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Social Cognitive Determinants of Physical Activity Participation among Vaccinated Malaysians

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ABSTRACT

Physical inactivity is a global public health concern associated with various adverse health outcomes. The pandemic restrictions on outdoor activities have caused physical activity levels to decrease by 6.3% globally. After vaccination is introduced, many individuals may feel more confident and safer to engage in physical activities but no fixed percentage of increased physical activity participation. This study aims to measure the social cognitive determinants of physical activity participation among vaccinated Malaysians. A total of 372 respondents, who had received vaccinations, were recruited for this study. The participants were selected from different age groups and genders in Malaysia. Multiple linear regression analysis was conducted to measure the relationship between the social cognitive determinants and physical activity participation among vaccinated Malaysians. The results revealed a significant relationship between the social cognitive determinants and physical activity participation ($\beta = 0.44$, $p < 0.001$). Self-efficacy ($\beta = 0.44$, $p = 0.001$) was found to be a significant predictor of physical activity participation. Participants with higher levels of self-efficacy were more likely to engage in regular physical activity. Similarly, outcome expectations ($\beta = 0.25$, $p = 0.039$), and goals ($\beta = 0.64$, $p = 0.001$) were positively associated with physical activity participation. In contrast, sociostructural factors demonstrated a negative association with physical activity participation ($\beta = -0.49$, $p = 0.001$). In conclusion, social cognitive theory are effective to promoting increased physical activity participation among vaccinated Malaysians. Understanding the role of social cognitive determinants may provide insights into strategies to promote physical activity among this population.

Keywords: physical activity participation, social cognitive theory, COVID-19, vaccinated Malaysian, multiple linear regression

INTRODUCTION

Physical activity is of greatest significance in the maintenance of general health and well-being. Regular physical activity has been linked to a multitude of health advantages, encompassing a decreased likelihood of developing chronic conditions like cardiovascular disease, obesity, and some forms of cancer (Department of Health and Human Services, 2018). Despite the well-documented advantages, the issue of physical inactivity continues to be a significant public health concern on a global scale, particularly within the context of Malaysia. The pandemic coronavirus disease has spread globally included Malaysian and effect the physical activity participation among Malaysians because of the quarantine. Until an effective vaccine appear as alternative to prevent this virus and make Malaysians confidently to go out for doing physical exercise (Ministry of Youth and Sport, 2021).

Vaccination status has been identified as a significant determinant that may impact the engagement in physical activity among individuals in Malaysia (Ministry of Health, 2021). Given the prevailing COVID-19 pandemic and the global implementation of vaccination initiatives, it is imperative to comprehend the potential influence of vaccination status on the social cognitive factors that are associated with individuals' engagement in physical activity.

Social cognitive determinants encompass the psychological and contextual aspects that exert an influence on an individual's inclination to participate in physical activity, as posited by (Bandura, 1977). The determinants encompassed in this framework consist of self-efficacy, outcome expectations, sociostructural factors, and goals. Self-efficacy, a crucial component of the social cognitive theory proposed by (Bandura, 1977), refers to an individual's belief in their capabilities to organize and execute the necessary actions to achieve a desired outcome. In the context of physical activity participation, self-efficacy plays a significant role in determining whether individuals will engage in regular exercise or lead a sedentary lifestyle. Vaccinated individuals may have varying levels of self-efficacy when it comes to participating in physical activities, influenced by factors such as their past experience, health conditions, and perceived barriers.

Moreover, outcome expectation, another factor within the social cognitive theory, focus on an individual's beliefs about the likely outcomes or results of their actions (Bandura & Cervone, 1986). Vaccinated Malaysians may have different expectations regarding the benefits associated with engaging in physical activity, such as improved physical and mental well-being, increased energy levels, and reduced risk of chronic disease (Mir, Ng, Mohd Jamali, Jabbar & Humayra). Exploring these outcome expectations can provide insights into the motivations and incentives that can encourage individuals to adopt and maintain an active lifestyle.

Sociostructural factors encompass the social and environmental conditions that shape an individual's health behaviors (Bandura & Cervone, 1986). These factors include access to facilities and resources, social support, cultural norms, and community factors. Among vaccinated Malaysians, sociostructural factors may play a vital role in facilitating or inhibiting physical activity participation (Smith, Lee & Chan, 2021). For example, the availability of well-maintained parks and recreational facilities, the presence of supportive social networks, and the cultural acceptance and encouragement of physical activity can strongly influence the engagement levels of Malaysians in post-vaccination physical activity.

Furthermore, setting goals act as a driving force that directs individuals toward desired outcomes (Bandura, 2001). In Malaysia, individuals who receive the vaccine can enhance their health outcome by establishing objectives linked to engaging in physical activities (Department Health Malaysia, 2022). These goal might involve accomplishing a specific number of exercise sessions per week or achieving a particular distance within a specific timeframe. Examining the impact of goal-setting on the physical activity behaviors of vaccinated individuals in Malaysia can offer valuable understanding about significance of setting specific goals in promoting and maintaining active and healthy lifestyle among Malaysians who have received the vaccine.

This study aims to measures the social cognitive determinants of physical activity participation among vaccinated Malaysians. By assessing variables such as self-efficacy, outcome expectations, sociostructural factors, and goals, the researcher can gain a comprehensive understanding of how vaccination status might influence these determinants and subsequently affect Malaysians engagement in physical activity.

Through the implementation of this research, the researcher aims to make a valuable contribution to the expanding area of information concerning the influence of vaccination status on health-related conduct, particularly in relation to engagement in physical activity. The results of this study have the potential to contribute valuable insights to public health treatments and initiatives targeting the enhancement of physical activity among vaccinated individuals in Malaysia. Consequently, these efforts can play a pivotal role in fostering improved general health and well-being. Therefore, further research is needed to understand the role of social cognitive theory determinants physical activity participation.

METHODOLOGY

Sampling

A crosss-sectional study design was employed to investigate the social cognitive determinants of physical activity participation among vaccinated Malaysians. The study sample consisted of 372 vaccinated Malaysians aged 18 to 48 years. Participants were recruited using a random sampling from various towns in Terengganu, Malaysia to ensure representation from diverse background. The UiTM Research Ethics Committee was giving the researchers ethical clearance (Ref. No: REC/07/2022 (PG/MR/164)) to ensure that this research will have no adverse effect on the respondents or the researcher. The authorization process begins with getting a letter from UiTM containing an application to conduct a research project. Following that, data collection was conducted through online surveys using platforms such as Google Forms. Participants were given information about the study and provided with the survey link. Informed consent was obtained prior to participants.

Procedure and Instrumentation

Data was collected through survey questionnaires to assess the social cognitive determinants of physical activity participation. The questionnaire was developed based on previous validated scales and adapted to the Malaysian context. It comprised of items measuring variables such as self-efficacy, outcome expectations, sociostructural factors and goals.

Demographic profiles include gender, age, race, the highest level of education, employment status, household income, vaccination status, state/region, town/city, and medical illness. The four-point Likert Scale of Exercise Self-Efficacy (ESES) was adapted and adopted to assess self-efficacy for being physically active with the vaccine elements. Ten (10) items adapted and adopted from previous studies (Kroll, Kehn, Ho & Groah, 2007) were used. On a four-point scale (1 = being not at all true, 2 = being seldom true, 3 = being somewhat true, and 4 = being always true), respondents are asked to assess their confidence in engaging in regular physical activity and exercise. One example of a self-efficacy item is " When I get the vaccination, I am optimistic that I can overcome obstacles and problems in terms of physical activity and exercise." The scale's reliability was calculated as being over 0.92 based on (Kroll, Kehn, Ho & Groah, 2007). Exercise outcome expectations are assessed using the adapted and adopted nine-item Outcome Expectations for Exercise Scale (OEES) developed for exercise and vaccination (Resnick, Zimmerman, Orwig, Furstenberg & Magaziner, 2000). The Social Support for Exercise Scale (SSES) developed by (Sallis, Grossman, Pinski, Patterson & Nader, 1987) for the level of social support participants receive for engaging in physical activity after vaccination and the goal was adapted and adopted from the 14-item Exercise Goal-Setting Scale (EGS) created by (Rovniak, Anderson, Winett & Stephens, 2002). A 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) was used to assess these items. A sample item for outcome expectations is “Physical activity makes me feel better physically”. The scale's reliability was over 0.87 based on (Resnick et al., 2000). With the use of (Sallis et al., 1987) 13-item Social Support for Exercise Scale (SSES), sociostructural elements were evaluated. "Friend gave me helpful reminders to exercise after vaccination" is an example sociostructural factor. Based on (Sallis et al., 1987), the scale's dependability was estimated to be more than 0.85. "I like to break more challenging fitness objectives down into a series of smaller goals," is an example of a goal-setting statement. Based on (Rovniak et al., 2002), the scale's dependability was estimated to be over 0.91.

Physical Activity

The level of PA was assessed using the International Physical Activity Questionnaire Short Form (IPAQ-SF) (Craig et al., 2003). The International Physical Activity Questionnaires (IPAQ) were established to offer a variety of highly developed tools that may be utilized internationally to get comparable physical activity estimates. IPAQ is a tool mostly used to monitor the adult population. IPAQ was developed and tested for use in adults (ages 15 to 69), and usage in older or younger age groups is not advised until more studies and testing are conducted. Although the variety of domains and

activity types in IPAQ should be carefully reviewed before utilizing it in this context, some intervention studies use it as an evaluation tool. IPAQ tracks physical activity across a range of contexts, including free time, activities connected to the home and yard, employment, and transportation. The IPAQ short form inquires about three more activities in the three aforementioned areas in addition to sitting. The specific types of exercise tested are walking, moderate-intensity activities and vigorous-intensity activities; frequency (measured in days per week) and duration (measured in minutes per day) are acquired separately for each different kind of exercise. On the questions, separate scores for walking, moderate-intensity exercise, and vigorous-intensity exercise were given. A total composite score was also offered to show how active an individual was overall. The length (in minutes) and frequency (in days) of walking, moderate-intensity activity, and vigorous-intensity exercise are added to determine the final score.

Data Analysis

The study employed multiple linear regression analysis to investigate the association between the determinants of the social cognitive theory (self-efficacy, outcome expectations, goals, and sociostructural factors) and the level of physical activity engagement among vaccinated individuals in Malaysia. The statistical software IBM SPSS Statistics 27 was utilized for data analysis. The collected data followed rigorous validation procedures to assure its comprehensiveness, including the application of exclusion criteria and the identification of any outliers. Additionally, a significance level of $p<0.05$ was determined.

Statistical Analysis

Initially, a correlation matrix was created in order to evaluate the bivariate associations between the independent factors and the dependent variable. This analysis aided in identifying the variables that exhibited a substantial correlation and hence should be incorporated into the regression model. Subsequently, a stepwise multiple linear regression analysis was performed using SPSS software (version 27). This approach facilitated the incorporation of the most crucial and statistically relevant variables into the ultimate model, while excluding predictors that did not demonstrate statistical significance. The significance levels for variable entry and removal were established at a threshold of $p<0.05$.

RESULTS

Descriptive Statistic

Table 1 displays the demographic characteristics of Malaysians who have received vaccinations in the state of Terengganu. In this study, all participants were Malaysians. Majority of the vaccinated Malaysians were aged between 26-33 years old 112 out of 372 (30.1%) and 100 out of 372 (26.9%) were aged between 34-41 years old. Notably, female vaccinated Malaysians showed a higher rate response 193 out of 372 (51.9%) compared to the male gender 179 out of (48.1%). In terms of ethnicity or race, dominants response rate 372 (100%) from malay respondents. Highest Education Level, 38.4% (143) of the vaccinated Malaysians surveyed had completed SPM, 27.7% (103) had a diploma as their highest education level, and 33.9% (126) held a degree as their highest education level. Employment Status, 65.6% (244) of the vaccinated Malaysians were employed full-time, A smaller percentage 3.5% (13) worked part-time, 20.4% (76) of those surveyed were students, and 10.5% (39) were unemployed at the time of the survey. It's worth noting that the majority of respondents were employed full-time, and a significant portion had attained a degree as their highest education level. Household Income, 70.4% (262) of the vaccinated Malaysians surveyed had a household income of less than RM 2,500, 29.6% (110) reported a household income in the range of RM 2,501 to RM 3,170. Vaccination Status, 10.8% (40) of the respondents had completed two doses of the vaccine, and the majority of respondents

89.2% (332) had completed a booster of the vaccine. A significant proportion of respondents had a household income of less than RM 2,500, and the majority had completed a booster vaccine.

Multiple Linear Regression Analysis

Figure 1, Table 2, & Table 3. A multiple linear regression was run to predict self-efficacy, outcome expectations, sociosturctural factors, and goals determinants of physical activity participation among vaccinated Malaysians. This resulted in a significant model, $F(4,367) = 32.737$, $p<.001$, $R2 = .513$. The vaccinated Malaysians were examined further and indicated that self-efficacy ($t = 9.21$, $p<.001$), outcome expectations ($t = 2.07$, $p<.039$), sociostructural factors ($t = -3.32$, $p<.001$), and goals ($t = -4.00$, $p<.001$) were significant determinants of physical activity participation among vaccinated Malaysians.

Self-efficacy

The unstandardized coefficient of 16.58 suggests that a one-unit rise in self-efficacy is associated with a predicted increase of 16.58 units in the dependent variable, which in this case is physical activity participation. The calculated standard error of 1.80 indicates a limited degree of variability in the estimated value. The coefficient for the standardized beta is 0.44, indicating that there exists a moderate positive relationship between self-efficacy and engagement in physical activity. The obtained t-value of 9.21 suggests that the coefficient under consideration is statistically significant at a significance level of $p < .001$.

Outcome expectations. The coefficient for outcome expectations is 8.02, indicating that there is a positive association between a one-unit rise in outcome expectations and an 8.02 unit increase in physical activity participation. The calculated standard error of 3.87 indicates a substantial degree of uncertainty in the estimated value. The standardized beta coefficient of 0.25 suggests a modest positive relationship between result expectations and participation in physical activity. The obtained t-value of 2.07 indicates that the coefficient under consideration is statistically significant, as evidenced by the corresponding p-value of 0.039.

Sociostructural factors

The unstandardized coefficient of -8.36 suggests that there is a negative relationship between sociostructural factors and the dependent variable. Specifically, for every unit increase in sociostructural factors, the dependent variable decreases by 8.36 units, while keeping all other independent variables equal. The coefficient's standard error is 2.52, indicating a limited degree of variability in the estimation. The standardized beta value of -0.49 suggests that there is a moderate negative relationship between sociostructural characteristics and participation in physical activity. The obtained t-value of -3.32 indicates that the coefficient is statistically significant at a significance level of $p < 0.001$.

Goals

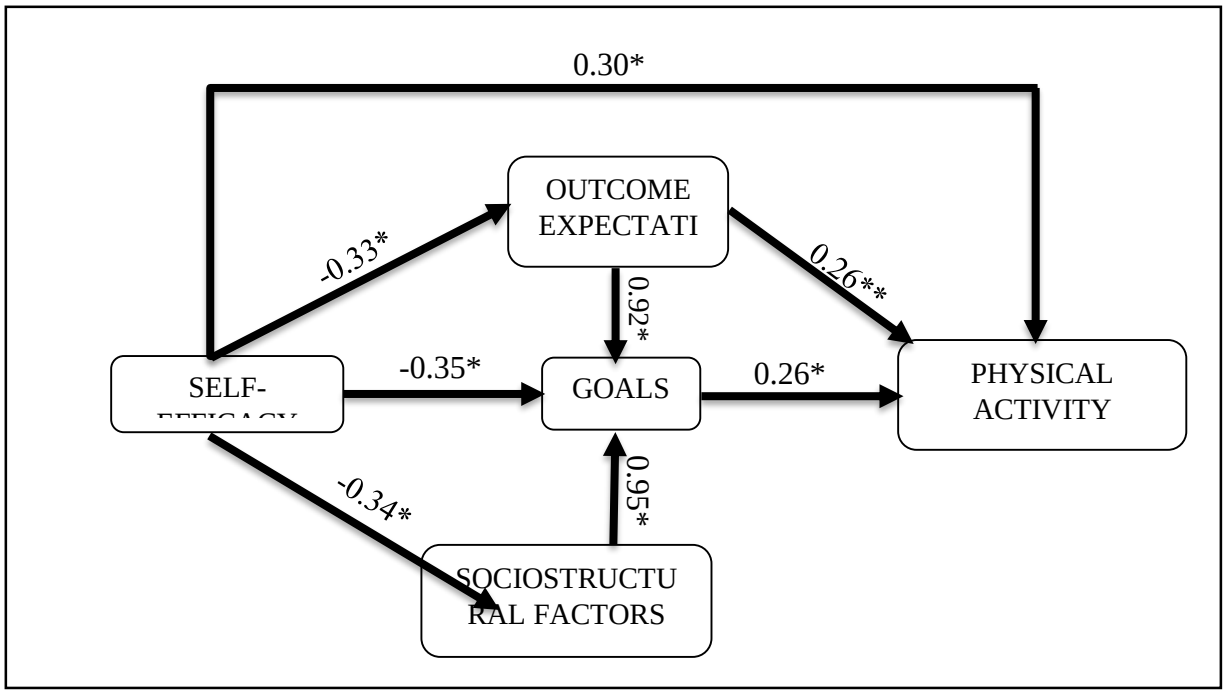
The unstandardized coefficient of 20.47 suggests that there is a positive relationship between the rise in goals and the dependent variable, while controlling for the effects of other independent variables. The calculated standard error of 5.15 indicates a substantial degree of uncertainty in the estimated value. The standardized beta value of 0.64 suggests a moderate positive relationship between goals and participation in physical activity. The obtained t-value of -4.00 indicates that the coefficient is statistically significant at a level of $p < 0.001$.

In summary, the findings of this study indicate that self-efficacy, outcome expectations, sociostructural factors, and goals play a significant role as social cognitive determinants in affecting the engagement of vaccinated individuals in physical activity among the Malaysian population.

Table 1. Demographic profile of vaccinated Malaysians in Terengganu (N = 372)

Variables		**N (%)**
Gender	Male	179 (48.1)
	Female	193 (51.9)
Age in groups	18 – 25 years	97 (26.1)
	26 – 33 years	112 (30.1)
	34 – 41 years	100 (26.9)
	42 – 48 years	63 (16.9)
Race	Malay	372 (100)
Highest educational level	SPM	143 (38.4)
	Diploma	103 (27.7)
	Degree	126 (33.9)
Employment status	Full-time employment	244 (65.6)
	Part-time employment	13 (3.5)
	Student	76 (20.4)
	Unemployment	39 (10.5)
Household income	Less than RM 2,500	262 (70.4)
	RM 2,501 – RM 3,170	110 (29.6)
Vaccination status	Complete 2 dose	40 (10.8)
	Complete booster dose	332 (89.2)

The Structural Model



***significant at the p < 0.001 level.*

Figure 1. The Structural Model

Table 2. Coefficients and R^2 for the regression model; dependent variable physical activity participation.

Variables	Unstandardized	Std. error	t	p-value
Constant	-139.89	14.37	-9.73	0.001
Self-Efficacy	16.58*	1.80	9.21	0.001
Outcome Expectations	8.02**	3.87	2.07	0.039
Sociostructural factors	-8.36*	2.52	-3.32	0.001
Goals	20.47*	5.15	-4.00	0.001
R^2	0.513			
adj. R^2	0.255			
F (df = 4, 367)	32.737			

***Significant at p < 0.05 level; *significant at the p < 0.001 level; Physical activity participation, self-efficacy, outcome expectations, sociostructural factors, goals.*

Table 3. The Direct Effects of Social Cognitive Determinants on Physical Activity Participation

Direct Effect			**Coefficients**	**p-value.**
Self-Efficacy	→	PA	0.30*	0.001
Self-Efficacy	→	Outcome Expectation	-0.33*	0.001
Self-Efficacy	→	Goals	-0.35*	0.001
Self-Efficacy	→	Sociostructural factors	-0.34*	0.001
Outcome Expectations	→	Goals	0.92*	0.001
Outcome Expectations	→	PA	0.26*	0.001
Goals	→	PA	0.26*	0.001
Sociostructural Factors	→	Goals	0.95*	0.001

*Note. PA =physical activity. *p < 0.001*

DISCUSSION

The primary objective of this study is to measure the social cognitive factors that influence engagement in physical activity among vaccinated individuals in Malaysia. This will be accomplished through the utilization of multiple linear regression analysis. The researcher posited that there is a substantial relationship between social cognitive determinants (namely self-efficacy, outcome expectations, sociostructural factors, and goals) and the level of physical activity engagement among vaccinated individuals in Malaysia. This study focuses on Malaysians who have received vaccinations, which is a distinctive component of this research. The emphasis on individuals who have had vaccinations is of significance as it enables researchers to examine potential variations or impacts associated with their vaccination status on their physical activity patterns. Based on previous study (Smith et al., 2021), physical activity rates have seen a significant decline during the COVID-19 pandemic. With the implementation of lockdown measures and restriction on outdoor activities, many individuals have become sedentary and less engaged in physical activity. Furthermore, the fear of contracting the coronavirus has also played a significant role in decreasing physical activity levels among the general population. So the results of the study revealed that, vaccine received by the respondent had increased their efficacy in doing physical activity in the post-pandemic era.

The findings from the multiple linear regression analysis indicated that a number of social cognitive factors had statistical significance in predicting the level of physical activity engagement among Malaysians who have received vaccinations. To begin with, it was observed that self-efficacy demonstrated a noteworthy and favorable impact on engagement in physical activity (B: 0.44, $p<0.001$). This finding indicates that those with elevated levels of self-efficacy, defined as their belief in their capacity to engage in physical exercise, exhibited a greater likelihood of actively participating in such activities. The implications of this discovery suggest that implementing interventions focused on enhancing self-efficacy, such as offering educational programs, skill-building initiatives, and support

systems, could potentially result in elevated levels of physical activity within the vaccinated Malaysian population.

Furthermore, it was observed that outcome expectations had a notable and favorable impact on engagement in physical activity ($\beta = 0.25$, $p = 0.039$). This finding suggests that persons with greater anticipations of the favorable consequences linked to physical activity, such as enhanced health, fitness, and well-being, demonstrated a higher propensity to participate in such activities. This discovery underscores the need to advocate for the advantages and incentives of engaging in physical activity as a means to motivate and inspire vaccinated individuals in Malaysia to partake in such activities.

In contrast, it was observed that sociostructural factors exerted a substantial adverse impact on engagement in physical activity (B: -0.49, $p<0.001$). This implies that several social and environmental variables, including limited facility accessibility, societal norms against physical exercise, and time limitations resulting from work or familial obligations, could potentially impede the engagement of vaccinated individuals in physical activity within the Malaysian context. In order to promote increased levels of physical activity, it may be imperative to tackle these sociostructural hurdles by implementing governmental reforms, fostering community-driven initiatives, and enhancing infrastructure.

It was determined that goals had a noteworthy and favorable impact on engagement in physical activity (B: 0.64, $p<0.001$). This finding suggests that persons who possessed well-defined and precise objectives pertaining to physical activity, such as reducing body weight, enhancing stamina, or attaining a particular degree of fitness, showed a higher propensity for participation in such activities. This discovery underscores the need to establish objectives and offer individuals tactics and assistance to attain them, with the aim of fostering physical activity among vaccinated individuals in Malaysia.

The study limitation that must be acknowledged is the low response rate seen in the study. The observed response rate indicates that it is likely that the sample was not fully and truthfully answered. The low rate of response could perhaps be ascribed to the respondents' limited availability due to their busy schedules when engaging in the online survey. Additionally, the excessive length of the questions may be a challenge for respondents in terms of attentively reading and comprehending the content. For individuals who possess limited time or exhibit a lack of motivation to engage in the process of completing the questionnaire, the task may provide challenges.

Future research should indicate that individuals with higher levels of exercise self-efficacy are more inclined to engage in regular exercise, mostly due to their utilization of self-regulation techniques such as goal establishment, self-monitoring, strategic planning, and problem-solving. Therefore, it is imperative to implement future interventions that can effectively enhance individuals' self-efficacy in circumstances where it is feasible, particularly in cases where it can facilitate advancements in self-regulation strategies and health-related behaviors. In general, the results of this study contribute to a better understanding of the association between physical activity levels among Malaysians and the components of Social Cognitive Theory (SCT). This highlights the necessity of advocating for consistent engagement in physical exercise in order to enhance immune system functionality, mitigate the likelihood of contracting infectious diseases, and prevent mortality associated with infectious diseases. Future recommendations for physical activity in public health guidelines should incorporate the examination of exercise's effects on both viral and chronic disorders.

CONCLUSION

This study suggested to use all of social cognitive theory bandura to determinate of physical activity participation for the effective results. The conclusions of this study highlight the importance of addressing the social cognitive variables in order to encourage involvement in physical activity among vaccinated individuals in Malaysia. Interventions aimed at addressing these variables, such as enhancing self-efficacy and fostering positive result expectations, have the potential to effectively enhance physical activity levels throughout the population. Additional investigation is necessary to examine supplementary variables that could potentially impact the engagement in physical activity among vaccinated individuals in Malaysia.

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DECLARATION OF CONFLICTING INTERESTS

Regarding the research, writing, and/or publishing of this paper, the authors reported that they had no possible conflicts of interest.

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