

RESEARCH ARTICLE

International Student Profiling Framework

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ABSTRACT The current conventional way of screening international students, solely based on prior admission and self-reported documents, is inadequate. Given the drastic increase in the number of incoming students, this inadequacy calls for better security surveillance. Therefore, this study investigates how personality traits can influence one's online prosocial behavior, as an alternative screening mechanism for international students. To assess the association between Big Five and Dark Triad personality traits and online prosocial behavior via the mediation of self-esteem, cross-sectional survey data was collected from 218 international postgraduate students and analyzed using partial least squares structural equation modeling. The significant outcome of this study is the establishment of the International Student Profiling Framework, which serves as the basis for understanding the influence of personality traits and self-esteem on international students' online prosocial behavior.

INDEX TERMS Personality, big five, dark triad, online prosocial behavior, self-esteem.

I. INTRODUCTION

The education sector not only fosters quality education but has also evolved into one of the main revenue-generating industries for a country [1]. Specifically, higher education has been revolutionized via internationalization, driven by socio-cultural, political, economic, and academic motivations to integrate global features for the benefit of the nation, academia, students, and public [1], [2]. Following the economic crisis that hit Asian countries in mid-97 and the 9/11 attack in the USA, there was a massive reduction of students to Western countries. Students then began seeking more affordable choices in the Asian region to pursue their higher education. Consequently, Malaysia has witnessed a significant rise in the number of international students over recent years, in line with its aspiration of becoming an education hub in the region. In fact, Malaysia's economy has grown as

a result of its lower outflow of local students going abroad and higher inflow of incoming international students [3], [4].

Human behavior is one of the most complex and dynamic disciplines, making it difficult to capture exact intentions, especially in terms of screening incoming international students online. Indeed, the human aspect of cybersecurity has received ever-growing research attention, such as in the areas of psychology, sociology, and culture [5]. Notably, recent literature has discovered that online prosocial behavior (OPB) is highly correlated with a low level of internalizing problems and externalizing behaviors [6], making it a desirable behavior among international students. However, the proliferation of online social networks (OSNs) has given way not only to broader networks and borderless connectivity, but also to social issues among international students, including visa and drug abuse and anti-social activities [7]. These students' relationships, communications, and prosocial behaviors on the Internet and OSNs are not well understood, and can be either positive, negative, or neutral [8], [9]. Therefore, the current conventional way of screening international students,

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solely based on their prior admission, is inadequate and calls for better security surveillance [10]. To address this issue, this study sought to answer the following two research questions:

(1) *Do personality traits influence international students' OPB?*

(2) *Does self-esteem influence the relationship between international students' personality traits and OPB?*

To answer the research questions, a quantitative survey was carried out among postgraduate international students studying in Malaysian higher education institutions. The contributions of this study are twofold. First, to the best of our knowledge, no study has proposed screening international students based on their personality traits and online behavior before or after their admission to educational institutions. In this regard, we fill a research gap in the existing literature, which has focused more on students' engagement, recruitment, well-being, learning styles, and academic performance [3], [11], [12]. Second, we adopt an infrastructure perspective on OPB, which has been discussed on a theoretical level but has not been tested empirically to date. Therefore, this study contributes by providing empirical evidence in this context, deepening our understanding of personality traits and OPB while also offering important implications for practice.

The remainder of the paper is structured into four sections. The second section presents an overview and related work on two personality trait models (i.e., Big Five and Dark Triad), OPB, and self-esteem. Based on the review, the overall research model and hypotheses are developed. In the third section, the research design is described in detail, including the study's context and measurement instruments. The survey results are reported in the fourth section, following which the findings are discussed and implications for research and practice are derived. Finally, this paper ends with a conclusion and directions for further research.

II. LITERATURE REVIEW

This section reviews the variables under investigation in this study: personality traits, OPB, and self-esteem. The relationships among them are also discussed and justified, providing a rationale for the research model.

A. PERSONALITY TRAITS

Personality includes various individual attributes that differentiate the way one person thinks, feels, and acts from another [13], [14]. The Five-Factor Model, commonly known as the Big Five, is one of the most widely accepted personality models. It consists of five factors or dimensions, often abbreviated as OCEAN: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism [15]. Openness to experience refers to individuals being considered 'open' when they are keen to explore and try new things. Conscientiousness refers to individuals who are organized, attentive, and good at time management. Extraversion refers to extroverted individuals who enjoy social gatherings and like to be around others. Agreeableness refers to individuals who are friendly, helpful to others, and maintain social

relationships well. Neuroticism refers to individuals who are prone to worry and anxiety.

Ongoing work by psychologists and scholars in the online social behavior domain demonstrates the need to explore darker behavioral tendencies on OSNs more. Not only are dark behaviors diverse and complex [16], but such behaviors online, such as cyberbullying, cyber-trolling, and cyberstalking, are determined by dark personality traits [17]. The Dark Triad model is most broadly used to describe the darker side of behavior. It was introduced by Paulhus and Williams in the early 2000s [18] and consists of three distinct but empirically overlapping traits. Machiavellianism refers to individuals who are manipulative and dishonest, and tend to exploit others. Narcissism refers to individuals who exhibit excessive self-love and a constant longing for respect and affection from others. Psychopathy refers to individuals who are thrill-seeking, egocentric, anxious, insensitive, and cold-hearted. The Dark Triad is said to co-exist with the Big Five, as it interprets pro and anti-social traits differently [18], [19]. As such, all three Dark Triad traits are associated with and predict at least one antisocial behavior [19].

B. ONLINE SOCIAL NETWORKS

In the past decade, the proliferation of information and communications technology (ICT) has led to the emergence of various types of OSNs. With their omnipresence and minimal cost, these social networks have become the new means of communication in this millennium [20]. OSNs like Facebook, Twitter, Instagram, and YouTube are generating an unbelievable amount of data from their users' active social interactions and networking [20]. OSNs are accessible through various mobile apps, with more than 98% of users worldwide accessing OSNs via mobile phones [21]. Consequently, OSNs have become widely used communication platforms, enabling various online activities that have essentially extended into virtual representations of real-life interactions. These online interactions can range from positive to neutral to negative, mirroring offline interactions [8].

The recent COVID-19 pandemic in early 2020 led to unprecedented lockdowns and the closure of all types of educational institutions worldwide, necessitating a shift to virtual or online learning [22], [23]. Both students' social and academic lives were conducted solely in virtual spaces, resulting in increased screen time and OSN usage [24]. Consequently, the extended time spent online, coupled with concerns related to COVID-19, the after-effects of lockdowns, stress, and other well-being factors, have collectively influenced students' behavior [25].

C. ONLINE PROSOCIAL BEHAVIOR

Prosocial behavior is the voluntary act of helping others while fostering harmonious relationships, benefiting both individuals and society [8], [26], [27], [28]. It not only encourages positive social interactions but is also interconnected with one's intellectual growth and social, emotional, and

psychological well-being [26], [29]. It is also argued that personality can predict prosocial behaviors [30].

The widespread exposure and unlimited access to digital content such as OSNs have contributed to constant online interactions with others [31]. Digital platforms have become appealing to youth for engaging in prosocial behavior due to several reasons: (a) they minimize spatial and temporal barriers; (b) activities are digitally recorded, making prosocial behavior more quantifiable and comparable; (c) they foster a sense of belonging and encourage personality development and representation; and (d) they have the potential to meet the psychosocial needs of children and adolescents creatively, providing unique social and emotional satisfaction as a result of prosocial behavior [31].

There are different forms of prosocial behavior, influenced by one's motivations, goals, and outcomes. In this regard, OPB denotes behavior performed on digital platforms, defined as cyber volunteerism, and encompasses activities such as mentoring, online charity participation, assistance through special interest groups, and OSN services [8], [32]. Notably, prosocial behavior centers on larger groups and organizations, whereas OPB focuses on individuals. In summary, digital platforms offer new avenues for OPB that are essential for youth development, including social and emotional engagement, a sense of belonging, personality development, and goal attainment [31].

While prosocial behavior entails voluntary assistance without the expectation of rewards, antisocial behavior encompasses actions that violate social norms and harm others, such as bullying, trolling, harassment, and hacking [8], [12], [19], [33]. Both prosocial and antisocial behaviors can occur on the Internet, as users may exhibit either type of behavior in different circumstances. Correspondingly, online antisocial behavior (OAB) is defined as any unconventional behavior that occurs online, resulting in negative consequences for the recipient [19]. Such online behavior is positively correlated with daily offline social behavior, indicating a consistency between online and offline conduct [34].

D. SELF-ESTEEM

Self-esteem refers to one's subjective evaluation of themselves [35], [36] and is commonly measured using Rosenberg's scale [37]. It is closely related to how a person presents themselves; those with high self-esteem would opt for self-improvement [38] as they are optimistic in their ability to think and act accordingly. Conversely, those with low self-esteem feel insecure and tend to protect themselves when faced with humiliation. Indeed, young individuals with low self-esteem are more likely to experience poor physical, mental, and financial health, and may be more prone to engage in criminal behavior compared to their counterparts with high self-esteem [35]. It is also noteworthy that one's self-esteem evolves in significant and profound ways from childhood to old age [36], [39].

Moreover, self-esteem is determined by an individual's personality characteristics [40], and is manifested in their

internet communication [41]. OSNs provide users with a means to connect without the risk of embarrassment or rejection, allowing them to enjoy the privilege of accessing information about others without revealing their own identity. This aspect of OSNs appeals to individuals with low self-esteem, in contrast to those with high self-esteem, who are more likely to display their positive traits openly [38], [40]. Thus, an individual's daily activities are associated with both positive (high) and negative (low) self-esteem, with the latter potentially motivating them to actively use OSNs [40], [41].

E. RATIONALE OF THE STUDY

Personality traits have been found to encourage OPB [42], but evidence of this relationship remains scarce and contentious [12]. Furthermore, the Big Five have been emphasized as contributing factors of OPB, whereas dark traits have been paid less attention. Dark traits must be considered as OPB predictors to gain a more complete understanding of how personality trait differences influence online behavior [43]. The Dark Triad is generally associated with antisocial behavior such as violence, lack of empathy, poor well-being, and fraud [18], [44]. In contrast, the Big Five often correlate with the opposite, i.e., prosocial behavior [45]. Accordingly, a meta-analytic review of 53 studies revealed that individuals who score high on the Dark Triad traits are most likely to score low on agreeableness in the Big Five. The study also showed that conscientiousness significantly affects antisocial behavior [46]. Another systematic literature review analyzed the association between darker traits (Dark Triad or Dark Tetrad) and OAB [19].

One way to understand and address these online behaviors is by examining their behavioral determinants. Researchers have primarily focused on offline prosocial behavior [26], but are now beginning to explore its online counterpart. Previous studies have indicated that offline prosocial behavior is associated with various positive outcomes, including individual well-being, academic performance, increased self-respect/self-esteem, and ultimately, happiness [47]. These findings underscore the importance of giving more attention to the online equivalent of prosocial behavior. However, most attention has been directed towards OAB [48], creating a paucity of literature on the OPB at the moment [12], [47]. Recent literature has even highlighted the lack of focus on the positive effects, leading to the development of new measures for OPB [8]. Additionally, scholars have expressed the need for more investigations into prosocial behavior [49], [50] as well as the exploration of mediating mechanisms between prosocial and antisocial behavior [51]. Overall, OPB remains an under-researched area, and our understanding of it among today's adolescents is limited [31], [47].

Examining OPB is crucial, as it promotes and reinforces positive online interactions, playing a vital role in balancing out OAB [8]. Moreover, OPB, along with positive interactions, can enhance an individual's overall well-being and self-esteem, contributing to positive development at the

individual, interpersonal, and societal levels [8]. Prosocial individuals exhibit common personality traits, while antisocial individuals tend to display unusual personality traits [18], [52]. Therefore, recent literature has emphasized the need to explore the antecedents of prosocial behavior on OSNs, especially in the context of online interactions and behaviors [12], [31], [50]. To date, however, no study has provided an empirically and theoretically integrated overview of how various personality traits, particularly those associated with OPB, are interrelated [28]. Thus, there is a pressing need to explore individual differences in OPB in relation to corresponding personality constructs to gain a comprehensive understanding of how personality shapes one's prosocial tendencies [28], [47], especially among international students.

Similarly, low self-esteem, which involves a negative self-assessment, is often associated with various psychological problems and antisocial behavior [53]. Therefore, there is a correlation between self-esteem and online behavior, either influenced by personality traits or independently [38], [40], [53], [54]. Research has also examined the correlation between self-esteem and OSN behavior while statistically controlling for personality traits [40]. It has been found that low self-esteem is associated with various psychological problems, such as antisocial behavior and violence [36], [53], [55], whereas the Big Five traits are correlated with high self-esteem [39], [40]. While some studies have explored the indirect effects of the Big Five and Dark Triad personality traits on online behaviors via the mediating role of self-esteem, no known attempt has been made to investigate self-esteem as a mediator between these traits and OPB in particular. Overall, empirical evidence on the interrelationships among personality, self-esteem, and OPB is still limited [12]. Consequently, this study aimed to investigate the Big Five and Dark Triad personality traits as antecedents and self-esteem as a mediating mechanism of OPB. The proposed research framework is shown in Figure 1.

III. METHODS

This section presents the study's methodological strategy by describing the survey measurements, target population, data collection procedure, and data analysis technique.

A. MEASUREMENTS

1) BIG FIVE

The Big Five Inventory (BFI) scale [56] was adapted to measure the OCEAN personality traits among international students. The BFI has demonstrated superior reliability as well as convergent, discriminant, and criterion validity compared to other measures of the Big Five. The BFI's 44 items were rated on a 5-point scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

2) DARK TRIAD

The Short Dark Triad (SD3) scale [57] was adapted to measure the Dark Triad traits among international students. The

SD3 has exhibited excellent reliability and convergent, discriminant, and criterion validity. A total of 27 items were used to assess the three personality traits on a 5-point scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

3) ONLINE PROSOCIAL BEHAVIOR

The OPB scale was used to evaluate international students' participation in OPB. It consists of two subscales (performing and receiving), which demonstrated good to excellent reliability ($\alpha_{\text{POPB}} = .896$; $\alpha_{\text{ROPB}} = .910$) among a sample of 1721 Flemish adolescents in the first year of secondary school [8]. The scale contained a total of 20 items to measure OPB on a 5-point range, as follows: 1 (Never), 2 (Once this month), 3 (A few times this month), 4 (Multiple times this month), and 5 (Every day).

4) SELF-ESTEEM

The 10-item Rosenberg Self-Esteem Scale (RSES) was employed to measure international students' self-esteem on a 5-point Likert scale, ranging from "Strongly Agree" to "Strongly Disagree" [37]. The original measurement used a 4-point rating scale. It was altered to a 5-point one with the addition of a midpoint (Neither Agree nor Disagree), as per the experts' suggestion during the content validity phase of this study. The midpoint addition allowed the respondents to express a neutral opinion, as they were not forced to agree or disagree with a statement [58]. The usage of 5-point and 7-point scales is also common among scholars [59]. Additionally, the RSES measures one's positive and negative feelings about oneself; therefore, the existence of a midpoint could eliminate biased data problems as the respondents are not compelled to take a side [58].

B. PARTICIPANTS

The choice of a self-administered online questionnaire was made to facilitate better dissemination among the targeted population of postgraduate international students in Malaysia. Research procedures, particularly when involving human participants, adhered to the guidelines of the UM Research Ethics Committee Non-Clinical Board (UMREC). Accordingly, approval (Ref Num: UM.TNC2/UMREC-1005) for this study was obtained before conducting the survey, and participation in the survey was voluntary. Participants were recruited through various channels, including the international students' offices of respective Malaysian universities, the Doctorate Support Group (DSG) Facebook page, and other support pages and groups on platforms such as Telegram, WhatsApp, and Facebook. Additionally, the snowball sampling technique was utilized, whereby participants were encouraged to recommend and share the survey link with other potential participants at the end of the survey. A total of 618 responses were collected through SurveyMonkey, an online survey authoring tool. Data screening was conducted to remove

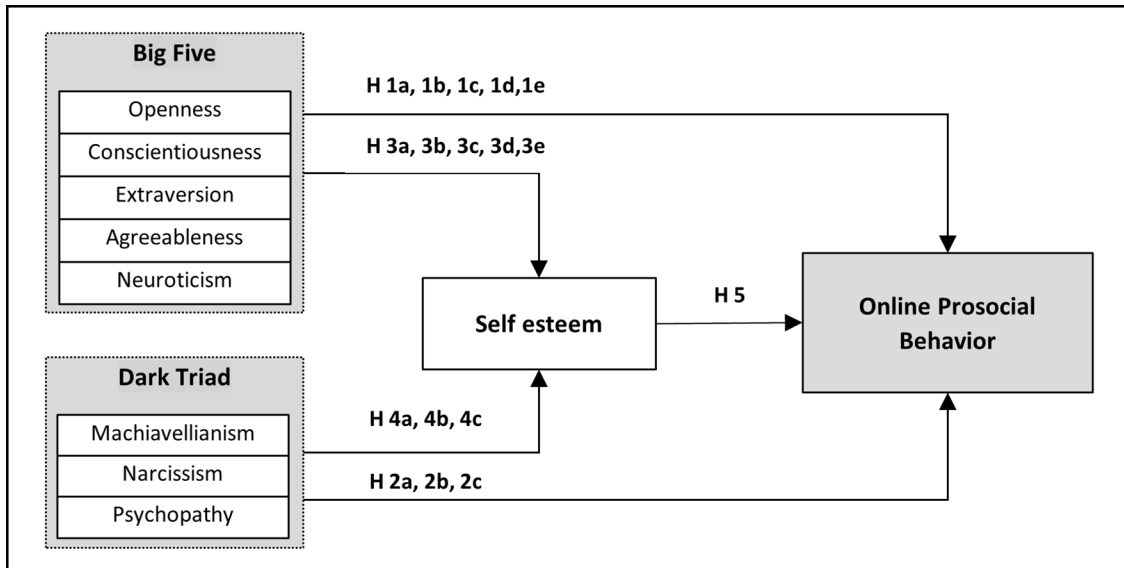


FIGURE 1. Proposed international student profiling framework.

TABLE 1. Discriminant validity result.

Construct	1	2	3	4	5	6	7	8	9	10
1 Agreeableness										
2 Conscientiousness	0.710									
3 Extraversion	0.635	0.731								
4 Machiavellianism	0.161	0.169	0.354							
5 Narcissism	0.598	0.691	0.875	0.521						
6 Neuroticism	0.414	0.482	0.655	0.221	0.581					
7 OPB	0.391	0.304	0.466	0.208	0.386	0.193				
8 Openness	0.613	0.770	0.809	0.270	0.648	0.525	0.361			
9 Psychopathy	0.106	0.256	0.372	0.798	0.514	0.350	0.316	0.275		
10 Self-esteem	0.470	0.518	0.625	0.185	0.600	0.537	0.429	0.485	0.269	

TABLE 2. Predictive relevance Q² result.

Construct	Q ²
OPB	0.129
Self-esteem	0.204

incomplete and outlier responses, resulting in 257 valid responses.

C. DATA ANALYSIS

For data analysis, this study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 3.3. PLS-SEM is a two-step process, including the assessments of the measurement model and the structural model, which will be explained in detail in the following sub-sections. Prior to that, various statistical remedies were employed to address common method variance (CMV) issues

in accordance with established guidelines [60], [61]. The results of three bias detection methods indicate that CMV was not a concern in this study, as all values fell below the specified cutoffs.

1) MEASUREMENT MODEL ASSESSMENT

The measurement model assessment was conducted to evaluate the model’s convergent validity, construct reliability, and indicator reliability, all of which passed the required threshold values [62]. Discriminant validity was determined using the Heterotrait-Monotrait ratio of correlations (HTMT) technique. As shown in Table 1, the values did not exceed the cutoff values of HTMT0.85 or HTMT0.90, confirming that construct validity was established in this study.

2) STRUCTURAL MODEL ASSESSMENT

The structural model assessment aimed to test the research hypotheses to answer the corresponding research questions.

TABLE 3. PLS-Predict result.

Construct	Q ² _predict	
OPB	0.163	
Self-esteem	0.330	

Item	PLS		Linear Model (LM)		PLS-LM	
	RMSE	MAE	RMSE	MAE	RMSE	MAE
opb_1	0.795	0.619	0.837	0.660	-0.042	-0.041
opb_2	0.904	0.700	0.977	0.734	-0.073	-0.034
opb_3	0.840	0.641	0.864	0.678	-0.024	-0.037
opb_4	0.750	0.584	0.788	0.610	-0.038	-0.026
opb_5	1.046	0.824	1.108	0.861	-0.062	-0.037
opb_6	0.931	0.705	0.959	0.709	-0.028	-0.004
opb_7	0.791	0.593	0.797	0.617	-0.006	-0.024
opb_8	1.042	0.805	1.089	0.851	-0.047	-0.046
opb_9	0.798	0.593	0.831	0.646	-0.033	-0.053
opb_10	0.812	0.629	0.835	0.666	-0.023	-0.037
opb_11	0.791	0.630	0.834	0.659	-0.043	-0.029
opb_12	0.889	0.697	0.915	0.708	-0.026	-0.011
opb_13	0.919	0.695	0.974	0.751	-0.055	-0.056
opb_14	0.926	0.720	0.963	0.757	-0.037	-0.037
opb_15	1.113	0.868	1.165	0.914	-0.052	-0.046
opb_16	0.969	0.767	1.026	0.774	-0.057	-0.007
opb_17	0.904	0.703	0.931	0.724	-0.027	-0.021
opb_19	0.945	0.739	1.026	0.793	-0.081	-0.054
opb_20	1.014	0.791	1.046	0.810	-0.032	-0.019

The model’s predictive relevance (Q²) was evaluated using the blindfolding procedure, which is a resampling method that systematically eliminates and defines indicators in the reflective measurement model of endogenous constructs [63]. A model is said to have satisfactory predictive relevance when its Q² is larger than zero [63]. The results in Table 2 indicate that this study’s model achieved predictive relevance.

Predictive relevance was further verified using the PLS-Predict procedure with the default number of folds and repetitions set to 10, following SmartPLS’ default settings [64]. The differences between the PLS and Linear Model (LM) were assessed, and the study model was deemed to possess strong predictive power, as none of the PLS model errors were lower than those of the LM model (see Table 3).

The assessment of path coefficients between latent variables is necessary to validate the structural model and research hypotheses. The path coefficient value should be at least 0.1 to establish a valid effect within the model [65]. In this study, nine of the 17 proposed hypotheses were supported. They were statistically significant at a significance level of at least 0.05, demonstrating positive directions with coefficient values (β) ranging from -0.163 to 0.257. Table 4 summarizes the results of all proposed hypotheses, including the direct and mediated relationships between the variables.

First, H1a, H1b, and H1c yielded contradictory results and were not supported in this study, rejecting the positive effects of openness, conscientiousness, and extraversion on OPB. One possible explanation might be that postgraduate international students are deeply immersed in academia, prioritizing their research over seeking new online experiences. Additionally, online socialization might be perceived as an unnecessary expenditure of time and money, especially when they have families with them in the host country who require support. Another interpretation is that predictions are simply not always true [42], particularly in unique contexts like that of postgraduate international students in Malaysia. Furthermore, environmental changes and adaptation difficulties faced by international students in their host country’s new environment and culture may play a role in the insignificant outcomes.

On the other hand, H1d was supported and aligns with recent findings that demonstrate a positive association between agreeableness and OPB [12], both in real-time and laboratory settings [45]. Thus, it can be concluded that international students who are friendly, helpful, and dependable consistently engage in more OPB. This study also found that international students do not exhibit neuroticism traits, and neuroticism is negatively associated with OPB, supporting H1e and confirming earlier findings [12], [45]. One possible

explanation is that postgraduate international students are usually emotionally stable and calm, likely due to their older and more mature status.

A previous study found that individuals scoring high in Machiavellianism traits tend to exhibit characteristics of problematic internet users [66]. However, in this study, H2a, which hypothesized a negative relationship between Machiavellianism and OPB, was not supported. This lack of support may be attributed to the fact that international students often display characteristics such as charisma, intelligence, leadership, and a strong focus on completing their studies, which may counteract the negative aspects of Machiavellianism. This interpretation is consistent with previous findings that Machiavellianism is negatively correlated with various attributes of emotional intelligence [67]. Likewise, H2b was not supported, suggesting that international students are neither addicted to social media nor using it problematically, bearing no impact on their OPB. However, H2c was supported, indicating that psychopathic traits hinder OPB among international students. This aligns with previous research indicating that psychopathy is negatively correlated with emotional intelligence [67].

As for the mediation analysis, the results revealed a significant correlation between self-esteem and OPB, even though there is only partial evidence that self-esteem can enhance OSN activities [40]. Earlier evidence of a strong association between low self-esteem and problem externalization suggests that individuals with low self-esteem tend to exhibit aggressive behavior when it deviates from social norms [55]. One possible reason is that prosocial behavior involves bi-directional interactions and is often linked to self-esteem [68]. Furthermore, low self-esteem is associated with narcissism, resulting in antisocial behavior, while high self-esteem fosters prosocial behavior [35], [55]. Notably, a common attribute of international students is their willingness to support their peers in both academic and non-academic matters. For instance, those with high self-esteem are more likely to assist individuals with low self-esteem once their personal needs have been met, a tendency that may extend to cyberspace [26]. The results in Table 4 are summarized and illustrated in Figure 2.

IV. DISCUSSION AND IMPLICATIONS

The proposed framework has been validated and yielded noteworthy results, which offer several contributions.

First, this framework contributes to a deeper understanding of the context of international students in Malaysia by developing and testing an integrated framework that explores how personality traits influence their OPB. OPB is a newly developed and under-researched construct that distinguishes itself from offline prosocial behavior, which has been the primary focus of previous literature [12]. This is a valuable contribution because it addresses the gap in evidence regarding the association between diverse personality traits and OPB [28]. In addition, this study is likely one of the first to employ OPB in the Malaysian context, expanding the literature beyond

Western countries and highlighting the importance of studying online behavior in culturally diverse regions like Asia, and more specifically, Malaysia. The geographical and cultural backgrounds of international students' countries of origin may manifest in their online behaviors, emphasizing the need for a cross-cultural examination of online behaviors. Overall, this study integrates and validates the applicability of three theories (personality traits, self-esteem, and OPB) within the Malaysian higher education context.

Second, the study's International Student Profiling Framework was developed using PLS-SEM, an approach considered suitable for simultaneously examining the underlying correlations among multiple constructs. PLS-SEM differs from conventional multivariate analysis by its ability to identify causal relationships among numerous variables. While PLS-SEM has been previously applied in the higher education setting, it has typically focused on aspects such as the adaptability of e-learning or the well-being of international students. Given that the OPB scale used in this study is relatively new, it contributes to methodological knowledge by extending the application of PLS-SEM to assess the OPB of international students.

Third, this study enriches the literature by introducing a mediating variable into the framework. Previous research has primarily investigated personality traits solely as direct predictors, along with other related constructs. In this study, self-esteem was proposed and validated as an underlying mechanism that explains how specific personality traits influence OPB. This finding is a crucial contribution that offers an initial understanding of how personality traits operate through self-esteem to manifest as OPB. Consequently, this research enhances existing frameworks and models of online behavior. Particularly, the insights gained from understanding these factors hold valuable implications for guiding higher education institutions (HEIs), ministries, and policymakers, as explained below.

A. HIGHER EDUCATION INSTITUTIONS

Malaysia's aspiration to become an international education hub in Southeast Asia is feasible due to its attractive pull factors, including its diversity, low cost of living, English-medium instruction, and hassle-free admission processes [10], [69]. While there has been a noticeable increase in the number of international students coming to Malaysia, we know of no prior efforts to screen these students before their arrival in the country. The current recruitment and screening process relies on merely a few documents, potentially leading to the oversight of critical information about prospective international students. In response to this issue, this study highlights how various personality traits and self-esteem are associated with OPB, offering valuable recommendations for identifying and extricating international students who may exhibit antisocial behavior.

Malaysian HEIs are striving to accomplish the nation's objective of becoming a regional hub for international

TABLE 4. Summary of hypotheses decision.

Hypotheses		Decision
H1a	Openness to experience is positively associated with OPB	Not Supported
H1b	Conscientiousness is positively associated with OPB	Not Supported
H1c	Extraversion is positively associated with OPB	Not Supported
H1d	Agreeableness is positively associated with OPB	Supported
H1e	Neuroticism is negatively associated with OPB	Supported
H2a	Machiavellianism is negatively associated with OPB	Not Supported
H2b	Narcissism is negatively associated with OPB	Not Supported
H2c	Psychopathy is negatively associated with OPB	Supported
H3a	Self-esteem mediates the relationship between openness and OPB	Not Supported
H3b	Self-esteem mediates the relationship between conscientiousness and OPB	Supported
H3c	Self-esteem mediates the relationship between extraversion and OPB	Supported
H3d	Self-esteem mediates the relationship between agreeableness and OPB	Not Supported
H3e	Self-esteem mediates the relationship between neuroticism and OPB	Supported
H4a	Self-esteem mediates the relationship between Machiavellianism and OPB	Not Supported
H4b	Self-esteem mediates the relationship between narcissism and OPB	Supported
H4c	Self-esteem mediates the relationship between psychopathy and OPB	Supported
H5	Self-esteem is positively associated with OPB	Supported

education in Southeast Asia. Although the influx of international students can undeniably bolster Malaysia's economy and enhance the rankings of Malaysian HEIs, it is crucial for HEIs to exercise caution in their recruitment efforts. Simply increasing the numbers of international students should not be the sole marker of success; instead, the focus should be on the quality of international students admitted. HEIs should therefore periodically review and refine their recruitment procedures in collaboration with administrators and recruiters, aiming to attract genuine international students to Malaysia. To this end, the findings from this study provide valuable insights for HEIs to develop strategies for international student recruitment, including improved screening and surveillance.

Furthermore, by monitoring international students' OPB on OSNs, HEIs can leverage students' interactions for various purposes. First, online reviews posted by students can offer valuable information for HEIs in the form of comments, recommendations, or suggestions to improve their products and services. As the primary customers of HEIs, student feedback should be given significant consideration to maintain and increase student intake. Moreover, students tend to be influenced by online content, particularly on OSNs. Therefore, HEIs should actively address both positive and negative online posts to enhance their reputation among students. Lastly, HEIs should be vigilant in managing paid reviews and fake content on their OSN platforms. These strategies

can project a sense of accountability and transparency to stakeholders and gain trust from students.

B. MINISTRIES

To Malaysian government ministries, this study's framework offers a supporting tool for monitoring incoming international students by understanding their personality traits and self-esteem in relation to their OPB. Ministries such as Higher Education, National Security, Immigration, and Healthcare can utilize this information to screen potential international students and effectively manage the international student population within the country. Ministries can also monitor if students showcase any changes in their personality traits and OPB throughout their study. In addition, ministries involved in ICT and security can collaborate to refine and adapt this framework for standardized use by the Malaysian government, which would streamline the management of international students or employees.

C. POLICYMAKERS

Malaysia's visa processing is notably hassle-free compared to other Southeast Asian countries, making it a key attraction for international students. Visa and immigration procedures play a pivotal initial role in shaping a positive impression of the host country. However, the current state of international student monitoring in the education and security sectors in Malaysia remains unclear. Therefore, Malaysian

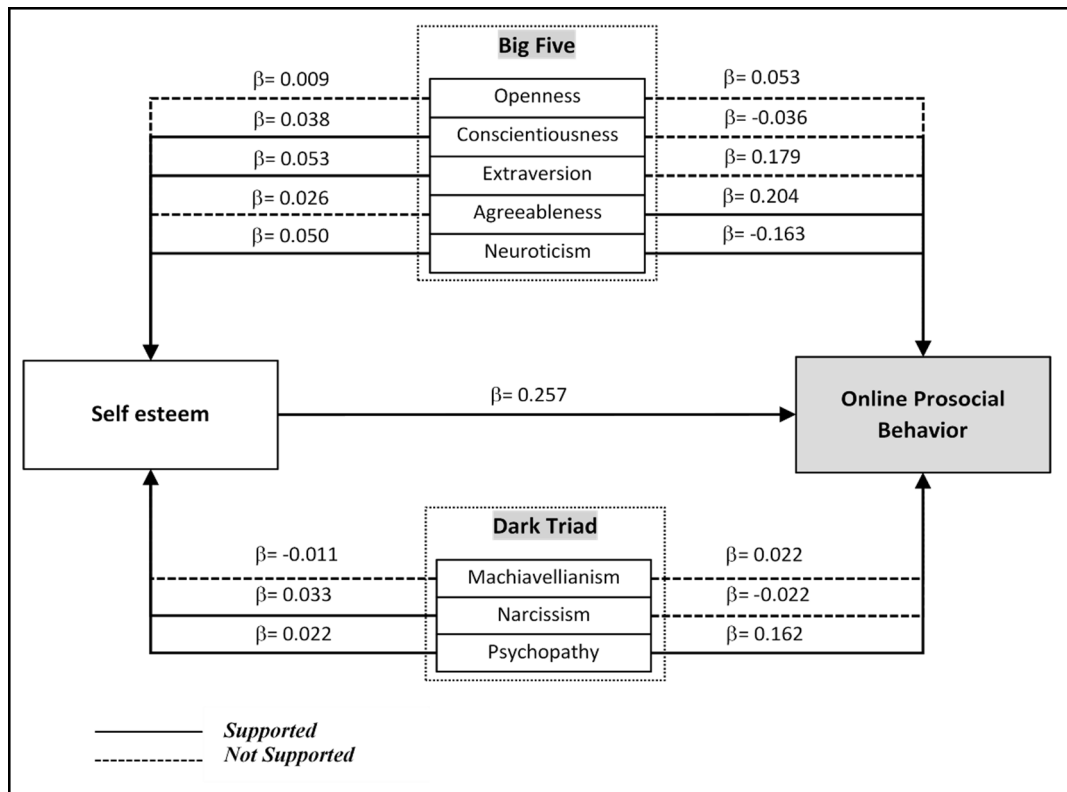


FIGURE 2. Structural model results.

policy-makers stand to benefit significantly from the utilization of this framework as they work towards positioning Malaysia as an education hub in Southeast Asia. As a starting point, policy-makers in these areas could consider integrating this framework into international student policies. Given the tech-savvy and social media-savvy nature of most of society, making the assessment of personality traits a mandatory policy could provide valuable insights into how dark or light students' personalities are.

At the same time, exposure to new environments, people, and cultures can influence international students' self-esteem and subsequently, their behavior. Therefore, policy-makers should establish appropriate guidelines for surveillance and ensure that data is collected ethically without adversely affecting students' well-being. Furthermore, policy-makers might find it advantageous to extend the application of this framework beyond international students to encompass international professionals and workers who enter Malaysia.

V. CONCLUSION

This study's proposed conceptual model was tested with a sample of international postgraduate students in Malaysia. The findings provided empirical support for nine of the model's 17 hypothesized relationships. Drawing from three well-established theories, i.e., the Big Five, Dark Triad, and self-esteem, the results collectively explain both the positive and negative aspects of one's personality and resulting self-worth. We find that personality traits can indeed

play a significant role in influencing international students' online social behavior, offering insights into their potential future behavior. Notably, this study highlights the significant correlation between self-esteem and OPB and the mediating role of self-esteem. It can thus be inferred that prosocial behavior involves a bi-directional interaction and is closely linked to one's self-esteem [68]. Ultimately, this study has not only introduced new dimensions to the existing higher education literature but also contributes to the current knowledge regarding the status quo of Malaysian higher education. Nevertheless, it is essential to acknowledge that the sample for this study was limited to Malaysian postgraduate international students. Consequently, the findings cannot be generalized to all international students studying in Malaysian educational institutions. Apart from expanding the sample, future researchers might consider incorporating additional factors, such as internet usage patterns, social media addiction, and the level of digital literacy, to gain a more comprehensive understanding of individuals' online behavior.

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