

## ORIGINAL ARTICLE

## DISCOVERING THE FACTORS OF COVID-19 VACCINE HESITANCY AMONG MALAYSIAN PARENTS USING THE 5C MODEL

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## ABSTRACT

Vaccine hesitancy (VH) among parents has existed even before the onset of the COVID-19 pandemic. The fast-tracked COVID-19 vaccine development has accentuated vaccine hesitancy among parents globally. This study aimed to discover the factors of COVID-19 vaccine hesitancy among Malaysian parents with children aged 17 and below using the 5C model proffered by WHO. A quantitative, cross-sectional online survey was conducted using questions adapted from previous studies. The data obtained were analysed using the SmartPLS (Version 3.3.3) software which generated the measurement and the structural models. There was a strong positive relationship between complacency, confidence, and constraints and vaccine hesitancy (VH) with the  $t$  and  $p$  values being  $t=3.454$ ;  $p=0.001$  for complacency,  $t=8.556$ ;  $p=0.000$  for confidence and constraints  $t=3.117$ ;  $p=0.002$ . Calculation and collective responsibility had no strong positive relationship towards VH based on the respective  $t$  and the  $p$  values. These findings show that the respondents displayed VH towards COVID-19 vaccines as they have low awareness about the benefits of vaccination, lack of trust in healthcare professionals, and unwillingness to travel or wait for the COVID-19 vaccines apart from being concerned about the safety and efficacy of the COVID-19 vaccines. Although there are limitations to this study, vaccine hesitancy among parents remains to be a concern in Malaysia due to the severity of COVID-19 among children. The findings in this study are in consensus that more efforts must be taken by the Ministry of Health Malaysia (MOH) and other related stakeholders to increase the level of vaccine acceptance towards the COVID-19 vaccines in children in Malaysia.

**Keywords:** Covid-19 vaccines, 5C Model, Vaccine Hesitancy, Parents

## INTRODUCTION

A vaccine is a pharmacological compound that improves an individual's immunity to a specific disease<sup>1</sup>. Although vaccines have eradicated various infectious diseases, the occurrence of the anti-vaccine movement has led to vaccine hesitancy causing the re-emergence of the once eradicated diseases<sup>2</sup>. According to the SAGE (Strategic Advisory Group of Experts) Working Group on Vaccine Hesitancy, vaccine hesitancy (VH) is the delayed acceptance or vaccination refusal even with the available vaccination services<sup>3</sup>. VH is a growing global problem that has been accelerated by the expansion of social media platforms. These platforms have been used unscrupulously by non-supportive organizations, groups, and individuals to misinform the public regarding the safety and efficacy of vaccines leading to decreasing rate of vaccination<sup>4</sup>. VH has been reported to be higher in developed countries compared to developing countries due to safety concerns<sup>5</sup>. According to the Wellness Global Monitor, the percentages of VH in developed countries such as Western Europe, Eastern Europe, North America, and Northern Europe are 59%, 50%, 28% and 27% respectively which are higher compared to South Asia and Eastern Africa which are 5% and 8% respectively<sup>5</sup>. Kalok et al., (2020) reported that 8% of 1081 urban pregnant women in Malaysia

who received antenatal care, were vaccine-hesitant<sup>6</sup>. In an unrelated study in Kuala Lumpur, Malaysia, 14.5% of the parents showed VH towards various vaccination<sup>7</sup>. One of the models proffered by SAGE WHO to investigate VH in global populations is the 5C model which looks into five factors; constraints, calculations, confidence, complacency, and collective responsibility<sup>8</sup>. Three cross-sectional studies conducted in Germany using the 5C model showed that the elderly were under-vaccinated due to high complacency and lack of confidence<sup>9</sup>.

The current COVID-19 pandemic caused by the novel coronavirus, SARS-CoV-2 has affected the global population in many devastating ways. Several fast-track COVID-19 vaccines have been developed by India, the United States, and Germany to achieve nationwide-herd immunity<sup>10</sup>. There are 30 vaccine candidates in clinical trials<sup>11</sup>. The COVID-19 vaccines that are currently being administered in Malaysia under the National Vaccine Programme are Pfizer-BioNTech, AstraZeneca and Sinovac while many more are expected to be added to this list to achieve herd immunity by the end of 2021<sup>12,13</sup>.

Due to the severity of the pandemic, CDC has recommended the administration of the COVID-19 vaccines in children<sup>14</sup>. Singapore is one of the

first Asian countries to immunize children aged 12 and above<sup>15</sup>. Malaysia has rolled out its vaccination programme among children aged 12 to 17 years using the Pfizer-BioNTech Covid-19 vaccine beginning October 2021<sup>16</sup>. This commenced with Sarawak the largest state in Malaysia<sup>17</sup>. This was then followed by the National COVID-19 Immunisation programme for children (PICkids) which started in February 2022<sup>18</sup>. Despite the rigorous efforts to vaccinate children, only 29.9% of the 4 million children in Malaysia have received the first dose of the COVID-19 vaccine<sup>19</sup>. The Ministry of Health (MOH) of Malaysia acknowledges that the low rate of acceptance of vaccination is mainly attributed to vaccine hesitancy among the parents which could be due to the lack of studies on the possible side effects of the COVID-19 vaccines in children aged 17<sup>19,20</sup>. This is because the COVID-19 vaccines are fast-track vaccines and these compounds the fear of parents in vaccinating their children<sup>21</sup>.

There is no study done to discover the level of VH against the COVID-19 vaccines among Malaysian parents with children aged 17 and below. Thus, this study aimed to discover the factors that contribute to COVID-19 vaccine hesitancy among Malaysian parents using the 5C model by WHO. The survey data was analyzed using Partial least squares (PLS). The findings from this study will point out the possible factors that lead to VH among parents in Malaysia that will eventually identify the actions that should be taken to address VH against the COVID-19 vaccines among Malaysian parents.

**METHODS**

**Study Design and Participant Recruitment**

A random quantitative, cross-sectional survey was conducted using Google Forms. The inclusion criteria were Malaysian parents with children

aged 17 years and below and future parents (expecting) residing in Peninsular Malaysia who can read and write in English and Bahasa Melayu. The participants were randomly recruited through friends, colleagues, relatives, and online communities of the authors. The survey questions were provided to the parents via several online platforms in which, some of the parents shared the survey link to their contacts to garner more responses. The survey questions used in this study were adapted from a study by Pottinger et al. (2018) and SAGE Vaccine Hesitancy Matrix mapped by World Health Organization (WHO)<sup>22,23</sup>. No face and content validation was done as the questionnaire had been adapted from previous studies which used validated questionnaires<sup>22,23</sup>. There were a total of 41 questions where 9 questions were on general information while the remaining 32 were vaccine hesitancy (VH)-related questions. The survey was conducted from the 29th of January 2021 to the 12th of February 2021. A total of 301 participants volunteered to do the survey and the sample size was determined to be more than the minimal number required based on the G-power analytical tool. The ethical approval was obtained from the Research & Ethics Committee of INTI International University (INTI/UEC/2018/001) before the commencement of the study.

**The 5C Model Questionnaire**

The VH questions were categorized into five parts following the 5C model; confidence, complacency, constraints, calculation, and collective responsibility. The VH-related questions based on the 5C model were adapted from Larson et al. (2015), Pottinger et al. (2018) and Betsch et al., (2018)<sup>8,22,23</sup>. The 5-point Likert scale was used to measure the perception of parents toward the survey questions (Table 1).

**Table 1a: The VH questions according to the 5C model, as recommended by Larson et al., 2015; Pottinger et al., 2018; Betsch et al., 2018<sup>8,20,21</sup>**

Constructs	Items (Questions)
Confidence (CD) [Identification of immunization behaviour towards COVID-19 vaccines]	I have vaccinated my child/children following the National Immunization Programme (NIP) (MMR, polio, etc...).
	I have delayed previous vaccination for my child due to an illness or an allergic response.
	I will vaccinate my child/children against COVID-19.
	I will vaccinate my child/children against COVID-19 even if she/he/they was/were allergic to previous vaccinations.
	I prefer injection and oral administration for my child/children’s COVID-19 vaccine administration.
	I am concerned about the safety and efficacy of the COVID-19 vaccines.

**Table 1b: The VH questions according to the 5C model, as recommended by Larson et al., 2015; Pottinger et al., 2018; Betsch et al., 2018<sup>8,20,21</sup>**

	I am concerned about the location or the country where the COVID-19 vaccines are made.
	The vaccines made in America or Europe are better than the ones made in other countries.
	I am concerned about the composition of the COVID-19 vaccines.
	I have refused a vaccine previously because I thought the vaccine had porcine or other animal-derived ingredients (non-halal) in it.
	My child/children has/have experienced side effects from previous vaccinations.
	I have experienced side effects from previous vaccinations.
Complacency (CP) [Perceived personal health and invulnerability]	The COVID-19 vaccines that will be administered among Malaysians will prevent my child/children from contracting COVID-19.
	The COVID-19 vaccine is still needed even when the disease is no longer prevalent.
	I would rather have my child develop his/her immunity against COVID-19 instead of being vaccinated against it.
	My child's school/daycare advice/requires my child to be vaccinated against COVID-19.
	I am willing to pay for the COVID-19 vaccine for my child/children.
Constraints (CT) [Structural and psychological barriers]	I trust my doctor's recommendation regarding the COVID-19 vaccine for my child/children.
	I can discuss COVID-19 vaccine shots with my child's doctor.
	I agree with some of the global leaders and influencers on not administering the COVID-19 vaccines as circulated via social media.
	Leaders (Ex: Religious, political, teachers, and health care workers) in my community support the COVID-19 vaccines for infants and children.
	The travelling distance to the healthcare facility and the waiting period at the facility are a hindrance for me to vaccinate my child/children.
Calculations (CL) [Extensive information research regarding COVID-19 vaccination]	Cost is an important consideration in vaccinating my child/children against COVID-19.
	I obtain information regarding the COVID-19 vaccine from news, Facebook, Whatsapp messages, or any other social media platforms.
	The information regarding the safety and efficacy of the COVID-19 vaccine on social media is reliable.
	I am aware of the reported side effects of the COVID-19 vaccines.
	I will handle the information concerning the side effects of the COVID-19 vaccines by finding out the information from reliable sources such as MOH, WHO, etc and contacting the doctor to find out the information.
Collective Responsibility (CR) [Willingness to protect others by vaccination]	I will vaccinate my child even after knowing the side effects of the COVID-19 vaccines.
	The parents in my circle of friends and my community have vaccinated their children following the National Immunization Programme (NIP) (Ex: MMR, polio, etc...).
	I think that others will be protected against COVID-19 when my child/children is/are vaccinated against COVID-19.
	I would consider vaccinating my child/children against COVID-19 if my family members/a friend/a colleague have been vaccinated against it.
	I would consider vaccinating my child/children against COVID-19 if a famous person (celebrity, politician, sportsperson etc) have been vaccinated against it.

**Partial Least Square (PLS) analysis**

The SmartPLS (Version 3.3.3) software was used to analyze the data obtained from the survey. PLS-SEM was used to assess the model's overall fit and examine the relationship between independent latent variables (IV) which were factors that contribute to vaccine hesitancy (VH) whereas the dependent latent variable (DV) was VH. Each VH-related question was coded accordingly. Questions that best represented VH were chosen as VH indicators and three to five questions that best represented each construct were chosen as indicators. The 5Cs (Confidence, Complacency, Constraints, Calculation, and Collective responsibility) which represented the factors that contribute to VH of COVID-19 vaccines among Malaysian parents were the constructs. Examples of indicators were VH1, CD3, CP1, CT2, CL3, and CR1. Figure 1 shows the PLS research model used in this study.

**RESULTS**

**Demographic Analysis of Participants**

A total of 313 Malaysian parents responded to the online survey, out of which 301 (96.17%) were valid responses and 12 (3.83%) were incomplete responses. From the 301 respondents, there were 194 females (64.45%), 104 males (34.55%), and 3 empty responses (1%) (Table 2). Most of the respondents were in the age group of 41-50 (39.20%), followed by 31-40 (26.91%), 51-60 (26.25%), and others (7.64%). The majority of the participants were Indians with a total number of 124 (41.196%), followed by 120 Malay participants (39.867%), 49 Chinese participants (16.279%), and 8 individuals from other ethnicities (2.658%).

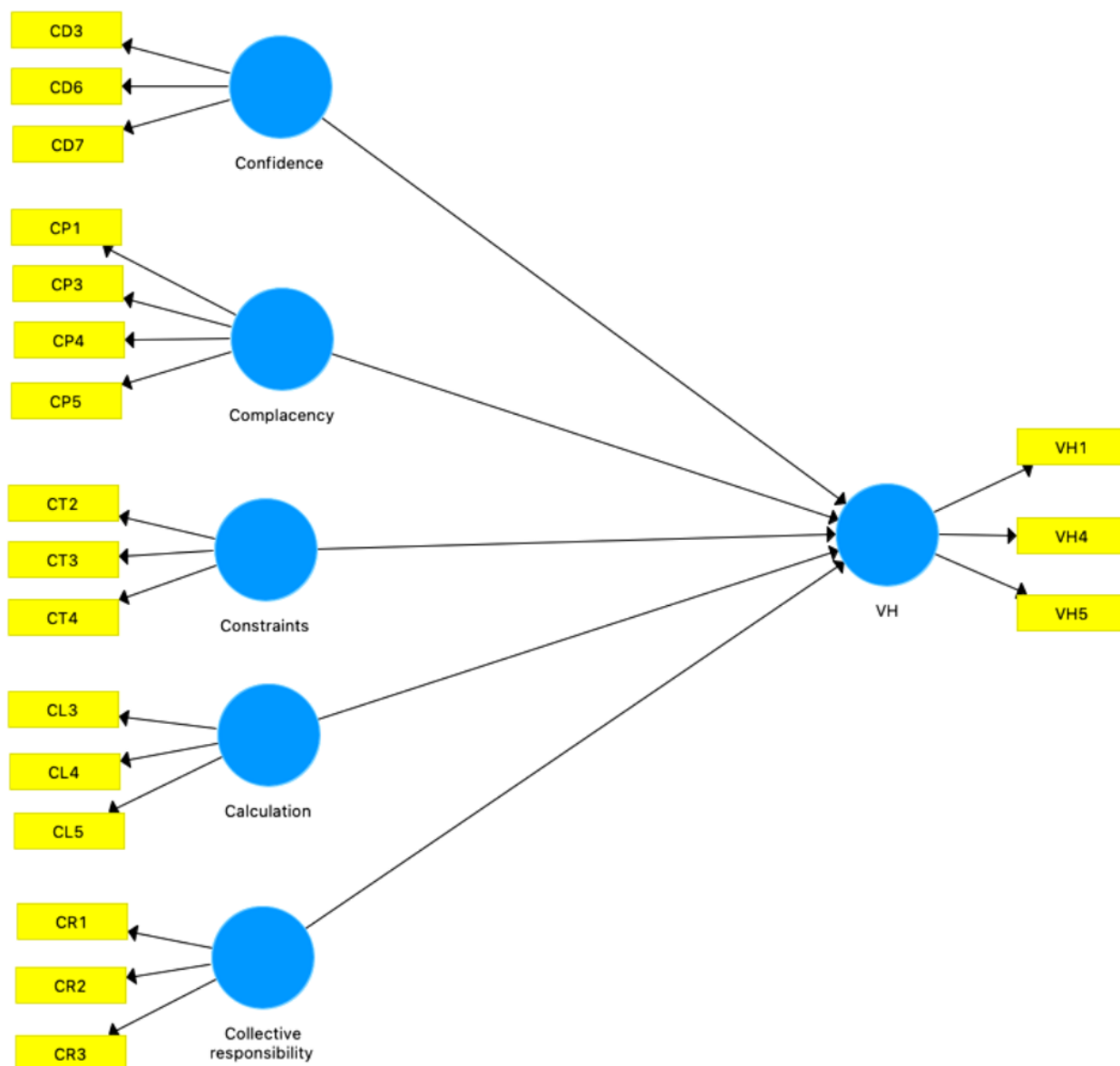


Figure 1: PLS research model used in this study

Table 2: Summary of participants' demographic characteristics.

Characteristics	Number (n=)	Percentage (%)
<b>Gender</b>		
Male	194	64.45
Female	104	34.55
Blank	3	1.00
<b>Age group</b>		
31-40	81	26.91
41-50	118	39.20
51-60	79	26.25
Others	23	7.64
<b>Ethnicity</b>		
Indian	124	41.196
Malay	120	39.867
Chinese	49	16.279
Others	8	2.658
<b>Religion</b>		
Islam	125	41.53
Hindu	84	27.91
Buddhist	38	12.62
Christian	47	15.61
Others	7	2.33
<b>Locality (State of residence in Malaysia)</b>		
Selangor	167	55.48
Malacca	60	19.93
Negeri Sembilan	39	12.96
Others	35	11.63
<b>Marital status</b>		
Married	278	92.36
Single	19	6.31
Blank	4	1.33
<b>Occupation</b>		
Employed in the medical line	16	5.32
Employed in the non-medical line	175	58.14
Homemaker	35	11.63
Self-employed	43	14.29
Others	33	10.96
<b>Education level</b>		
Tertiary (Science)	87	28.904
Tertiary (Non-Science)	152	50.498
Others	62	20.598
<b>Do you have a child/children?</b>		
Yes	274	91.03
No	25	8.31
Blank	2	0.66

Most of the respondents were from Selangor (55.48%), followed by Malacca (19.93%), Negeri Sembilan (12.96%), and others (11.63%). 278 participants (92.36%) were married, 19 participants (6.31%) were single parents, and there were four blank responses (1.33%). Most of the respondents were employed in the non-medical line (58.14%), followed by self-employed (14.29%), homemakers (11.63%), other professions (10.96%), while those who were employed in the medical line totalled 5.32%. Most participants had tertiary-level education in a non-science background (50.498%) followed by tertiary education in a science background (28.904%). From the online survey obtained, 274 respondents had children (91.03%), and 25 respondents had no children (8.31%) (Table 2).

#### Measurement Model Evaluation

The composite reliability (CR) and Cronbach's alpha were in the range of 0.411 to 0.840 and 0.063 to 0.746 respectively (Table 3). This showed that not all of the values were in the satisfactory range indicating a moderate to poor internal consistent reliability. The average variance extracted was from 0.312 to 0.569 (data not shown) indicating an insufficient degree of convergent validity. Although not all variables showed expected values, this measurement model was accepted to be partially reliable for further analysis.

**Table 3: Cronbach’s Alpha, Composite reliability (CR), and Average Variance Extracted (AVE).**

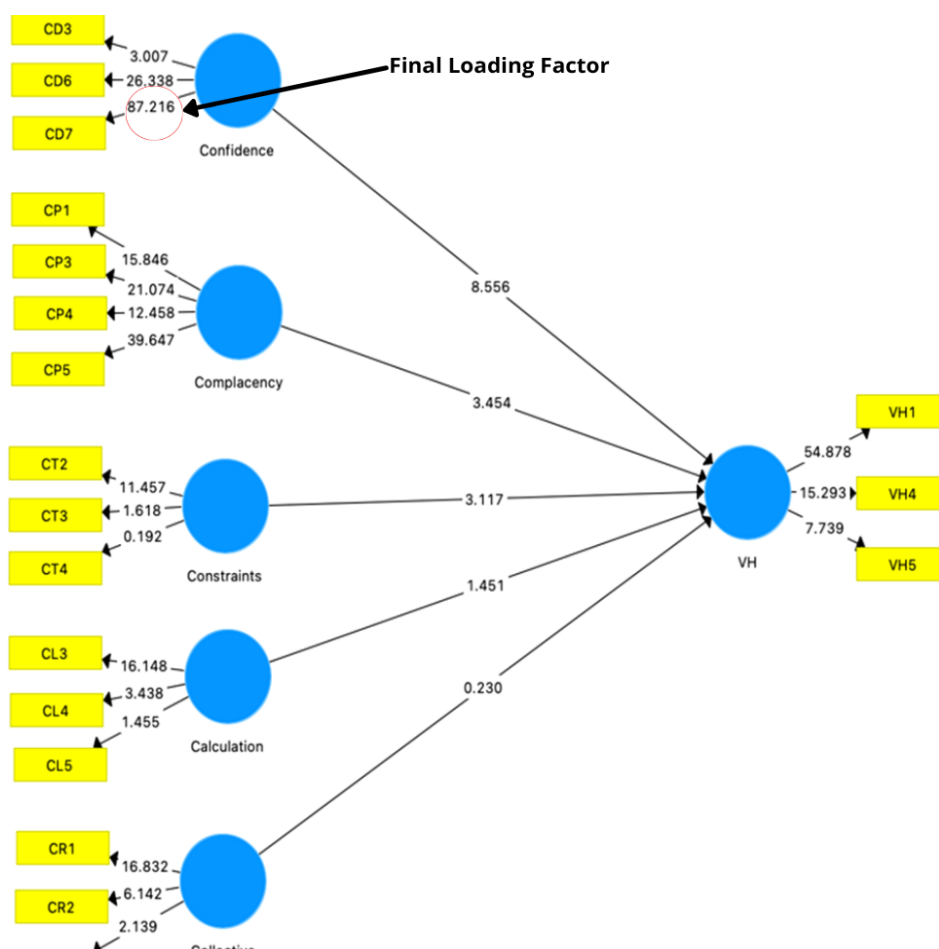
Variable	Cronbach’s Alpha	Composite reliability (CR)	Average Variance Extracted (AVE)
Calculation	0.063	0.556	0.348
Collective responsibility	0.397	0.673	0.443
Complacency	0.746	0.840	0.569
Confidence	0.507	0.735	0.516
Constraints	0.088	0.411	0.312
Vaccine Hesitancy	0.597	0.775	0.541

Table 4 shows the discriminant validity matrix obtained for the measurement model. Based on the results obtained, the items showed stronger loadings on their constructs (Confidence, Complacency, Calculation, Constraints, Collective responsibility) compared to other constructs within the model as indicated by the

bold values (0.590, 0.665, 0.755, 0.719, 0.558, 0.736) satisfying the requirement of the Fornell and Larcker theory. Thus, it can be concluded that there was sufficient discriminant validity among each construct as they were distinctive from each other.

**Table 4: Discriminant validity matrix.**

Constructs	Calculation	Collective responsibility	Complacency	Confidence	Constraints	VH
Calculation	<b>0.590</b>					
Collective responsibility	0.268	<b>0.665</b>				
Complacency	0.442	0.515	<b>0.755</b>			
Confidence	0.470	0.499	0.594	<b>0.719</b>		
Constraints	0.314	0.329	0.406	0.355	<b>0.558</b>	
VH	0.455	0.436	0.602	0.713	0.445	<b>0.736</b>



**Figure 2: Structural model after the non-parametric bootstrapping**



The Collinearity statistics or Variance inflation factor (VIF) values obtained were in the range of 1.000 to 1.686. This shows that this model of the study had good collinearity as the predictors were not measuring each other and they were not correlated (data not shown).

**Structural Model Evaluation**

Figure 2 shows the structural model after the non-parametric bootstrapping was done. The correlation between the independent variables to dependent variables improved the structural model compared to the measurement model evidenced by the increase in the factor loading

values. The initial factor loading of CP1 was 0.734 but after bootstrapping, the value increased to 15.846 (Figure 2).

The analysed data showed that complacency (H<sub>3</sub>), confidence (H<sub>4</sub>) and constraints (H<sub>5</sub>) had a strong positive relationship with VH among Malaysian parents (t > 1.645, p<0.05) (Table 5). Thus, the hypotheses of a positive relationship between H<sub>3</sub>, H<sub>4</sub> and H<sub>5</sub> were accepted. However, the calculation (H<sub>1</sub>) and collective responsibility (H<sub>2</sub>) did not have a strong positive relationship with VH.

**Table 5: The relationship of hypothesis with vaccine hesitancy.**

Hypothesis	Relationship	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T-statistics	P-values	Upper Limit	Lower Limit	Decision
H <sub>1</sub>	Calculation-> VH	0.081	0.085	0.056	1.451	0.147	-0.024	0.194	Not supported
H <sub>2</sub>	Collective responsibility -> VH	0.012	0.019	0.05	0.23	0.818	-0.082	0.115	Not supported
H <sub>3</sub>	Complacency -> VH	0.203	0.203	0.059	3.454*	0.001	0.088	0.315	Supported
H <sub>4</sub>	Confidence -> VH	0.493	0.489	0.058	8.556*	0.000	0.374	0.598	Supported
H <sub>5</sub>	Constraints -> VH	0.159	0.161	0.051	3.117*	0.002	0.062	0.262	Supported

\*Significant at p<0.05

**DISCUSSION**

Complacency, confidence, and constraints were found to be the major contributing factors to COVID-19 vaccine hesitancy (VH) among the Malaysian parents in this study. Parents were complacent in believing that the administration of the COVID-19 vaccines will not prevent their children from contracting the virus at the time this study was conducted. Similar findings were also reported in the study by Panting et al., (2018) which reported that VH in Malaysia was caused by a lack of awareness about the benefits of childhood vaccination among parents<sup>24</sup>. Parents perceive that vaccine-preventable diseases (VPD) are no longer prevalent and thus, opting not to vaccinate their children<sup>24</sup>. Another possible reason for the COVID-19 VH is that there is no stringent requirement of vaccination requirement in schools particularly in primary schools or daycares as the Pfizer vaccine has only been approved for administration among schoolchildren aged 12-17 years old at the time of the survey<sup>25</sup>. Besides that, the lack of confidence in the safety and efficacy of the COVID-19 vaccines agreed with the findings in other studies among parents in the US and Malaysia<sup>24,26</sup>.

The lack of confidence was largely due to the fear of adverse reactions reported in the AstraZeneca and the Johnson & Johnson vaccines<sup>21</sup>. In addition, VH among Malaysian parents could have been caused by incomplete clinical trials in

children aged 16 and below. The clinical trials for the Pfizer COVID-19 vaccine started in late March 2021 in children aged 12-15 years old and are still underway along with a few more vaccines<sup>21</sup>. In addition, the response to the Pfizer vaccine is expected to vary between children and adults and also among children below 12 years old due to the differences in the immune responses<sup>21</sup>. In addition, the occurrence of very rare blood clots associated with the administration of the AstraZeneca vaccine sees the suspension of the clinical trials of this vaccine in children. Such information triggers fear in parents leading to VH.

Concern about the location or the country where the COVID-19 vaccines were also identified to be another contributing factor to VH among Malaysian parents. This is because parents indicated their concern about the composition of the COVID-19 vaccines. Not knowing the composition of the vaccine makes parents hesitant, fearing the incorporation of substances that are deemed forbidden in certain religions. This finding was also supported by a study in Malaysia where Panting et al., (2018) found that a group of young educated parents questioned the halal status of the vaccines creating major concerns among Malay parents and eventually causing the increase of VH<sup>24</sup>. Malaysian parents were also not in support of vaccinating their children against COVID-19 if their children experienced allergic responses in previous vaccinations. Some other reasons that were

believed to contribute to VH among Malaysian parents were their concern about the side effects (2.4%) and distrust of the vaccine (2.1%)<sup>22</sup>. This study also suggests that Malaysian parents are not likely to support vaccination if their children displayed adverse reactions to previous vaccinations. The reason for this attitude will be due to the fear of the child's safety upon vaccination as reported in a study done in the United States (US)<sup>27</sup>. In addition, parents' trauma in previous vaccinations could also lead to the prohibition of vaccination in their children<sup>21</sup>. However, the recent transmission of fast-spreading variants is expected to boost vaccine acceptance in parents for many including Malaysians have indicated a faster achievement of herd immunity<sup>13,21</sup>.

Although currently, the COVID-19 vaccines are administered at no cost in Malaysia the cost of travelling to the vaccination centres amidst the pandemic may be a constraint to some parents especially those in outskirts or deep rural areas. The PLS analysis also showed that the Malaysian parents recruited in this study did not trust the doctor's recommendation regarding the COVID-19 vaccine for their children attributed to VH. This was in consensus with a study conducted in the US. The health care workers were often sought by parents to gain trust and recommendations apart from their network influences to accommodate parents' immunization decision<sup>27</sup>. Thus, if the health care workers do not recommend vaccination for the children, the parents will be vaccine-hesitant.

The findings in our study suggest the pivotal influence of public figures in promoting vaccine acceptance among Malaysian parents. A negative remark by these figures may potentially affect the parents' decision in vaccinating their children, as seen in a cross-sectional study conducted in Australia by which, the susceptible parents were more likely to display increased VH after viewing negative vaccine messages from political and medical leaders<sup>26</sup>.

This study also suggests that the calculation and collective responsibility do not contribute to VH against the COVID-19 vaccines. This could be attributed to increased awareness of the respondents towards the reliability level of the information regarding the safety and efficacy of the COVID-19 vaccine circulated via trusted online platforms such as MOH (<http://covid-19.moh.gov.my/vaksin-covid-19>) and JKJAV (<https://www.vaksincovid.gov.my/>)<sup>29,30</sup>.

Information regarding the COVID-19 vaccine was obtained from news, Facebook, Whatsapp messages, or any other social media platforms by the participants. This finding was not in line with a study in the US which suggested that VH was caused by a biased presentation on the Internet or media regarding vaccination protection and the harmful side effects. For example, the safety

of measles, mumps, and rubella immunization and its unproven relationship to autism had gained publicity over these years which had contributed to increased VH due to vast public reporting on this issue<sup>31</sup>. The respondents also indicated through the survey to possibly vaccinate their child even after knowing the side effects of the COVID-19 vaccines. In comparison, in Italy, it was found that the fear of the possible side effects of the vaccines contributed to VH as the parents were concerned about the children's safety<sup>32</sup>.

Collective responsibility also did not contribute to vaccine hesitancy among Malaysian parents. This was because the participants believed that when they vaccinate their children against COVID-19, others will be protected as well. This shows a positive attitude of the parents towards vaccination because they realize their responsibilities in protecting each other. If this positive attitude persists among all parents, herd immunity can soon be achieved to control the COVID-19 pandemic<sup>33</sup>. Apart from that, the participants agreed that they would consider vaccinating their children against COVID-19 if their family members, friends, colleagues, or famous individuals like celebrities, politicians, or sportspeople have been vaccinated against it. This finding agrees with the study conducted by Zhang et al., (2019)<sup>28</sup>. Zhang et al., (2019) found that celebrities and public figures, especially politicians can influence parents to vaccinate their children<sup>28</sup>. To have better vaccine acceptance of the COVID-19 vaccines, public figures should play a positive role in health communication<sup>28</sup>.

Partial least squares (PLS) were used to analyse the findings of the survey as this statistical tool is robust in identifying the correlation between the independent variables and dependent variable<sup>34,35</sup>. Moreover, to our best knowledge, this statistical tool has not been used to investigate the correlation of independent factors towards vaccine hesitancy, particularly towards COVID-19 vaccines among parents. Through this study, we have demonstrated that the PLS can be used to determine which of the 5 Cs: Confidence, Complacency, Calculation, Constraint, and Collective responsibility has a positive relationship with the COVID-19 vaccine hesitancy among parents.

Although the sample size of 301 respondents obtained in this study was sufficient for analysis, it cannot be used to generalize the overall perception of Malaysian parents. Increased sample size and continual perception studies especially during the vigorous vaccination exercise in Malaysia will give a better insight into parents' views on the administration of these vaccines in children. This survey was also not carried out in the other states in Malaysia including Sabah and Sarawak. Since this was an



online survey, the view of parents in deep rural areas who have limited access to internet connection could not be obtained.

## CONCLUSION

Complacency, confidence, and constraints were identified through the PLS analysis as the factors that contribute to vaccine hesitancy towards the COVID-19 vaccines among Malaysian parents. The data obtained in this study also showed that the parents who responded in this study do not consider calculation and collective responsibility when choosing to vaccinate their children with the vaccine. However, the results obtained in this study cannot be used to generalize the overall view of the total Malaysian parent population due to the total number of participants recruited in this study. In addition, as with many perception studies, the trend of perception will change over time more so with changing dynamics of the pandemic and now endemic in Malaysia. Nevertheless, further surveys on VH will help behavioural scientists, public health clinicians and the Ministry of Health of Malaysia to better manage VH among Malaysian parents not only for COVID-19 but also for other types of childhood vaccination.

## Conflict of Interest

The authors declare no potential conflict of interest.

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