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A DEMATEL-Based Model for Understanding Bullying Factors Among Orang Asli Pupils in Malaysia

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ABSTRACT

Bullying within Orang Asli primary schools in Malaysia represents a complex socio-educational dilemma. While ethnic disparities, cultural friction, and socioeconomic disadvantages are recognized as contributing factors to student vulnerability, existing research remains fragmented. Most studies examine risk factors in isolation, failing to account for the systemic interdependencies that drive bullying dynamics within indigenous communities. Consequently, there is a critical need for an integrated approach to understand how these multifaceted elements interact to influence social safety. This study aims to develop a causal model to analyze the factors influencing bullying dynamics among Orang Asli pupils, focusing on five key dimensions: ethnic, cultural, socioeconomic, peer pressure, and the school support system. To achieve this, the study employs the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method. This approach utilizes expert evaluations to identify cause and effect relationships and determine the relative influence of each factor within the ecosystem. The findings reveal a highly interconnected system where peer pressure is the most prominent factor but functions as a systemic outcome. Conversely, the school support system and socioeconomic conditions emerge as the primary causal drivers. These results indicate that bullying is a structural phenomenon, where institutional quality and socioeconomic stability serve as the root regulators that shape the cultural environment and peer dynamics for Orang Asli pupils. In conclusion, this research demonstrates that bullying among Orang Asli pupils is a multifaceted phenomenon driven by the complex interplay of social, cultural, and institutional forces. Methodologically, the study provides a data-driven framework for prioritizing interventions based on a causal hierarchy of risk factors. By elucidating these interrelationships, the research fills critical gaps in the understanding of indigenous social dynamics and educational policy, offering a strategic model for fostering inclusive and safe learning environments in marginalized contexts

Keywords:

orang Asli; students; DEMATEL

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1. Introduction

UNESCO [1] reported that school bullying is a serious global issue with 32 percent of students worldwide have experienced peer victimization. Evidence suggests that students perceived as divergent from dominant social cohorts, particularly those from indigenous and ethnic minority backgrounds face a disproportionately higher risk of victimization and social exclusion. Research indicates that these marginalized groups are frequently targeted due to perceived cultural or ethnic differences, which are intensified within school environments that lack inclusive support structures. In Malaysia, the Ministry of Education Malaysia [2] discovered that 4,994 bullying cases were recorded through the *Sistem Sahsiah Diri Murid (SSDM)* for the first ten months of 2023 alone. Tahir et al. [3] argued that the current legal and doctrinal gaps are still falling short, particularly in establishing clear accountability for school bullying. While this problem is widespread, it is often more critical within marginalized communities. Within this context, Othman [4] stated that Orang Asli school children face unique challenges in achieving the national sustainable education agenda including the need for a safer learning environment. According to the United Nations [5], addressing these disparities is essential to achieve Sustainable Development Goal (SDG) 4 and SDG 10 which focusing on inclusive quality education and reduced inequalities.

Bullying in Malaysian schools has been widely studied over the years but most of the focus has been on the general student population. For instance, Ismail et al. [6] conducted a preliminary study using a modified social experiment approach to understand the manifestation of bullying among primary school children. However, Renganathan [7] argued that most research concerning the Orang Asli focus too much on their educational challenges, often overlooking the deeper social challenges like bullying and peer victimization. While Ahmad et al. [8] and Salim et al. [9] examined the factors contributing to the academic success and observations of Orang Asli teachers, there remained the lack of actual data regarding on specific bullying patterns faced by the school children themselves. Furthermore, Yusoff et al. [10] highlighted that educational disparities among Orang Asli communities were often driven by social and environmental challenges that mainstream intervention programs fail to address. This study addresses this gap by investigating the nature of bullying among Orang Asli school children which providing a specialized perspective that has been missing from previous research.

This study offers significant contributions to both the theoretical discourse on indigenous education and the practical development of inclusive social policy. Theoretically, this research advances the current literature by pivoting from the traditional, narrow focus on academic attainment to a more holistic examination of the socio ecological well-being of Orang Asli pupils. By prioritizing their lived social experiences, the study provides a critical lens into the nuances of bullying within marginalized and indigenous contexts which areas frequently overlooked in mainstream behavioral research. This shift is essential for deconstructing how systemic marginalization manifests as peer-led aggression in specialized educational settings.

Practically, the findings serve as an empirical roadmap for key institutional stakeholders, specifically the Ministry of Education Malaysia and the Department of Orang Asli Development (JAKOA). By elucidating the underlying causal mechanisms of bullying, this study provides an evidence-based framework for the formulation of culturally responsive and contextually situated interventions. Rather than applying generic anti-bullying protocols, these insights allow for the design of support systems that address the unique cultural and socioeconomic drivers of the Orang Asli experience. Ultimately, these contributions are vital for establishing a safe, inclusive, and equitable educational environment that fosters long-term retention and social integration for indigenous learners.

1.1 Forms, Contexts, and Consequences of Bullying among Orang Asli Children

Empirical evidence indicates that bullying among Orang Asli pupils occurs both within and beyond school settings. Marcus *et al.* [11] found that bullying is not only perpetrated within school environments but is also sustained by members of the surrounding community, giving rise to what may be characterised as intra-ethnic bullying. Based on studies made by Rahim *et al.* [12] and Yi, S. *et al.* [13], the manifestations of bullying are multifaceted, encompassing physical, verbal, social, and sexual forms. Meanwhile Marcus *et al.* [11], Mohamad and Bakar [14] and Nur *et al.* [15]) found the physical bullying appears to be particularly prevalent among Orang Asli pupils. Brownlee *et al.* [16] identified the behaviour often reflects power imbalances, especially in terms of physical size, and includes aggressive acts such as kicking, pushing, and spitting.

Further evidence highlights the intersection of bullying with racial discrimination. According to Angit [17], many Orang Asli pupils experience racism and bullying in school, which often perpetrated by mainstream pupils. This issue is a significant concern not only for the pupils themselves but also for their parents because it represents one of the contributing factors to school dropout reported by Rahim *et al.* [12] and IDEAS [18]. Victims are subjected to derogatory labels such as stinky and stupid and are ridiculed for their socioeconomic status based on study made by Rahim *et al.* [12] in 2020. In addition, linguistic discrimination has been reported by Angit [17], whereby Orang Asli pupils and community members are mocked for their language and accent. As a coping mechanism, some feel compelled to suppress their linguistic identity in public interactions to avoid ridicule or exploitation. This response reflects both the social pressures they face and their vulnerability to being deceived by individuals from other communities when using their native language or accent.

The consequences of bullying among Orang Asli pupils are complex and varied. Marcus *et al.* [11], victims experience a range of emotional responses and behavioural reactions. Some, particularly male children, report intense anger and a desire for retaliation against their perpetrators. Conversely, other experience fear and choose to withdraw from the situation, often seeking safety at home. These differing responses may be influenced by factors such as age, physical size, and perceived vulnerability. The same findings reported by Mohamad and Bakar [14] during the exploration to see how different the pupils process peer victimization through the lens of individual temperament and social environment.

Within the school context Marcus *et al.* [11] and Mohamad and Bakar [14]) confirmed teachers had play a protective role in addressing bullying incidents. When pupils report such experiences, teachers can intervene, often by reprimanding the perpetrators. However, not all victims disclose their experiences, as some fear further victimisation or escalation of the. In addition, Mohamad and Bakar [14] seen the phenomena where's the pupils unable seeking support from teachers, children frequently turn to their peers. In certain instances, peer involvement escalates into physical confrontation, suggesting that while peer support is valued, it may also lead to retaliatory aggression. This dynamic underscore the centrality of peer relationships in shaping pupil's responses to bullying. As noted by Rahim *et al.* [12], the presence of supportive friends can mitigate the emotional impact of bullying and plays a critical role not only in coping with such incidents but also in influencing school retention among Orang Asli pupils.

1.2 Bullying Determinants and Research Gaps

Extent literature has identified multiple determinants of bullying behaviour across individual, peer, and institutional domains. For instance, Sabramani *et al.* [20] reported that bullying among Malaysian secondary school students is influenced by individual characteristics, peer conflict, social

media usage patterns, and classroom climate. These characteristics significantly associated with school bullying. Notably, peer influence was found to exert both positive and negative effects, contributing to substantial behavioural changes among students. In contrast, favourable school-related factors such as positive classroom behaviour, strong attachment to teachers, and consistent teacher appraisal were associated with more constructive student behaviour. These findings are further supported by Azizah and Nisa [21], who similarly identified peer influence and the school environment as critical determinants of bullying occurrence. In addition, Tan *et al.* [22] highlighted several factors significantly associated with bullying victimisation. These include exposure to physical attacks, illicit drug use, involvement in physical fights, younger age (i.e., below 14 years), and prior suicide attempts. Furthermore, psychosocial factors such as loneliness, truancy, suicidal ideation, and symptoms of despair, anxiety, and stress were also found to be closely linked to bullying victimisation.

In contrast, research reveals that the factors that contribute to bullying among Orang Asli students are strongly based in home background, environmental circumstances, and family traditions. According to Dewi *et al.* [23] Ismail *et al.* [6] and Paul *et al.* [11], low family socioeconomic position has a significant impact on school failure and increased student vulnerability. These factors create a huge "resilience gap," making students more vulnerable to exploitation inside the educational environment. Furthermore, cultural and language differences between Orang Asli family practices and mainstream educational frameworks also contribute to misunderstanding and exclusion of Orang Asli pupil from their peers. It was found by Dewi *et al.* [23] and Ismail *et al.* [6] that these factors cause social marginalization and targeted harassment. The qualitative findings provided by Ismail *et al.* [6] suggest that social exclusion serves as a direct precursor to bullying behavior, effectively transforming educational environments into spaces of isolation. Their analysis indicates that when inclusive practices are absent, schools cease to be supportive communities and instead become sites of marginalization for vulnerable pupils. In addition, Ismail *et al.* [6] and Paul *et al.* [11] identified that inadequate systematic data collection on bullying among Orang Asli pupil makes it difficult to quantify the problem accurately and to conduct focused treatments. As noted in the works of MJS Paul *et al.* [11] and Ismail *et al.* [6], these investigations underscore the significance of enhanced reporting processes to meet the demands of these Orang Asli pupil.

Bullying, according to the social-ecological framework given by Hong and Espelage [24], is a multidimensional phenomenon caused by the ongoing interaction of individual, peer, and institutional systems. Their findings indicate that victimization is more than just a behavioral issue; it is profoundly ingrained in macro-level cultural norms and social identities. In this context, larger social dynamics, like ethnicity and group identity, shape how pupils are seen in their educational setting. These institutions can create an environment in which minority or indigenous people are more prone to marginalization, as cultural ideas determine the social value attributed to various identities. Importantly, the authors identify peer interactions as the most direct microsystem in which these broader cultural disparities are performed and perpetuated. Peer dynamics serve as an important mediating mechanism, transforming abstract racial disparities into observable acts of hostility by normalizing discriminating conduct. This implies that peer pressure does not operate in a vacuum, but rather exacerbates existing social tensions. In the Orang Asli setting, this paradigm argues that bullying is the result of macro-level cultural vulnerabilities being activated by the immediate peer environment, necessitating an intervention plan that targets both institutional support and social group dynamics.

Despite these contributions, several limitations remain evident in the existing body of knowledge. According to Ang *et al.* [25] and Ismail *et al.* [6] much of the current research relies on cross-sectional designs which constrain the ability to examine the long-term effects of bullying. This aspect is crucial for informing sustainable and long-term policy interventions, particularly for Orang Asli students.

Moreover, existing studies such as Hong and Espelage [25], Subramani *et al.* [20] and Azizah and Sitni [21] frequently overlook Orang Asli perspectives, thereby producing potentially biased findings that limit the development of culturally appropriate and context-sensitive interventions. Additionally, there is a lack of in-depth investigation into peer group dynamics and social interactions, despite their recognized importance in shaping bullying behavior. This gap restricts a comprehensive understanding of how social pressures operate within Orang Asli communities. Furthermore, while prior studies such as insert three references help to explain school bullying among Orang Asli children, these studies tend to examine bullying-related variables in isolation without adequately considering their interrelationships within a broader community context. These studies have successfully identified relevant factors, but they fall short in explaining how these factors interact and influence one another within a systemic framework.

To address these limitations, the present study adopts the Decision-Making Trial and Evaluation Laboratory (DEMATEL) approach to examine the causal structure of bullying among Orang Asli students. By identifying cause-and-effect relationships among key factors, this approach enables the classification of variables into cause-and-effect clusters. Consequently, the findings will provide a more holistic understanding of the bullying system and offer valuable insights for policymakers to design proactive and targeted interventions that address the root causes shaping bullying behavior among Orang Asli students.

2. Methodology

2.1 DEMATEL Procedural Framework

This study used the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method, which is a sophisticated structural modeling technique originally developed by the Science and Human Affairs Program of the Battelle Memorial Institute of Geneva between 1972 and 1976 to analyze complex world problems. This method has evolved into a powerful multi-criteria decision-making tool as demonstrate by Si *et al.* [26]. that enables researchers to visualize the causal relationships among factors in complex systems through the construction of structural models and impact-relation maps. According to Wu and Lee [27], the fundamental premise of DEMATEL lies in its ability to transform qualitative assessments into quantitative indices, thereby revealing the interdependencies and feedback mechanisms among system elements. According to Tzeng, Chiang, and Li [28], unlike traditional analytical methods that assume independence among criteria, DEMATEL acknowledges the intricate interrelationships and mutual influences that characterize real-world decision-making scenarios, making it particularly valuable for identifying key factors and understanding their direct and indirect effects on other elements within a system. As evidenced by Govindan, Khodaverdi, and Jafarian [29] and Zhou, Huang, and Chen [30], the DEMATEL method has been extensively applied across diverse domains, including supply chain management, environmental assessment, technology evaluation, and organizational performance analysis. These applications demonstrate the method's versatility and robustness in addressing complex decision-making problems by clarifying the structural relationships between system variables.

The implementation of DEMATEL follows a systematic five-step procedure that transforms expert judgments into structural matrices revealing causal relationships. To determine the causal structure of bullying dynamics, the study followed the five-step DEMATEL procedure. First, an initial direct-relation matrix was established through expert evaluations. This matrix was then normalized to standardize the influence values. Third, the total-relation matrix was computed to account for both direct and indirect interactions. In the fourth step, prominence and relation indices were calculated to identify the importance and causal role of each factor. Finally, a causal diagram was constructed

to provide a visual representation of the structural model, facilitating the identification of strategic intervention points.

2.2 Steps in DEMATEL

Step 1: Generate the direct relation matrix

To identify the model of the relations among the n criteria, an $n \times n$ matrix is first generated. The effect of the element in each row is exerted on the element of each column of this matrix. If multiple experts' opinions are used, all experts must complete the matrix. arithmetic mean of all the experts' opinions is used and then a direct relation matrix X is generated.

$$X = \begin{bmatrix} 0 & \cdots & x_{n1} \\ \vdots & \ddots & \vdots \\ x_{1n} & \cdots & 0 \end{bmatrix} \quad (1)$$

Step 2: Compute the normalized direct-relation matrix

To normalize, the sum of all rows and columns of the matrix is calculated directly. The largest number of the row and column sums can be represented by k . To normalize, it is necessary that each element of the direct-relation matrix is divided by k .

$$k = \max \left\{ \max \sum_{j=1}^n x_{ij}, \sum_{i=1}^n x_{ij} \right\}$$

$$N = \frac{1}{k} * X \quad (2)$$

Step 3: Compute the total relation matrix

After calculating the normalized matrix, the fuzzy total-relation matrix can be computed as follows:

In other words, an $n \times n$ identity matrix is first generated, then this identity matrix is subtracted from normalized matrix and the resulting matrix is reversed. The normalized matrix is multiplied by the resulting matrix to obtain the total relation matrix.

$$T = \lim_{k \rightarrow +\infty} (N^1 + N^2 + \cdots + N^k) \quad (3)$$

$$T = N \times (I - N)^{-1} \quad (4)$$

Step 4: Set the threshold value

The threshold value must be obtained to calculate the internal relations matrix. Accordingly, partial relations are neglected and the Network Relationship Map (NRM) is plotted. Only relations whose values in matrix T is greater than the threshold value are depicted in the NRM. To compute the threshold value for relations, it is enough to calculate the average values of the matrix T . After the threshold intensity is determined, all values in matrix T which are smaller than the threshold value are set to zero, that is, the causal relation mentioned above is not considered.

In this study, the threshold value is equal to 1.4954

Step 5: Final output and create a causal diagram

The next step is to find out the sum of each row and each column of T (in step 3). The sum of rows (D) and columns (R) can be calculated as follows:

$$D = \sum_{j=1}^n T_{ij} \quad (5)$$

$$R = \sum_{i=1}^n T_{ij} \quad (6)$$

Then, the values of $D+R$ and $D-R$ can be calculated by D and R , where $D+R$ represent the degree of importance of factor i in the entire system and $D-R$ represent net effects that factor i contributes to the system.

2.3 Sampling Technique for DEMATEL Application

The selection of appropriate sampling techniques constitutes a critical component in DEMATEL implementation, as the quality and representativeness of expert judgments directly influence the validity and reliability of the resulting structural model. Purposive sampling, often characterized as judgmental or expert sampling, remains the predominant technique in DEMATEL research. As noted by Patton [31] and Etikan et al., [32] this approach allows for the deliberate selection of participants based on their specialized knowledge and deep understanding of the problem domain. The determination of an optimal sample size in such applications is frequently debated. However, Chen and Hung [33] and Li and Tzeng [34] suggest that a range of 5 to 15 experts is enough to balance diverse perspectives with the practical requirements of consensus building. Furthermore, the criteria for expert qualification typically include extensive professional experience and advanced academic credentials, as established by Dalalah et al. [35] and Shieh et al. [36]. In accordance with these methodological standards, the current study engaged a panel of five experts to provide the primary data. This panel size is justified by the depth of domain expertise required for accurate causal modeling rather than a need for statistical representativeness.

- i. A Psychology Officer in Child Development from the Ministry of Women, Family and Community Development, with extensive experience in child behaviour and psychological wellbeing.
- ii. An academic researcher specialising in Orang Asli education and marginalisation, with significant research contributions in indigenous education and social inequality.
- iii. A Medical Officer with experience in child and adolescent health, particularly in understanding the psychological and health impacts of bullying.
- iv. An officer from the Department of Orang Asli Development (JAKOA), with direct exposure to the socioeconomic and cultural conditions of Orang Asli communities.
- v. A representative from the Ministry of Education (MOE), Unit Orang Asli, involved in policy implementation and educational support programs for indigenous students.

Each expert possessed 10 to 15 years of professional experience and direct field engagement, ensuring their evaluations were grounded in both theory and practice. By synthesizing insights from psychological, medical, and educational sectors, this expert-based approach enhances the validity of the findings and provides a comprehensive understanding of the complex social dynamics surrounding bullying. Although the number of experts is relatively small, it is consistent with

DEMATEL methodology, which emphasises the depth of expertise rather than sample size, as the technique relies on informed judgment rather than statistical generalisation.

2.4 DEMATEL Questionnaire Scale Explanation

Respondents are required to assess the direct influence of each factor on other factors using a five-point scale. The scale is defined as follows: 0 = No influence, indicating that one factor has absolutely no impact on another; 1 = Low influence, suggesting minimal impact; 2 = Moderate influence, representing a reasonable degree of impact; 3 = High influence, indicating substantial impact; and 4 = Very high influence, denoting an extremely strong causal relationship between factors. This numerical scale allows for systematic quantification of expert judgments regarding the interdependencies among variables. The collected responses are subsequently aggregated to form an initial direct-relation matrix, which undergoes mathematical normalization and matrix operations to derive the total-relation matrix. From this matrix, key indicators including prominence values ($R+C$) and relation values ($R-C$) are calculated, enabling the classification of factors into cause-and-effect groups. The prominence value indicates the overall importance of a factor within the system, while the relation value determines whether a factor primarily influences others (cause) or is predominantly influenced by others (effect). This analytical approach provides valuable insights into the structural relationships among variables and facilitates evidence-based decision-making by identifying critical factors that warrant prioritized attention in intervention strategies.

3. Results

3.1 The average direct-relation matrix

The data from the average direct-relation matrix (Table 1) provides empirical evidence that ethnic and cultural factors constitute the foundational drivers of social friction among pupils. In the DEMATEL framework, the magnitude of these values directly represents the intensity of influence one variable exerts over another. As illustrated in the diagram below, the Ethnic factor exerts a dominant influence on Culture (3.4) and Peer Pressure (3.2), while Culture maintains a reciprocal impact on Ethnic (3.0) and Peer Pressure (3.0).

Table 1
Average Direct-Relation Matrix

	Ethnic	Culture	Socio economic	Peer Pressure	School Support System
Ethnic	0.0000	3.4000	2.4000	3.2000	2.4000
Culture	3.0000	0.0000	2.0000	3.0000	2.2000
Socioeconomic	2.4000	2.0000	0.0000	3.0000	3.4000
Peer Pressure	3.0000	3.0000	2.0000	0.0000	3.0000
School Support System	0.0000	3.4000	2.4000	3.2000	2.4000

Our analysis reveals a primary causal pathway between Ethnic and Culture factors, defined by a potent bidirectional relationship (3.4 and 3.0, respectively). This interaction suggests that ethnic identity and cultural nuances form a self-reinforcing foundation for social friction within the school environment. Within the social-ecological framework proposed by Hong and Espelage [24], these variables serve as macro-level precursors to victimization; in the context of the Orang Asli, cultural marginalization appears systemic rather than incidental. Furthermore, the substantial influence of

Ethnic (3.2) and Culture (3.0) on Peer Pressure indicates that peer groups act as the primary microsystem where abstract social distinctions are operationalized. In this setting, peer dynamics do not merely reflect personal animosity but serve as a functional mechanism that translates latent ethnic differences into observable bullying behaviors.

Simultaneously, the School Support System emerges as the dominant institutional mediator, exerting significant influence over Culture (3.4), Peer Pressure (3.2), and Socioeconomic conditions (2.4). This empirical pattern suggests that the school's structural environment encompassing policy, teacher engagement, and support mechanisms is the primary regulator of the educational climate. Ultimately, the data reveals a hierarchical causal structure: while Ethnic and Culture act as the latent triggers or contextual drivers of tension, Peer Pressure and the School Support System function as the active leverage points that determine whether these tensions manifest as bullying. This findings-driven model underscores that effective interventions must move beyond addressing symptoms to target the institutional and social mechanisms that govern how identity-based differences are navigated in the classroom.

3.2 The normalized direct-relation matrix

To normalize, the sum of all rows and columns of the matrix is calculated directly. The largest number of the row and column sums can be represented by k . To normalize, it is necessary that each element of the direct-relation matrix is divided by k .

Table 2
Normalized Direct-Relation Matrix

	Ethnic	Culture	Socio economic	Peer Pressure	School Support System
Ethnic	0.0000	0.2698	0.1905	0.2540	0.1905
Culture	0.2381	0.0000	0.1587	0.2381	0.1746
Socioeconomic	0.1905	0.1587	0.0000	0.2381	0.2698
Peer Pressure	0.2381	0.2381	0.1587	0.0000	0.2381
School Support System	0.0000	3.4000	2.4000	3.2000	2.4000

The Normalized Direct-Relation Matrix (Table 2) provides a quantitative map of the direct influences within the school environment. To read this table correctly, it is essential to follow the Row-to-Column rule. The Rows represent the factor giving the influence (Source), while the Columns represent the factor receiving that influence (Effect).

By reading across the School Support System (SSS) row, we can see its direct impact on the rest of the system. Specifically, the SSS row shows a value of 0.2698 for Culture, 0.2540 for Peer Pressure, and 0.1905 for Socioeconomic conditions. The value of 0.2698 is particularly significant as it represents the highest level of direct influence in the matrix, matching the impact that Ethnic identity has on Culture. This proves that the school's support structure is a primary driver that shapes both the social climate and the socioeconomic stability of Orang Asli pupils.

Furthermore, the diagonal values of 0.0000 indicate that a factor does not influence itself in this model. By following this row-based analysis, we move away from guesswork and establish a data-driven basis for identifying the School Support System as the most *effective lever* for educators to improve student wellbeing.

3.3 The total relation matrix

While the direct-relation matrix identifies immediate connections, the Total Relation Matrix captures the cumulative impact of factors, including indirect influences where one variable triggers a second, subsequently affecting a third. This matrix provides an aggregate measure of influence within the system. By applying the threshold value of 1.4954, we can filter the data to identify the relationships that possess the systemic significance required to shape the overall bullying dynamics among Orang Asli pupils.

Table 3
The total relation matrix

	Ethnic	Culture	Socio economic	Peer Pressure	School Support System
Ethnic	1.3404	1.5577	1.3631	1.6914	1.4883
Culture	1.4196	1.2319	1.2399	1.5555	1.3651
Socioeconomic	1.4527	1.4344	1.1684	1.6317	1.5008
Peer Pressure	1.5003	1.5050	1.3157	1.4541	1.4879
School Support System	1.5727	1.5752	1.4773	1.7725	1.3953

The most significant systemic interaction occurs between the School Support System and Peer Pressure (1.7725). This exceptionally high value identifies the school's institutional framework as the dominant force within the network, exerting a decisive causal influence on peer group dynamics. Furthermore, Ethnic identity acts as a foundational driver, significantly impacting both Culture (1.5577) and Peer Pressure (1.6914). While Culture is an inherent component of a student's heritage, the data suggests that this heritage serves as a primary lens through which social interactions are filtered, subsequently shaping the peer dynamics and social standing of the pupils.

By analyzing these total influence scores, the study identifies the root drivers of bullying. The findings reveal that strengthening the School Support System transcends the implementation of a singular intervention as it triggers a cascading positive effect that mitigates negative peer pressure and fosters cultural inclusion across the entire student population. This systemic approach ensures that improvements in institutional support effectively reshape the social environment for all indigenous pupils within the school.

The most significant finding is the interaction between the School Support System and Peer Pressure (1.7725). This high value indicates that the school's support structure is the dominant force in the network, exerting a decisive influence on how peer dynamics fluctuate. Similarly, Ethnic identity significantly impacts both Culture (1.5577) and Peer Pressure (1.6914), suggesting that a student's heritage is a primary factor in determining their social standing. By analyzing these total scores, the study identifies the root drivers of bullying. This reveals that strengthening the School Support System does more than just add a program, it triggers a cascading positive effect that reduces negative peer pressure and promotes cultural inclusion across the entire student body.

3.4 The threshold value

Table 4

The threshold values **1.4954** | Total Experts: **5** | Total Factors: **5**

Factor	R (Influence)	C (Influence)	R+C (Prominence)	R-C (Relation)
Ethnic	7.4410	7.2857	14.7268	0.1553
Culture	6.8121	7.3042	14.1164	-0.4921
Socioeconomic	7.1879	6.5644	13.7524	0.6235
Peer Pressure	7.2630	8.1053	15.3684	-0.8423
School Support System	7.7930	7.2373	15.0303	0.5557

Table 4 presents the Prominence ($D+R$) and Relation ($D-R$) indices, which quantify the relative importance and functional roles of each factor within the bullying dynamics of Orang Asli pupils. In this framework, the D value represents the influence a factor exerts on the system, while R reflects the influence it receives. By calculating the difference ($D-R$), we categorize variables into Cause factors (positive values, driving the system) and Effect factors (negative values, representing outcomes).

The analysis identifies Peer Pressure ($D+R = 15.3684$) as the most prominent factor, signifying its role as the primary visible manifestation of bullying. However, its negative relation index ($D-R = -0.8423$) confirms that it functions as a sink or Effect factor. This indicates that peer pressure is not an independent root cause, but a symptom heavily dictated by other systemic pressures. Similarly, Culture ($D-R = -0.4921$) is categorized within the effect group, which suggests that the cultural atmosphere of the school is not a standalone issue but is created by deeper factors like how the school is managed and how students feel about their ethnic identity.

In contrast, Socioeconomic Status ($D-R = 0.6235$), the School Support System ($D-R = 0.5557$), and Ethnic factors ($D-R = 0.1553$) are identified as the system's *dispatchers* or Causes.

- i. Socioeconomic Status: This emerges as the most potent causal driver. This suggests that the economic disparities inherent in marginalized indigenous communities are the fundamental *power source* shaping social vulnerability and school interactions.
- ii. School Support System: With high prominence ($D+R = 15.0303$) and a strong causal rating, institutional structures including policy and teacher engagement act as the primary regulators of the school ecosystem. Improvements here are mathematically predicted to trigger positive shifts across the entire network.
- iii. Ethnic Factors: While exhibiting a more moderate causal value, ethnicity remains a foundational driver that filters how students perceive identity and social standing.

Overall, the findings reveal a layered causal hierarchy. Socioeconomic conditions, the School Support System, and Ethnic identity act as the primary drivers, which in turn shape the cultural climate and Peer Pressure. To ensure scientific focus, a threshold value of 1.4954 was applied, filtering out negligible correlations to isolate only the most robust interactions.

This mapping demonstrates that bullying among Orang Asli pupils is not a standalone behavioral problem but a systemic outcome. It emerges from the intersection of structural conditions (Socioeconomic), institutional capacity (School Support), and identity-related dynamics. Consequently, effective interventions must move beyond treating peer behavior and instead target these high-level causal drivers through multi-level, context-sensitive strategies.

3.5 Final output and create a causal diagram

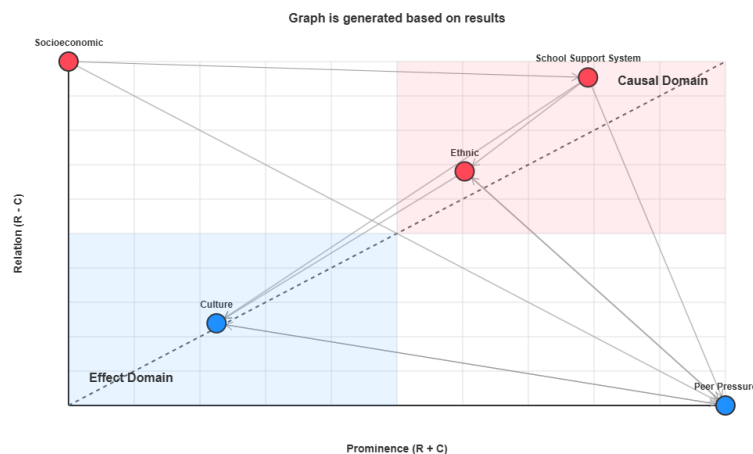


Fig. 1. Cause Effect

The DEMATEL causal map illustrates the structural interdependencies of the bullying ecosystem among Orang Asli pupils by plotting factors based on their Prominence ($D+R$) and Relation ($D-R$). This visualization categorizes factors into the Causal Domain, which represents the primary drivers of the system, and the Effect Domain, which represents the outcomes or manifestations of those drivers. In the Causal Domain, the School Support System and Ethnic Identity emerge as the most significant dispatchers of influence. Their high prominence and positive relation values identify them as the strategic engines of the network. However, it is essential to acknowledge the role of Socioeconomic Status, which, despite having lower prominence (total volume of interaction) than the other drivers, maintains a high positive relation value. This identifies it as a pure causal driver. It acts as an independent external force that fundamentally shapes institutional capacity. This suggests that the socioeconomic challenges faced by the Orang Asli community are not results of bullying, but rather foundational conditions that dictate the effectiveness of school-based support.

Conversely, Peer Pressure and Culture are situated in the Effect Domain, characterized by negative relation values. Peer Pressure, positioned at the far right of the Prominence axis, serves as the central receiver or Core Effect of the entire system. This positioning is critical for intervention modeling, as it proves that peer aggression is a visible symptom of the interplay between the causal dispatchers specifically institutional support, cultural heritage, and socioeconomic stressors. Peer pressure is the point where systemic tensions become observable, but it lacks the causal power to drive the system independently. The strategic implications of this mapping are clear: to effectively mitigate peer-led bullying (Effect), interventions must shift away from treating symptoms in isolation. Instead, policymakers must prioritize institutional reform, culturally sensitive support structures, and the mitigation of socioeconomic disparities (Causes). By targeting these root drivers, educators can trigger a systemic improvement that reduces the social pressure within the student population, fostering a more equitable and safer educational environment for indigenous pupils.

By applying the DEMATEL methodology, this study systematically maps the causal architecture of bullying among Orang Asli pupils, shifting the analytical focus from isolated variables to a dynamic, interconnected system. Through the calculation of prominence ($D+R$) and relation ($D-R$) values, the findings identify peer pressure and school support systems as the primary causal drivers (causes) that dictate the trajectory of peer aggression, while socioeconomic and cultural factors emerge as dependent variables (effects) within the network. This causal hierarchy reveals that while ethnic and cultural differences provide the underlying context for victimization, the persistence of bullying is

largely governed by the quality of institutional intervention and peer social dynamics. Consequently, the results offer a data-driven roadmap for policymakers, suggesting that strategic interventions must prioritize institutional reform and social-emotional learning to effectively mitigate the systemic vulnerabilities faced by indigenous students.

4. Conclusions

This study utilized the DEMATEL approach to map the causal interdependencies of bullying among Orang Asli primary school pupils in Malaysia. The analysis reveals that bullying is not the result of isolated triggers but emerges from a systemic network of social, cultural, and institutional influences. The average direct-relation matrix confirmed moderate to strong interactions across five key determinants which are ethnic differences, cultural background, socioeconomic conditions, peer pressure, and school support systems.

The findings identify peer pressure and school support systems as the most influential drivers within this network. Peer pressure serves as a central mechanism that reinforces bullying behavior through social group dynamics. Simultaneously, the school support system was found to exert a significant causal influence on both peer interactions and socioeconomic challenges. This suggests that while ethnic and cultural factors act as underlying vulnerabilities, the persistence of bullying is primarily determined by the quality of institutional intervention and peer-level social acceptance.

This research contributes to the literature by moving beyond reductionist models that examine bullying factors in isolation. By adopting a causal modeling perspective, the study provides a structured map of how these variables interact, filling a critical knowledge gap regarding indigenous education in Southeast Asia. The application of DEMATEL allows for the identification of key leverage points, offering a more sophisticated explanation of bullying dynamics than traditional descriptive studies.

From a policy perspective, interventions must prioritize institutional reform and social emotional learning. Specifically, the findings suggest that schools should implement culturally sensitive anti bullying policies and enhance teacher training to address the specific socioeconomic realities of Orang Asli pupils. Other than that, programs such as peer mentoring and Social Emotional Learning (SEL) are essential to reshape the social dynamics that currently normalize bullying. These efforts support Malaysia's commitment to SDG 4 (Quality Education) and SDG 10 (Reduced Inequalities) by fostering safer, more inclusive learning environments.

While this study provides a robust data-driven roadmap, it is limited by its reliance on expert evaluations and a specific set of variables. Future research should expand this model to include family and community influences and validate these causal relationships through longitudinal empirical data.

In summary, bullying among Orang Asli pupils is a multifaceted challenge that requires a systems-based solution. By focusing on the pivotal roles of school support and peer dynamics, educators and policymakers can develop more effective, culturally appropriate strategies to ensure educational equity for indigenous students.

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Declaration

During the preparation of this work, the authors used ChatGPT and QuillBot AI to refine the conceptual framework and perform language editing for clarity and grammatical accuracy. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the final content of the publication.

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