjective norm remained undesirable ($\alpha = .68$). Considering the subscale repeatedly showed low reliability in both Study 1 and Study 2, the general subjective norm was removed from the questionnaire. The TPB questionnaire for students' career choices in STEM in Study 2 was improved as shown in Table 2. As a result, the total number of items was reduced to 46 items. This resulted in the second set of TPB questionnaire for students' career choices in STEM which was used in Study 3.

3.3 Study 3

The third set of TPB questionnaire for students' career choices in STEM used in Study 3 is a result from Study 2. Study 3 was conducted in a school located in Johor, Malaysia. A total of 45 Form Four students aged 16 years old completed the questionnaire. The respondents consisted of 33 male (73.30%) and 12 were female (26.70%) students.

The TPB questionnaire used in Study 3 contained 31 five-point Likert scale items, ranging from 1 (disagree) to 5 (agree). Similar to Study 1 and 2, the questionnaire in Study 3 also encompassed four sections with the TPB constructs, namely attitude towards career choice ($\alpha = .86$), subjective norm ($\alpha = .91$), perceived behavioural control ($\alpha = .85$), and career choice intention ($\alpha = .89$). As shown in Table 1, subjective norm only had three subscales remained, namely teachers ($\alpha = .73$), parents ($\alpha = .85$), and friends ($\alpha = .92$). The revisions done to the questionnaire used in Study 3 were as detailed in Table 2.

As a result, all constructs and subscales in the TPB questionnaire for students' career choices in STEM in Study 3 were beyond the recommended threshold value for reliability. This indicates that all items in the questionnaire used in Study 3 had good internal consistency. Therefore, the TPB questionnaire for students' career choices in STEM in Study 3 is final and is considered empirically feasible to be tested for future research use and for further validation.

4. Discussion and Conclusion

This paper presents the development of a TPB questionnaire that measures the antecedents that influence students' STEM career choices. Table 2 depicts the summary of the development of the TPB questionnaire for students' career choices in STEM. As shown in the table, the development of the questionnaire involved three pilot tests, namely Study 1, Study 2 and Study 3. The table entails the modifications on the questionnaire including addition, removal, rewording, and rearrangement of items from Study 1 to Study 3.

Table 2. *Modifications of Constructs*

Scale	Questionnaire		
	Study 1 ($n = 56$)	Study 2 ($n = 32$)	Study 3 ($n = 45$)
	1 (Disagree) – 7 (Agree)	1 (Disagree) – 7 (Agree)	1 (Disagree) – 5 (Agree)

ACC1	Choosing a career in STEM is good.	Choosing a career in STEM is good.	A career in STEM is good.
ACC2	Choosing a career in STEM makes me feel good.	Choosing a career in STEM makes me feel good.	A career in STEM will make me feel good.
ACC3	I will feel happy if I choose a career in STEM.	I will feel happy if I choose a career in STEM.	A career in STEM will make me happy.
ACC4	Choosing a career in STEM is meaningful.	Choosing a career in STEM is meaningful.	A career in STEM is meaningful to me.
ACC5	If I choose a career in STEM, I will be respected.	If I choose a career in STEM, I will be respected.	A career in STEM will bring me respect.
ACC6	Good income from a STEM career is what I want.	Good income from a STEM career is what I want.	A career in STEM makes me feel proud.
ACC7	If I choose a career in STEM, I will have a good standard of living/lifestyle.	If I choose a career in STEM, I will have a good standard of living/lifestyle.	
ACC8	If I choose a career in STEM, I will be proud of myself.	If I choose a career in STEM, I will be proud of myself.	
ACC9	Making myself feel proud of my career choice in STEM is what I want.	Making myself feel proud of my career choice in STEM is what I want.	

Note	1. No modifications from ACC1 to ACC9.	1. Modifications <ul style="list-style-type: none"> i) Wording <ul style="list-style-type: none"> • ACC1 to ACC5 ii) Combination <ul style="list-style-type: none"> • ACC8 & ACC9 → ACC6 iii) Removal <ul style="list-style-type: none"> • ACC6 & ACC7 	
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	General	Teachers	
SN1	People who are important to me think that I should choose a career in STEM.	I need to choose a career in STEM because the people who are important to me want me to.	My teachers think that I should choose a career in STEM.
SN2	I need to choose a career in STEM because the people who are important to me want me to.	I feel under pressure when people who are important to me want me to choose a career in STEM.	My teachers think that I should choose a career in STEM, therefore I should do so.
SN3	I feel under pressure when people who are important to me want me to choose a career in STEM.	I feel under pressure when most people like me choose a career in STEM.	My teachers' advice is important to my career choice in STEM.
SN4	I feel under pressure when most people like me choose a career in STEM.	Many people choose a career in STEM, so I want to choose a STEM career too.	My teachers' teaching will encourage me to choose a career in STEM.
		Teachers	
SN5	Many people choose a career in STEM fields, so I want to choose a STEM career too.	My teachers think that I should choose a career in STEM.	My teachers' teaching will increase my interest to choose a career in STEM.
	Teachers		Parents

SN6	My teachers think that I should choose a career in STEM.	When it comes to choosing a career, I feel the need to do what my teachers think I should do.	My parents think that I should choose a career in STEM.
SN7	When it comes to choosing a career, I feel the need to do what my teachers think I should do.	I listen to my teachers' advice when it comes to choosing a career.	My parents think that I should choose a career in STEM, therefore I should.
SN8	I listen to my teachers' advice when it comes to choosing a career.	My teachers' teaching encourages me to choose a career in STEM.	My parents' advice is important to my career choice in STEM.
SN9	My teachers' teaching encourages me to choose a career in STEM.	My teachers' teaching improves my interest in choosing a career in STEM.	My parents encourage me to choose a career in STEM
Parents			
SN10	My teachers' teaching improves my interest in choosing a career in STEM.	My parents think that I should choose a career in STEM.	My parents' encouragement will increase my interest to choose a career in STEM
Parents		Friends	
SN11	My parents think that I should choose a career in STEM.	When it comes to choosing a career, I feel the need to do what my parents think I should do.	My friends think that I should choose a career in STEM.
SN12	When it comes to choosing a career, I feel the need to do what my parents think I should do.	I listen to my parents' advice when it comes to choosing a career.	My friends think that I should choose a career in STEM, therefore I should.
SN13	I listen to my parents' advice when it comes to choosing a career.	My parents encourage me to choose a career in STEM fields.	My friends' advice is important to my career choice in STEM.
SN14	My parents encourage me to choose a career in STEM fields.	My parents' encouragement improves my interest in choosing a career in STEM.	My friends encourage me to choose a career in STEM.
Friends			
SN15	My parents' encouragement improves my interest in choosing a career in STEM.	My friends think that I should choose a career in STEM.	My friends' encouragement will increase my interest to choose a career in STEM.
Friends			
SN16	My friends think that I should choose a career in STEM.	When it comes to choosing a career, I feel the need to do what my friends think I should do.	
SN17	When it comes to choosing a career, I feel the need to do what my friends think I should do.	I listen to my friends' advice when it comes to choosing a career.	
SN18	I listen to my friends' advice when it comes to choosing a career.	My friends encourage me to choose a career in STEM.	

SN19	My friends encourage me to choose a career in STEM.	My friends' encouragement improves my interest to choose a career in STEM.	
SN20	My friends' encouragement improves my interest to choose a career in STEM.		
	1. Modification i) Rearrangement • SN2 to SN20 → SN1 to SN19 ii) Removal • SN1	1. Modification i) Wording • SN6 to SN9, SN11 to SN14, SN16, SN17 & SN19 ii) Rearrangement • SN5 to SN19 → SN1 to SN15 iii) Removal • SN1 to SN4	
PBC1	I am confident that I can choose a career in STEM.	I am confident that I can choose a career in STEM.	I am confident I will be able to choose a career in STEM.
PBC2	Choosing a career in STEM is up to me.	For me to choose a career in STEM is easy.	I think it is easy for me to choose a career in STEM.
PBC3	For me to choose a career in STEM is easy.	I expect that I will have the ability to choose a career in STEM.	I expect myself to have the ability to choose a career in STEM.
PBC4	I expect that I will have the ability to choose a career in STEM.	Having the ability would enable me to choose a career in STEM.	I have good ability to choose a career in STEM.
PBC5	Having the ability would enable me to choose a career in STEM.	I expect that I will get good academic results to choose a career in STEM.	I have the self-confidence to choose a career in STEM.
PBC6	I expect that I will get good academic results to choose a career in STEM.	Performing well in academic would enable me to choose a career in STEM.	It is under my control to choose a career in STEM.
PBC7	Performing well in academic would enable me to choose a career in STEM.	I expect that I will have the self-confidence to choose a career in STEM.	
PBC8	I expect that I will have the self-confidence to choose a career in STEM.	Having the self-confidence would enable me to choose a career in STEM.	
PBC9	Having the self-confidence would enable me to choose a career in STEM.		
Note	1. No modification on PBC1. 2. Modification i) Rearrangement • PBC3 to PBC9 → PBC2 to PBC8 ii) Removal • PBC2	1. Modification i) Wording • PBC1 to PBC4 ii) Combination • PBC7 & PBC8 → PBC5 iii) Removal • PBC5 & PBC6 iv) Addition • PBC6	

CCI1	I aim to choose a career in STEM.	I aim to choose a career in STEM.	I will choose a career in STEM.
CCI2	I plan to choose a career in STEM.	I plan to choose a career in STEM.	I intend to choose a career in STEM.
CCI3	I will choose a career in STEM.	I will choose a career in STEM.	I aim to choose a career in STEM.
CCI4	I am going to choose a career in STEM.	I am going to choose a career in STEM.	I plan to choose a career in STEM.
CCI5	I guess I would choose a career in STEM.	I guess I would choose a career in STEM.	
CCI6	It is likely that I will choose a career in STEM.	I expect to choose a career in STEM.	
CCI7	I expect to choose a career in STEM.	There is a high possibility that I will choose a career in STEM.	
CCI8	There is a high possibility that I will choose a career in STEM.		
Note	1. No modification from CCI1 to CCI5 2. Modification i) Rearrangement • CCI7 → CCI6 • CCI8 → CCI7 ii) Removal • CCI6	i) Modification i) Wording • CCI4 ii) Rearrangement • CCI1 → CCI3 • CCI2 → CCI4 • CCI3 → CCI1 • CCI4 → CCI2 iii) Removal • CCI5 to CCI 7	

This paper focuses on the process of developing the questionnaire, that is, how the items and scales in the questionnaire were carefully adapted, modified and revised in each pilot test. It is important to adapt and modify the questionnaire according to the context of this study in line with the research objective to guarantee the questionnaire matches the comprehension level of the targeted respondents (Survey Research Center, 2016). The items were modified according to the results from the reliability tests in each pilot test. When the internal consistency of the scales could be improved after item modifications, the relevant items were remained. On the other hand, if the reliability of a scale remained below the recommended threshold value at .70 after item modifications, the relevant items were removed. The modifications were done based on the pilot test results to improve the questionnaire so that it is apt for the target sample and the context of the research.

As aforementioned, the understanding towards the students' career choice intention in STEM is scarce despite the need to address students' career choices. This paper is an initiative develop a TPB questionnaire to measure the factors that better explain students' intention towards deciding STEM career choices. This study definitely provides a separate new context specific questionnaire with contextual details in Malaysia setting compared to TPB to assess students' career choices in STEM. This would offer insights to not only local policy makers and stakeholders, but also add to the literature on how STEM is positioned across different contexts. As such, factors that influence students' career choices in STEM could be emphasised in consideration of educational decisions, policy making and strategy planning in relation to STEM education.

There are also limitations to be addressed in this study. The data in the three pilot tests were collected through self-reported surveys which could have caused common method variance. Subsequent research employing a qualitative approach such as cognitive interview could help to provide a more comprehensive and in-depth understanding of the questionnaire developed. Besides, this paper only reported the initial stage of the questionnaire development, hence further research can examine the

psychometric aspects of the questionnaire. Further research could be done using confirmatory factor analysis and provide external evidence of validity for the questionnaire that would help the researchers to develop a more valid and reliable research instrument to measure students' career choices in STEM. Consequently, it can be concluded that the results of the current study could be used for scale validation in the future research to assess students' career choice in STEM. The validated questionnaire will be useful to investigate secondary school students' career choices particularly in the STEM fields.

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