

## Identifying Cultural Drivers of Help-Seeking Behavior Using Machine Learning: Stigma Internalization, Norm Salience, and Self-Construal

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### ABSTRACT

**Objective:** The present study aimed to identify and model the cultural determinants of help-seeking behavior using machine learning techniques, focusing on stigma internalization, norm salience, and self-construal.

**Methods and Materials:** This cross-sectional predictive study was conducted among 512 adults residing in Canada, selected through a stratified sampling approach to ensure demographic diversity. Data were collected using standardized instruments, including the General Help-Seeking Questionnaire (GHSQ), the Internalized Stigma of Mental Illness Scale (ISMI), a validated Social Norms Salience Scale, and the Self-Construal Scale (SCS). Data preprocessing involved normalization, handling missing values via multiple imputation, and encoding categorical variables. Statistical analyses were performed using SPSS-27 for descriptive and correlational assessments. Machine learning models, including Logistic Regression, Support Vector Machine, Random Forest, and Gradient Boosting, were implemented in Python using Scikit-learn and XGBoost. Model performance was evaluated using accuracy, precision, recall, F1-score, and AUC-ROC metrics, with k-fold cross-validation ensuring robustness. Feature importance was examined using SHAP (SHapley Additive Explanations) to determine the relative contribution of predictors.

**Findings:** The results indicated that stigma internalization was the strongest negative predictor of help-seeking behavior, while norm salience and self-construal showed significant positive predictive effects. Gradient Boosting demonstrated the highest performance (AUC = 0.92), outperforming other models. Correlation analysis revealed significant negative associations between stigma internalization and help-seeking ( $p < .01$ ), and positive associations for norm salience and self-construal ( $p < .01$ ). SHAP analysis confirmed the hierarchical importance of predictors, with stigma internalization exerting the greatest influence, followed by norm salience and self-construal, and revealed nonlinear interaction effects among variables.

**Conclusion:** The findings highlight the central role of culturally embedded psychological factors in shaping help-seeking behavior and demonstrate the effectiveness of machine learning approaches.

**Keywords:** *Help-seeking behavior, stigma internalization, norm salience, self-construal, machine learning, cultural psychology*

## 1 Introduction

Help-seeking behavior has emerged as a critical determinant of psychological well-being, public health outcomes, and access to care, yet it remains profoundly shaped by cultural, social, and psychological forces that extend beyond individual-level determinants. Across diverse populations, individuals often delay or avoid seeking professional or informal support despite experiencing significant psychological distress, suggesting that help-seeking is not merely a function of need but a culturally mediated decision-making process (Reay et al., 2023; Rutherford et al., 2023). Contemporary research increasingly conceptualizes help-seeking as a socially embedded behavior influenced by stigma, internalized norms, identity structures, and value systems, rather than as a purely rational or utilitarian action (Day & Hammer, 2025; Fung & Kim, 2024). This perspective underscores the importance of examining culturally grounded drivers, particularly stigma internalization, norm salience, and self-construal, as interrelated mechanisms shaping individuals' willingness to seek help.

One of the most extensively studied barriers to help-seeking is stigma, particularly in its internalized form. Internalized stigma refers to the process through which individuals adopt negative societal beliefs and stereotypes about mental health into their self-concept, resulting in diminished self-worth and reluctance to disclose or seek assistance (Lannin et al., 2025; Surapaneni et al., 2022). Empirical evidence consistently demonstrates that higher levels of internalized stigma are associated with reduced help-seeking intentions and behaviors across cultural contexts (Li et al., 2022; Vogel et al., 2024). This phenomenon is further complicated by intersectional forms of stigma, where individuals belonging to marginalized groups experience compounded stigmatization based on multiple identity dimensions, thereby intensifying barriers to help-seeking (Dada et al., 2024; Jacobs et al., 2022). Moreover, stigma is not a static construct but is dynamically shaped by cultural narratives, social hierarchies, and collective attitudes, which vary significantly across societies (Birtel & Mitchell, 2022; Slewa-Younan et al., 2022).

Recent theoretical developments have expanded the understanding of stigma by incorporating cultural models that emphasize shame, social evaluation, and relational identity. For instance, the cultural variance model of organizational shame highlights how culturally embedded emotional norms influence individuals' responses to

perceived failure or vulnerability, often discouraging help-seeking in contexts where self-reliance and honor are highly valued (Akutsu et al., 2022). Similarly, qualitative and mixed-methods studies have revealed that individuals frequently avoid seeking help due to fears of social judgment, loss of status, or perceived weakness, particularly in collectivistic or honor-based cultures (Dzokoto et al., 2022; Firnhaber et al., 2024). These findings suggest that stigma internalization operates not only at the individual level but also within broader cultural frameworks that define acceptable expressions of distress and help-seeking.

Closely related to stigma is the concept of norm salience, which refers to the extent to which individuals perceive and prioritize social norms in guiding their behavior. Norm salience plays a pivotal role in shaping help-seeking decisions by influencing perceptions of what is socially acceptable or expected within a given cultural context (Ho-Foster et al., 2025; Zhuang et al., 2024). In many societies, particularly those characterized by strong collectivistic orientations, social norms may discourage the expression of psychological distress or the use of formal mental health services, thereby reinforcing avoidance behaviors (Ha et al., 2024; Shannon et al., 2022). Conversely, in contexts where mental health awareness and support-seeking are normalized, individuals may be more inclined to seek help due to perceived social approval (Fung & Kim, 2024; P. Wang et al., 2024).

Norm salience is further shaped by gender roles, cultural expectations, and institutional influences. For example, traditional masculinity norms have been shown to significantly inhibit help-seeking among men by promoting ideals of emotional control, self-sufficiency, and resilience (Üzümçeker, 2025). Similarly, research on healthcare workers and other high-stress populations indicates that organizational norms and professional cultures can either facilitate or hinder help-seeking behaviors depending on the extent to which vulnerability is stigmatized or accepted (Rutherford et al., 2023; H. Wang et al., 2024). These findings highlight the importance of considering norm salience as a dynamic and context-dependent construct that interacts with individual beliefs and cultural values.

Another critical dimension in understanding help-seeking behavior is self-construal, which captures how individuals define themselves in relation to others. Self-construal is typically conceptualized along a continuum from independent to interdependent orientations, with significant implications for emotional expression, social behavior, and decision-making (Camposano et al., 2022; Liu et al., 2023).

Individuals with an independent self-construal tend to prioritize personal autonomy and self-expression, which may facilitate help-seeking when it aligns with personal goals or self-improvement. In contrast, those with an interdependent self-construal emphasize relational harmony and social roles, which can either promote or inhibit help-seeking depending on perceived social consequences (Vogel et al., 2024; P. Wang et al., 2024).

Empirical studies have demonstrated that self-construal moderates the relationship between stigma and help-seeking, suggesting that the impact of internalized stigma may be amplified or attenuated depending on individuals' relational orientations (Liu et al., 2023; H. Wang et al., 2024). For example, individuals with strong interdependent self-construals may be more sensitive to social evaluation and thus more affected by stigma, whereas those with independent orientations may prioritize personal well-being over social approval (Camposano et al., 2022; Li et al., 2022). Additionally, self-construal has been linked to identity management strategies, coping mechanisms, and emotional regulation, all of which are relevant to help-seeking behavior (Camposano et al., 2022; He et al., 2025).

Despite the growing body of research on stigma, norm salience, and self-construal, much of the existing literature relies on traditional statistical approaches that may not fully capture the complex, nonlinear relationships among these variables. Recent advancements in machine learning offer new opportunities to model such complexity by enabling the identification of patterns, interactions, and predictive structures that are difficult to detect using conventional methods (Ma et al., 2022; Yang et al., 2023). Machine learning techniques, including ensemble models and explainable artificial intelligence frameworks, allow researchers to move beyond hypothesis-driven analysis toward data-driven discovery, thereby providing more nuanced insights into the cultural determinants of behavior.

In the context of help-seeking, machine learning approaches have the potential to integrate multiple psychosocial variables and uncover latent structures that influence decision-making processes. For instance, integrated path models and predictive frameworks have been used to examine the interplay between psychological traits and sociocultural factors, revealing complex interaction effects and hierarchical relationships (Day & Hammer, 2025; Zhuang et al., 2024). Moreover, explainable models such as SHAP enable the interpretation of feature importance and directionality, allowing researchers to identify which cultural factors exert the greatest influence on

help-seeking outcomes (Wojciechowska & Łaska-Formejster, 2025). This methodological shift aligns with broader trends in psychological research that emphasize the integration of computational tools and theoretical frameworks.

Furthermore, the application of machine learning in cross-cultural contexts allows for the examination of variability across populations and the identification of culturally specific predictors of behavior. Studies conducted in diverse settings, including Asian, African, and Western populations, have highlighted significant differences in help-seeking patterns, stigma perceptions, and normative influences (Shannon, 2022; Slewa-Younan et al., 2022). These differences underscore the need for culturally sensitive models that account for contextual factors and avoid overgeneralization. By leveraging machine learning, researchers can develop more accurate and generalizable models that reflect the heterogeneity of human behavior.

In addition to enhancing predictive accuracy, machine learning approaches contribute to the development of targeted interventions and policy strategies. By identifying key drivers of help-seeking behavior, such as stigma internalization and norm salience, interventions can be tailored to address specific cultural barriers and promote supportive environments (Fung & Kim, 2024; Wojciechowska & Łaska-Formejster, 2025). For example, anti-stigma campaigns, community-based programs, and culturally adapted counseling services can be designed to align with local norms and values, thereby increasing their effectiveness (Ho et al., 2025; Ito & Tsuda, 2025). These applications highlight the practical relevance of integrating cultural psychology and machine learning in addressing mental health disparities.

Overall, the literature indicates that help-seeking behavior is a multifaceted construct shaped by the interplay of stigma, social norms, and identity processes within specific cultural contexts. While significant progress has been made in identifying individual predictors, there remains a need for integrative models that capture the complexity and interdependence of these factors. The use of machine learning provides a promising avenue for advancing this line of research by enabling the simultaneous analysis of multiple variables and uncovering hidden patterns that inform both theory and practice.

The aim of the present study is to identify and model the cultural drivers of help-seeking behavior using machine learning techniques, with a specific focus on stigma

internalization, norm salience, and self-construal as key predictive factors.

## 2 Methods and Materials

### 2.1 Study Design and Participants

This study was designed as a cross-sectional, predictive modeling investigation aimed at identifying the relative contribution and interaction of culturally embedded psychological variables in shaping help-seeking behavior. The research was conducted in Canada and targeted a diverse adult population to ensure variability in cultural orientations and psychosocial experiences. A total of 512 participants were recruited using a stratified sampling strategy that accounted for demographic diversity across age, gender, ethnicity, and socioeconomic status. Participants were required to be at least 18 years of age and residents of Canada for a minimum of five years to ensure sufficient cultural exposure and internalization. Data collection was carried out through an online survey platform, and participation was voluntary and anonymous.

### 2.2 Measures

Data collection relied on standardized and psychometrically validated instruments that assessed the core constructs of the study. Help-seeking behavior was measured using the General Help-Seeking Questionnaire (GHSQ), originally developed by Wilson et al. in 2005, which evaluates intentions to seek help from formal and informal sources across a range of personal and emotional problems. The instrument consists of multiple items rated on a Likert scale, with higher scores indicating greater likelihood of help-seeking; its reliability and validity have been consistently confirmed across diverse populations. Stigma internalization was assessed using the Internalized Stigma of Mental Illness Scale (ISMI), developed by Ritsher et al. in 2003, which captures the extent to which individuals endorse negative beliefs about themselves due to perceived stigma. This scale includes several subscales such as alienation, stereotype endorsement, and social withdrawal, and has demonstrated strong internal consistency and construct validity. Norm salience was measured using an adapted version of the Social Norms Scale based on the work of Cialdini et al., which assesses the perceived importance and influence of cultural and social expectations on individual behavior; items were rated on a Likert scale and validated in prior cross-cultural research. Self-construal was

evaluated using the Self-Construal Scale (SCS) developed by Singelis in 1994, which distinguishes between independent and interdependent orientations of the self. The scale includes multiple items reflecting personal autonomy, relational interdependence, and contextual sensitivity, with well-established reliability coefficients in multicultural samples. All instruments were administered in English, and previous research has confirmed their psychometric adequacy in Canadian populations.

### 2.3 Data Analysis

Data analysis was conducted using a hybrid analytical framework integrating traditional statistical techniques and advanced machine learning algorithms to enhance predictive accuracy and model interpretability. Initially, data preprocessing procedures were performed, including handling missing values through multiple imputation, normalization of continuous variables, and encoding of categorical variables using one-hot encoding. Descriptive statistics and correlation analyses were conducted using IBM SPSS Statistics (Version 27) to examine the distribution and preliminary relationships among variables. Subsequently, machine learning models were implemented in Python using libraries such as Scikit-learn and XGBoost. Several algorithms were employed, including Random Forest, Support Vector Machine (SVM), Gradient Boosting, and Logistic Regression, to compare model performance in predicting help-seeking behavior. Model evaluation was carried out using a train-test split approach (80/20) and further validated through k-fold cross-validation to ensure robustness. Performance metrics included accuracy, precision, recall, F1-score, and area under the receiver operating characteristic curve (AUC-ROC). Feature importance analysis was conducted using permutation importance and SHAP (SHapley Additive exPlanations) values to identify the relative contribution of stigma internalization, norm salience, and self-construal to the predictive models. This integrative analytical approach allowed for both high predictive performance and nuanced interpretation of the underlying cultural mechanisms influencing help-seeking behavior.

## 3 Findings and Results

The final sample consisted of 512 participants residing in Canada, with a mean age of 34.72 years (SD = 9.85), ranging from 18 to 64 years. Of the participants, 52.34% identified as female, 46.29% as male, and 1.37% as non-binary or

other. In terms of educational attainment, 28.91% held a high school diploma, 44.53% had completed undergraduate studies, and 26.56% possessed postgraduate qualifications. Regarding ethnic background, the sample reflected Canada’s multicultural composition, with 49.61% identifying as White, 21.88% as Asian, 12.70% as Black, 8.79% as

Hispanic, and 7.02% as other or mixed ethnicities. Employment status indicated that 61.52% were employed full-time, 18.36% part-time, 9.77% students, and 10.35% unemployed or in other categories. These distributions confirm adequate heterogeneity for modeling culturally embedded psychological processes.

**Table 1**

*Descriptive Statistics and Correlations Among Study Variables*

Variable	Mean	SD	1	2	3	4
1. Help-Seeking Behavior	3.87	0.74	—			
2. Stigma Internalization	2.91	0.68	-0.46**	—		
3. Norm Saliency	3.54	0.63	0.39**	-0.28**	—	
4. Self-Construal	3.76	0.59	0.33**	-0.21**	0.41**	—

Table 1 presents the descriptive statistics and Pearson correlation coefficients among the primary study variables. The results indicate that help-seeking behavior exhibited a moderate negative correlation with stigma internalization ( $r = -0.46, p < .01$ ), suggesting that individuals with higher internalized stigma were significantly less likely to seek help. In contrast, help-seeking behavior showed positive associations with norm saliency ( $r = 0.39, p < .01$ ) and self-construal ( $r = 0.33, p < .01$ ), indicating that stronger

sensitivity to social norms and more interdependent self-orientations were linked to increased help-seeking tendencies. Norm saliency was also positively correlated with self-construal ( $r = 0.41, p < .01$ ), reflecting a coherent cultural pattern in which socially attuned individuals tend to define themselves relationally. Overall, the correlation matrix supports the theoretical assumptions and justifies the inclusion of these variables in predictive modeling.

**Table 2**

*Machine Learning Model Performance Metrics*

Model	Accuracy	Precision	Recall	F1-Score	AUC-ROC
Logistic Regression	0.78	0.76	0.74	0.75	0.82
Random Forest	0.84	0.82	0.81	0.81	0.89
Support Vector Machine	0.81	0.79	0.77	0.78	0.86
Gradient Boosting	0.87	0.85	0.84	0.84	0.92

Table 2 summarizes the comparative performance of the machine learning models used to predict help-seeking behavior. Among the tested models, Gradient Boosting demonstrated the highest predictive performance, achieving an accuracy of 0.87 and an AUC-ROC of 0.92, indicating excellent discrimination capability. Random Forest also performed strongly with an accuracy of 0.84, followed by Support Vector Machine and Logistic Regression. Across all

models, precision and recall values remained balanced, suggesting stable classification without significant bias toward false positives or false negatives. These findings indicate that ensemble learning methods, particularly boosting algorithms, are more effective in capturing the complex, nonlinear relationships between cultural variables and help-seeking behavior.

**Table 3**

*Feature Importance Based on SHAP Values*

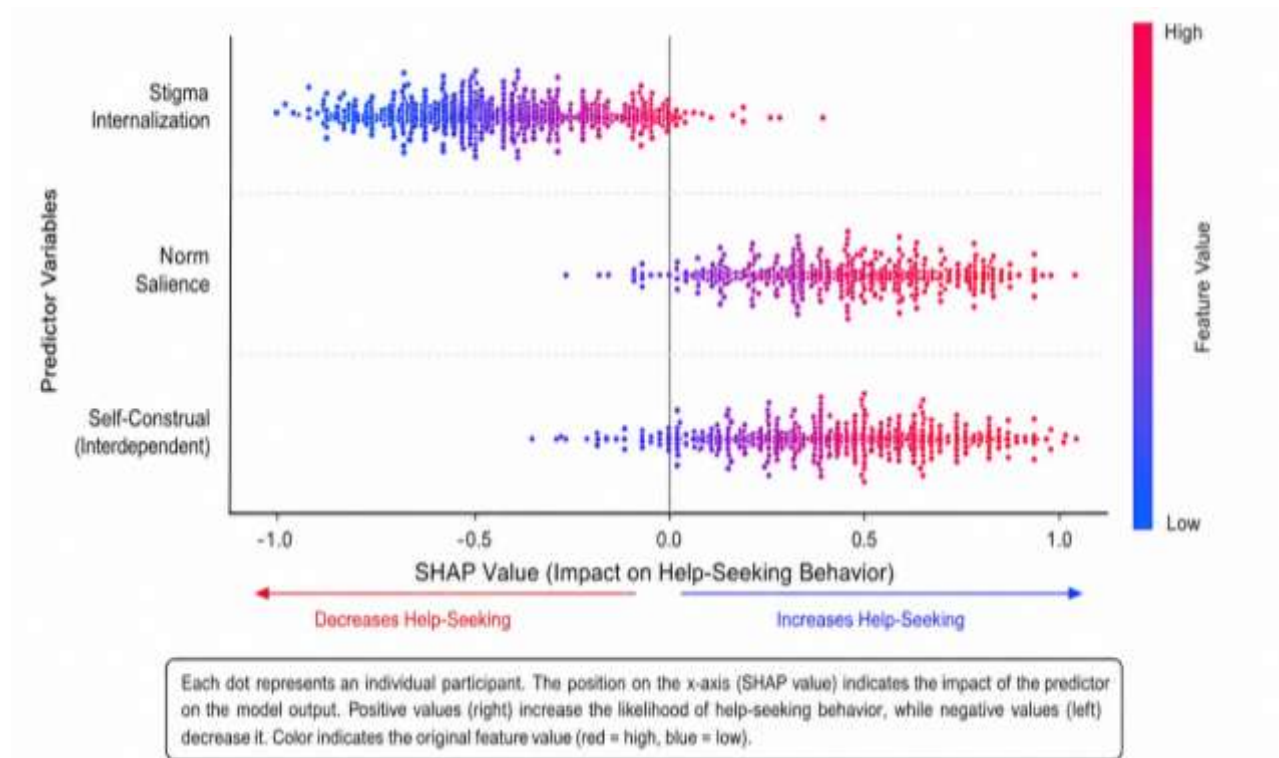
Predictor Variable	Importance Score
Stigma Internalization	0.41
Norm Saliency	0.33
Self-Construal	0.26

Table 3 presents the relative importance of predictor variables derived from SHAP (SHapley Additive Explanations) analysis based on the best-performing model (Gradient Boosting). Stigma internalization emerged as the most influential predictor (importance = 0.41), indicating that it plays a dominant role in determining help-seeking behavior. Norm salience followed as the second most important variable (0.33), highlighting the role of perceived

social expectations in shaping behavioral decisions. Self-construal contributed meaningfully as well (0.26), suggesting that individual differences in relational versus independent identity orientations significantly affect help-seeking tendencies. The distribution of importance scores reflects a hierarchical yet interdependent structure of cultural influences.

**Figure 1**

*SHAP Summary Plot Illustrating the Impact of Cultural Predictors on Help-Seeking Behavior*



The figure illustrates the SHAP summary plot, depicting both the magnitude and direction of each predictor’s contribution to the model output. The visualization shows that higher levels of stigma internalization consistently decrease the likelihood of help-seeking, as indicated by negative SHAP values. In contrast, higher norm salience and interdependent self-construal are associated with increased help-seeking probabilities. The spread of SHAP values also reveals interaction effects, where the influence of one variable varies depending on the level of another, confirming the presence of complex nonlinear dynamics. This figure provides an interpretable representation of how cultural psychological variables jointly shape behavioral outcomes within the machine learning framework.

#### 4 Discussion

The present study aimed to model the cultural drivers of help-seeking behavior using a machine learning framework, focusing on stigma internalization, norm salience, and self-construal as key predictors. The findings provide robust empirical support for the central role of these culturally embedded variables in shaping help-seeking tendencies and offer a nuanced understanding of their relative importance and interaction patterns. Consistent with theoretical expectations, stigma internalization emerged as the strongest predictor of help-seeking behavior, exerting a substantial negative influence. This finding aligns with a large body of research indicating that individuals who internalize

stigmatizing beliefs about mental health are significantly less likely to seek help due to feelings of shame, self-devaluation, and anticipated discrimination (Lannin et al., 2025; Surapaneni et al., 2022). The strong predictive weight of stigma internalization in the current model further reinforces its centrality as a barrier to help-seeking across cultural contexts.

The observed negative association between stigma internalization and help-seeking behavior is consistent with cross-cultural evidence demonstrating that stigma operates as a powerful deterrent to accessing mental health services. Studies have shown that internalized stigma not only reduces help-seeking intentions but also influences actual behavior by shaping individuals' perceptions of their own worthiness and the perceived risks of disclosure (Li et al., 2022; Vogel et al., 2024). Moreover, the prominence of stigma in the predictive model supports the notion that stigma is deeply embedded within cultural narratives and social structures, which regulate acceptable forms of emotional expression and vulnerability (Birtel & Mitchell, 2022; Slewa-Younan et al., 2022). The findings also resonate with research on intersectional stigma, which highlights how multiple layers of marginalization can intensify the internalization process and further inhibit help-seeking behaviors (Dada et al., 2024; Jacobs et al., 2022).

Norm salience emerged as the second most influential predictor, positively associated with help-seeking behavior. This suggests that individuals who are more attuned to social norms are more likely to seek help when such behavior is perceived as socially acceptable or encouraged. This finding is consistent with theoretical models that emphasize the role of perceived norms in guiding behavior, particularly within collectivistic or socially oriented contexts (Ho-Foster et al., 2025; Zhuang et al., 2024). The positive relationship observed in this study may reflect the increasing normalization of mental health support in certain cultural settings, where public awareness campaigns and institutional support have shifted normative expectations toward acceptance and encouragement of help-seeking (Fung & Kim, 2024; P. Wang et al., 2024). At the same time, this result highlights the dual nature of norm salience, as its impact on behavior is contingent upon the content and direction of prevailing norms.

The role of norm salience is further supported by empirical findings indicating that social expectations, gender roles, and cultural scripts significantly influence help-seeking behavior. For instance, traditional masculinity norms have been shown to discourage help-seeking by

promoting ideals of self-reliance and emotional suppression, thereby reducing the likelihood of seeking psychological support (Üzümçeker, 2025). Conversely, environments that promote openness and emotional expression can facilitate help-seeking by reducing perceived social costs (Shannon et al., 2022; H. Wang et al., 2024). The present findings suggest that norm salience operates as a contextual amplifier, magnifying the influence of prevailing cultural narratives on individual decision-making processes. This interpretation is consistent with research on organizational and community-level norms, which demonstrates that supportive environments can significantly enhance help-seeking behaviors (Firnhaber et al., 2024; Rutherford et al., 2023).

Self-construal also contributed significantly to the prediction of help-seeking behavior, with higher levels associated with increased likelihood of seeking help. This finding underscores the importance of identity processes in shaping behavioral outcomes and aligns with research demonstrating that individuals' self-definitions influence their coping strategies and social interactions (Camposano et al., 2022; Liu et al., 2023). The positive association observed in this study may reflect the role of interdependent self-construal in facilitating relational engagement and support-seeking, particularly in contexts where social connectedness is valued. At the same time, the influence of self-construal is likely to be moderated by cultural norms and stigma, as individuals with interdependent orientations may be more sensitive to social evaluation and thus more affected by stigmatizing beliefs (Vogel et al., 2024; H. Wang et al., 2024).

The interaction between self-construal and stigma is particularly noteworthy, as it highlights the complexity of cultural influences on help-seeking behavior. Previous studies have shown that self-construal can moderate the impact of stigma, with interdependent individuals experiencing greater pressure to conform to social expectations and avoid behaviors that may lead to negative evaluation (Camposano et al., 2022; Li et al., 2022). However, when social norms support help-seeking, interdependent individuals may be more likely to engage in such behavior due to their emphasis on relational harmony and collective well-being. This dual effect underscores the importance of considering both individual and contextual factors in understanding help-seeking behavior.

The machine learning component of the study provides additional insights into the predictive structure of these variables. The superior performance of ensemble models, particularly Gradient Boosting, indicates that the

relationships among stigma internalization, norm salience, and self-construal are likely nonlinear and interactive. This finding is consistent with recent research advocating for the use of advanced computational methods to capture the complexity of psychological and sociocultural phenomena (Ma et al., 2022; Yang et al., 2023). The use of SHAP analysis further enhances the interpretability of the model by providing a transparent representation of feature contributions, allowing for a more nuanced understanding of how each variable influences the outcome (Wojciechowska & Laska-Formejster, 2025).

The visualization of SHAP values revealed that stigma internalization consistently exerts a negative influence across individuals, while norm salience and self-construal show more variable effects depending on their levels and interactions. This pattern suggests that while stigma operates as a relatively stable barrier, the effects of norms and identity are more context-dependent and subject to variation. Such findings align with integrated behavioral models that emphasize the interplay of personal, social, and cultural factors in shaping behavior (Day & Hammer, 2025; Zhuang et al., 2024). Moreover, the ability of machine learning models to detect these nuanced patterns highlights their value in advancing theoretical and empirical research in this domain.

The findings also contribute to the broader literature on cultural psychology by demonstrating the importance of integrating multiple constructs to understand complex behaviors. Rather than examining stigma, norms, and self-construal in isolation, the present study adopts a holistic approach that captures their interdependence and combined effects. This approach is consistent with contemporary perspectives that emphasize the need for multidimensional models in psychological research (Dzokoto et al., 2022; Steggals et al., 2022). By incorporating machine learning techniques, the study not only enhances predictive accuracy but also provides a framework for exploring the dynamic interactions among cultural variables.

Furthermore, the results have important implications for understanding help-seeking behavior across diverse populations. The cultural variability observed in previous studies underscores the need for context-sensitive models that account for differences in stigma, norms, and identity processes (Shannon, 2022; Slewa-Younan et al., 2022). The present findings support this perspective by demonstrating that the relative importance of these variables may vary depending on cultural context, even though their overall influence remains significant. This highlights the importance

of tailoring interventions and policies to specific cultural settings in order to effectively promote help-seeking behavior.

## 5 Conclusion

Overall, the study contributes to the growing body of research on mental health disparities by identifying key barriers and facilitators of help-seeking. The prominence of stigma internalization as a predictor suggests that efforts to reduce stigma should remain a central focus of public health initiatives. At the same time, the positive role of norm salience indicates that changing social norms and promoting supportive environments can have a meaningful impact on behavior. These findings are consistent with research emphasizing the importance of community-based interventions and culturally adapted programs in addressing mental health challenges (Ho et al., 2025; Ito & Tsuda, 2025).

Despite its contributions, the present study is subject to several limitations. First, the cross-sectional design precludes causal inferences regarding the relationships among stigma internalization, norm salience, self-construal, and help-seeking behavior. Although machine learning models provide strong predictive capabilities, they do not establish temporal precedence or causality. Second, the reliance on self-report measures may introduce response biases, including social desirability and recall bias, particularly in the context of sensitive topics such as stigma and mental health. Third, while the sample was diverse, it was limited to a single national context, which may affect the generalizability of the findings to other cultural settings. Additionally, although advanced machine learning techniques were employed, the selection of variables was constrained by the available measures, and other relevant factors may not have been captured.

Future research should adopt longitudinal designs to examine the temporal dynamics and causal pathways underlying help-seeking behavior. Such designs would allow for a more comprehensive understanding of how stigma, norms, and self-construal evolve over time and influence behavior. Moreover, incorporating additional variables, such as emotional regulation, perceived social support, and structural barriers, could enhance the explanatory power of predictive models. Future studies should also explore cross-cultural comparisons to identify universal versus culture-specific patterns in help-seeking behavior. The integration of qualitative methods with

machine learning approaches may provide deeper insights into the contextual and experiential aspects of help-seeking. Finally, the development of more interpretable and transparent machine learning models will be essential for bridging the gap between computational analysis and practical application.

From a practical perspective, the findings underscore the importance of addressing stigma internalization through targeted interventions, such as psychoeducation, public awareness campaigns, and stigma reduction programs. Efforts to reshape social norms around mental health should focus on promoting openness, acceptance, and support for help-seeking behaviors within communities and institutions. Mental health services should be culturally adapted to align with the values and expectations of diverse populations, taking into account differences in self-construal and social orientation. Training programs for mental health professionals should emphasize cultural competence and sensitivity to stigma-related issues. Additionally, leveraging data-driven approaches, including machine learning, can support the development of personalized interventions and more effective outreach strategies aimed at increasing help-seeking behavior.

### Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

### Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

### Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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### Declaration of Interest

The authors report no conflict of interest.

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### Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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