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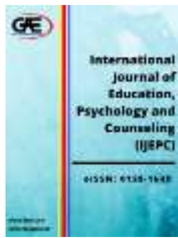

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LATENT PROFILES OF INTOLERANCE OF UNCERTAINTY AND ANXIETY SENSITIVITY AMONG CHINESE POSTGRADUATE STUDENTS IN MALAYSIA: LINKS TO PSYCHOSOCIAL WELL-BEING AND COUNSELLING-RELEVANT INSIGHTS

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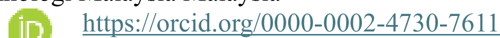
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Abstract:

Psychosocial well-being is an important educational and counselling outcome for international postgraduate students who often face sustained academic and acculturative uncertainty. Although intolerance of uncertainty (IU) and anxiety sensitivity (AS) have been widely studied as risk factors, less is known about how these risks cluster within individuals. Using a person-centred approach, this study examined latent profiles based on prospective IU (IU-PA), inhibitory IU (IU-IA), and anxiety sensitivity–cognitive concerns (AS-CC) in Chinese postgraduate students in Malaysia ($N = 396$; PhD $n = 288$; Master's $n = 108$). Latent profile analysis supported a three-profile solution—Low-Risk (39.9%), Moderate-Risk (40.7%), and High-Risk (19.4%)—showing a clear gradient in overall risk severity. Psychosocial well-being differed across profiles, $F(2, 393) = 9.91$, $p < .001$, and post-hoc comparisons indicated that the High-Risk group reported lower well-being than both the Low-Risk ($d = 0.56$) and Moderate-Risk groups ($d = 0.50$). Degree level was not associated with profile membership, suggesting that these risk configurations cut across master's and PhD programmes. The findings point to a practical implication for university counselling and student support: brief screening on IU-PA, IU-IA and AS-CC may help identify a subgroup

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with compounded cognitive risk, for whom uncertainty-management and culturally responsive support can be prioritised.

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Keyword:

Anxiety Sensitivity; Educational Counselling; International Postgraduate Students; Intolerance of Uncertainty; Latent Profile Analysis; Psychosocial Well-Being

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Introduction

Psychosocial well-being (PWB) is widely regarded as an important indicator of successful adjustment in higher education because it captures emotional, social, and psychological functioning (Keyes, 2002). For postgraduate students, especially those in research-based training, everyday study demands often sit alongside long periods of uncertainty about academic progress, research outcomes, funding, and future careers (Carleton, 2016; Taylor et al., 2007). Under such conditions, individual differences in intolerance of uncertainty (IU) and anxiety-related cognitive vulnerability may be particularly relevant (Carleton, 2016; Carleton et al., 2007; Taylor et al., 2007). Much of the existing work, however, has relied on variable-centered approaches, which can obscure how multiple risk factors naturally cluster within individuals (Laursen & Hoff, 2006). Person-centered modelling, such as latent profile analysis (LPA), offers a way to identify subgroups that share distinct configurations of risk, producing evidence that is easier to translate into counselling and student-support decisions (Nylund et al., 2007). In this context, the present study examined Chinese postgraduate students enrolled at a Malaysian public research university, using LPA to identify IU–AS-CC profiles and to test whether these profiles differ in PWB, with practical relevance for educational counselling in cross-cultural settings (Zhai & Razali, 2022).

Intolerance of uncertainty (IU) refers to a dispositional difficulty in tolerating distress when information is perceived as insufficient, ambiguous, or unpredictable, together with a negative appraisal of uncertainty itself (Carleton, 2016). Contemporary conceptualizations describe IU as multidimensional, typically reflected in two facets (Carleton et al., 2007; McEvoy & Mahoney, 2011). Prospective IU involves a strong preference for predictability and heightened concern about future events, whereas inhibitory IU reflects behavioral freezing or inaction when uncertainty is encountered (Carleton et al., 2007; McEvoy & Mahoney, 2011). A substantial body of research has linked IU to internalizing difficulties such as anxiety and

depression, supporting its role as a transdiagnostic vulnerability (Shihata et al., 2016). In international student populations, elevated IU may intensify the perceived threat of unfamiliar academic and social environments, potentially eroding psychological resources and undermining well-being (Kraemer et al., 2015).

IU is also unlikely to operate on its own, particularly when students interpret uncertainty-driven arousal as dangerous or uncontrollable (Allan et al., 2014). Anxiety sensitivity (AS)—the fear of anxiety-related sensations based on beliefs that these sensations have harmful consequences—has been shown to co-occur with IU and may heighten distress when uncertainty is experienced (Allan et al., 2014). In the present context, anxiety sensitivity–cognitive concerns (AS-CC) is especially relevant because it reflects fear of cognitive dyscontrol or "going crazy" during anxiety (Reiss et al., 1986). When a student finds uncertainty hard to tolerate, the person may worry persistently about unpredictable outcomes, and the accompanying cognitive arousal (e.g., racing thoughts, concentration difficulties) may then be interpreted as a sign of mental breakdown (Reiss et al., 1986; Oglesby et al., 2017). In this way, fear of the unknown and fear of one's own anxiety-related thoughts can reinforce each other and contribute to escalating distress (Oglesby et al., 2017).

Despite this plausible IU–AS interplay, most previous studies have examined IU, AS, and well-being using variable-centered methods such as regression or mediation analyses (Laursen & Hoff, 2006). These approaches are informative for estimating average associations, but they typically assume population homogeneity and are less able to capture meaningful differences among individuals (Laursen & Hoff, 2006). In student samples, heterogeneity is likely: some students may report high IU but relatively low AS-CC, whereas others may show a "double jeopardy" pattern in which both IU and AS-CC are elevated (Laursen & Hoff, 2006). These configurations matter because multiple cognitive vulnerabilities may combine in a non-linear way, producing disproportionately poorer outcomes in well-being (Hofmann et al., 2010). From a theoretical perspective, this clustering reflects compounded cognitive risk, in which difficulty tolerating uncertainty and fear of cognitive discontrol may interact to sustain a self-reinforcing cycle that is more damaging to PWB than either vulnerability alone (Hofmann et al., 2010; Oglesby et al., 2017).

A person-centered approach such as LPA directly addresses this limitation by identifying unobserved subgroups with distinct configurations of prospective IU, inhibitory IU, and AS-CC (Nylund et al., 2007). This is not only a methodological choice but also a practical one, because profiles can be mapped more readily onto student-support decisions than single-variable cut-offs (Nylund et al., 2007). If a distinct high-risk subgroup characterized by jointly elevated IU facets and AS-CC can be identified, university counselling services can move away from a one-size-fits-all approach and implement brief screening triads targeting these specific facets (Nylund et al., 2007). Such profiling can also support tiered support systems: students with moderate or isolated risks may benefit from general academic advising, whereas those in a high-risk profile can be prioritized for more specialized, culturally responsive interventions aimed at uncertainty-management and cognitive reframing (Zhai & Razali, 2022).

To address this gap, the present study adopted LPA to identify subgroups of Chinese postgraduate students in Malaysia based on prospective IU, inhibitory IU, and AS-CC, and then tested whether these profiles differed in psychosocial well-being. It was hypothesized that a high-risk profile characterized by jointly elevated IU facets and AS-CC would report lower PWB than other profiles. By clarifying who is most vulnerable and how risks cluster, the

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findings aim to support more targeted screening and counselling strategies for international postgraduate students, moving beyond general wellness messaging toward support that aligns with students' specific cognitive risk configurations.

Methods

Participants were 396 Chinese postgraduate students currently enrolled at a Malaysian public research university (PhD: n = 288, 72.7%; Master's: n = 108, 27.3%). Eligibility criteria required participants to be of Chinese nationality, currently residing in Malaysia for study purposes, and enrolled in a full-time postgraduate programme. Data were collected between February and April 2025. Participants were recruited through university social media groups (e.g., WeChat and WhatsApp) and direct email invitations. Because the questionnaire did not collect demographic information such as age and gender, these characteristics are not reported. Prior to analysis, responses were screened for completeness, and only cases with complete data on the study variables were retained for subsequent analyses.

Intolerance of uncertainty (IU). IU was measured using the 12-item Intolerance of Uncertainty Scale (IUS-12; Carleton et al., 2007). The scale yields two subscale scores: Prospective IU (IU-PA; 7 items) and Inhibitory IU (IU-IA; 5 items) (Carleton et al., 2007; McEvoy & Mahoney, 2011). In the current sample, internal consistency was good (Cronbach's $\alpha = .808$ for IU-PA; $\alpha = .894$ for IU-IA).

Anxiety sensitivity–cognitive concerns (AS-CC). AS-CC was assessed using the Cognitive Concerns subscale (6 items) of the Anxiety Sensitivity Index-3 (ASI-3; Taylor et al., 2007), reflecting fear of cognitive dyscontrol during anxiety (Reiss et al., 1986). Internal consistency for AS-CC in the present study was good (Cronbach's $\alpha = .895$).

Psychosocial well-being (PWB). PWB was assessed using the 14-item Mental Health Continuum–Short Form (MHC-SF; Keyes, 2002). The total MHC-SF score was used as the indicator of overall PWB, with higher scores reflecting better well-being. In the current sample, internal consistency was excellent (Cronbach's $\alpha = .937$).

Latent profile analysis (LPA) was conducted on standardised (z) scores of IU-PA, IU-IA, and AS-CC using Mplus (Version 8). Model convergence and replication of the best log-likelihood were checked to reduce the risk of local maxima. Models specifying one to 6 profiles were estimated and compared using the Bayesian Information Criterion (BIC), sample-size adjusted BIC (SABIC), entropy, average posterior probabilities, and profile size to determine a parsimonious and interpretable solution with adequate classification. To reduce the risk of local maxima, model convergence and replication of the best log-likelihood solution were checked. After selecting the optimal profile solution, one-way ANOVA with Tukey's HSD post-hoc tests examined differences in PWB across profiles. Multinomial logistic regression was then used to test whether programme level (Master's vs. PhD) was associated with profile membership, using the Low-Risk profile as the reference group and reporting odds ratios (ORs) with 95% confidence intervals. Subsequent comparisons of PWB across profiles relied on individuals' most-likely class assignments; therefore, although entropy and posterior probabilities were evaluated, a small degree of classification error cannot be ruled out.

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Ethical approval was obtained from the UTM Research Ethics Committee at Universiti Teknologi Malaysia (Approval No.: UTMREC-2025-105). Participation was voluntary, and informed consent was obtained prior to data collection.

Results

The LPA models with one through six profiles were estimated and compared on fit indices and classification quality (see Table 1). The three-profile solution was selected as the optimal model. Notably, it had the lowest Bayesian Information Criterion (BIC = 2722.04) among the candidate models, indicating the best balance of model fit and parsimony. The entropy value for the three-profile solution was 0.836, suggesting clear separation between profiles and a high classification precision (the average posterior probability for individuals' most-likely class was 0.924). Additionally, the smallest profile in the three-class model comprised about 19.4% of the sample (n = 77), exceeding the minimum size threshold for meaningful analysis. Although a four-profile solution produced a slightly lower Akaike Information Criterion and sample-adjusted BIC, it did not substantially improve model interpretation or classification quality: the four-profile model had a higher BIC (2723.11), a lower entropy (0.805), and its smallest class was only 12.6% of the sample. Considering the combination of statistical criteria and conceptual interpretability, the three-profile model was deemed superior to the alternatives.

Table1: Latent Profile Model Fit (1–6 Profiles)

K	LogLik	Params	AIC	BIC	SABIC	Entropy	AvgPP	Smallest class %	Class sizes
1	-1685.70	6	3383.40	3407.29	3388.25			100.00	396
2	-1406.22	13	2838.44	2890.19	2848.95	0.837	0.952	38.38	244/152
3	-1301.20	20	2642.41	2722.04	2658.58	0.836	0.924	19.44	158/161/77
4	-1280.81	27	2615.61	2723.11	2637.44	0.805	0.887	12.63	149/132/65/50
5	-1268.28	34	2604.56	2739.93	2632.04	0.772	0.844	9.34	130/109/70/50/37
6	-1256.84	41	2595.67	2758.91	2628.82	0.782	0.843	12.12	82/81/72/61/52/48

Notes: AvgPP = average posterior probability for most-likely class. Smallest class % is based on modal assignment.

Profile Characteristics: The three identified profiles reflected a gradient of overall risk severity across the IU and AS-CC measures, rather than qualitatively distinct patterns. Table 2 presents the descriptive statistics for each profile (raw means with standard deviations, and corresponding z-score means for IU-PA, IU-IA, and AS-CC), and Figure 1 illustrates the standardized mean profiles. In Profile 1 (Low-Risk, n = 158; 39.9%), students scored low on all three risk indicators. Their mean levels of Prospective IU, Inhibitory IU, and AS-CC were well below the sample average (z-means approximately –0.8 to –0.9). For instance, this group's mean IU-PA was 2.47 (SD = 0.63) and IU-IA was 1.75 (SD = 0.47), indicating a generally relaxed attitude toward uncertainty; their AS-CC mean of 1.57 (SD = 0.36) was similarly low, suggesting minimal fear of cognitive symptoms of anxiety. In Profile 2 (Moderate-Risk, n = 161; 40.7%), students exhibited intermediate levels on all measures. Their scores clustered

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around the overall sample mean (z-means roughly –0.1 to +0.2). For example, the Moderate-Risk profile had a mean IU-PA of 3.28 (SD = 0.44), IU-IA of 2.89 (SD = 0.59), and AS-CC of 2.50 (SD = 0.53), reflecting moderate intolerance of uncertainty and moderate cognitive anxiety concerns. Finally, Profile 3 (High-Risk, n = 77; 19.4%) was characterized by elevated scores across all indicators. These students had consistently high IU-PA (M = 4.12, SD = 0.32), IU-IA (M = 4.06, SD = 0.50), and AS-CC (M = 3.95, SD = 0.56) values, corresponding to z-scores in the range of +1.3 to +1.6. This profile represents a small subgroup with a co-occurring pattern of extreme uncertainty intolerance and strong fears about anxiety-related cognitive symptoms.

Table 2: Profile Characteristics (Raw Mean (SD) + Z-Mean)

Profile	n	IU-PA M(SD)	IU-PA z-mean	IU-IA M(SD)	IU-IA z-mean	AS-CC M(SD)	AS-CC z-mean	PWB M(SD)
1 (Low-risk)	158	2.47 (0.63)	-0.82	1.75 (0.47)	-0.91	1.57 (0.36)	-0.85	3.69 (0.72)
2 (Moderate)	161	3.28 (0.44)	0.20	2.89 (0.59)	0.22	2.50 (0.53)	0.09	3.62 (0.67)
3 (High-risk)	77	4.12 (0.32)	1.26	4.06 (0.50)	1.40	3.95 (0.56)	1.57	3.24 (0.95)

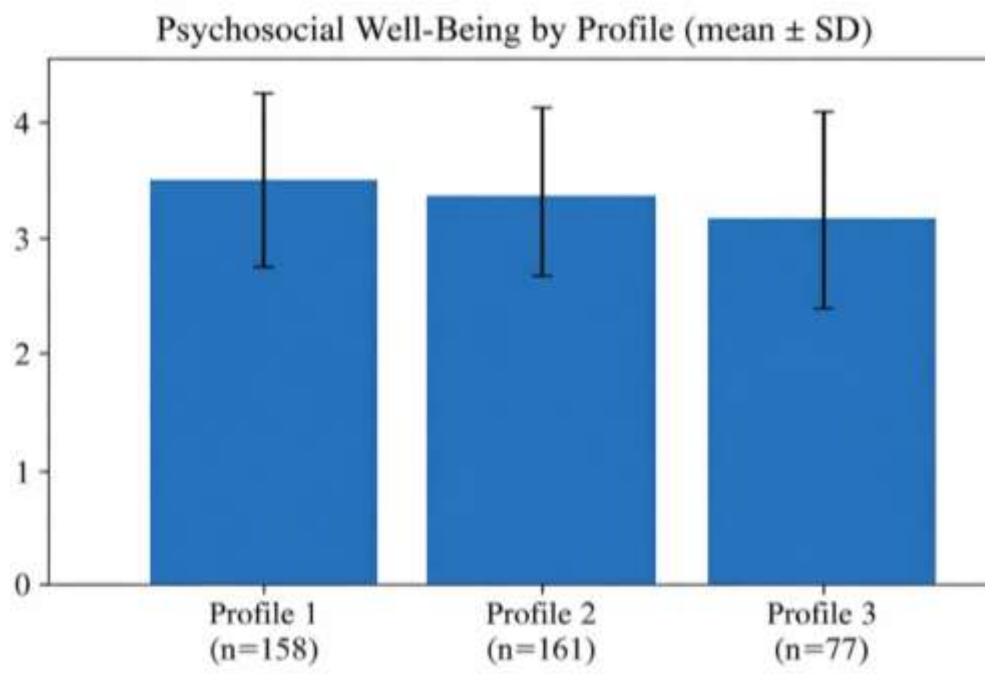

Figure 1: Standardized Indicator Means Across the Three Latent Profiles (K=3)

Post-hoc comparisons (Tukey HSD) indicated a threshold-like pattern within this sample in the association between profile risk and well-being. The High-Risk profile reported significantly lower PWB (M = 3.24, SD = 0.95) than both the Low-Risk profile (M = 3.69, SD = 0.72; p < .001, Cohen's d = 0.56) and the Moderate-Risk profile (M = 3.62, SD = 0.67; p = .007, d = 0.50). In contrast, there was no significant difference in PWB between the Low-Risk and Moderate-Risk groups (mean difference = 0.07; p = .717). Overall, PWB was lower primarily

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in the High-Risk profile, where IU and AS-CC were jointly elevated. It should be noted that these PWB group comparisons were based on participants' most-likely class assignments; although classification uncertainty was low, this approach may introduce a slight bias due to potential misclassification.

Table 3: Differences In Psychosocial Well-Being (PWB) Across Profiles

Profile	n	PWB M(SD)
1 (Low-risk)	158	3.69 (0.72)
2 (Moderate)	161	3.62 (0.67)
3 (High-risk)	77	3.24 (0.95)

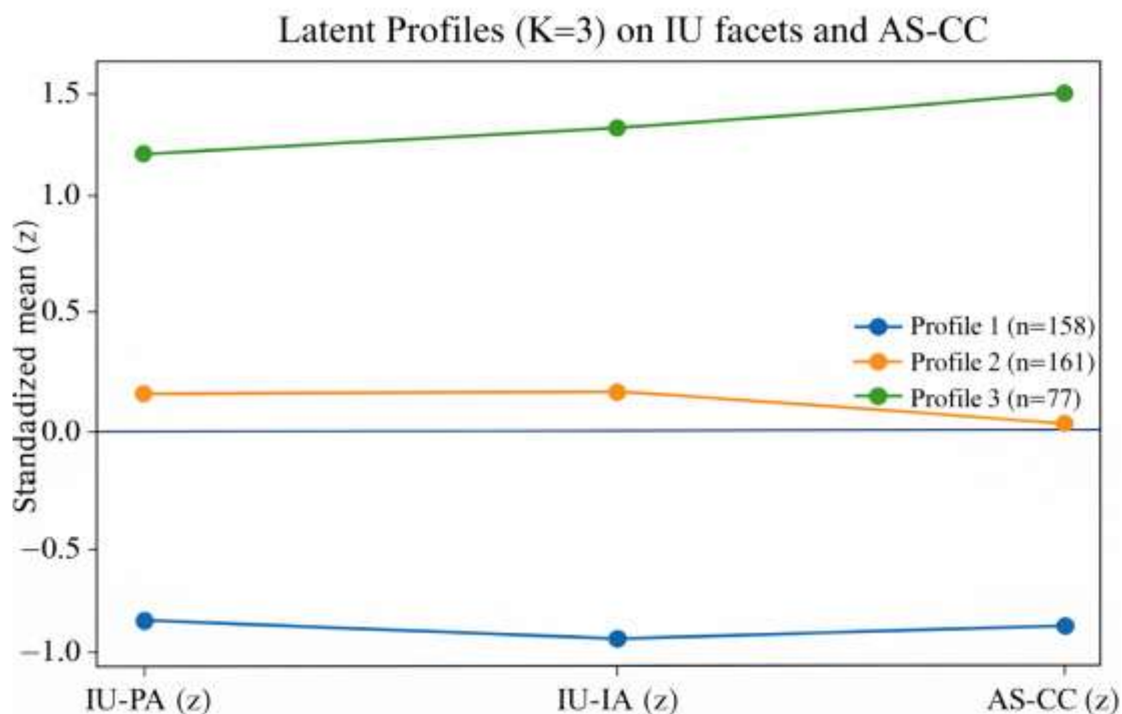

Figure 2: Psychosocial Well-Being (PWB) Across the Three Latent Profiles (K=3)

Programme Level as Predictor: Finally, the study tested whether students' programme level (Master's vs. PhD) was related to their profile membership. A multinomial logistic regression analysis (reference category = Low-Risk profile) showed that programme level was not a significant predictor of latent profile membership (Table 4). The overall model was not statistically significant (likelihood ratio χ^2 test, $p = .235$), indicating no strong association between being a Master's or PhD student and profile classification. Specifically, being a PhD student (as opposed to a Master's student) did not significantly change the odds of belonging to the Moderate-Risk profile (OR = 0.80, 95% CI [0.49, 1.31], $p = .378$) or the High-Risk profile (OR = 1.38, 95% CI [0.72, 2.65], $p = .334$). In summary, Master's and PhD students were about equally likely to fall into each of the three risk profiles, suggesting that academic programme level was not a distinguishing factor for these IU/AS-CC profiles in this sample.

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Table 3: Degree Predicting Profile Membership (Multinomial Logistic Regression)

Comparison (vs Profile 1)	OR	95% CI	p
Profile 2 vs Profile 1	0.80	[0.49, 1.31]	0.378
Profile 3 vs Profile 1	1.38	[0.72, 2.65]	0.334

Predictor: PhD (1) vs Master (0). Reference outcome: Profile 1 (Low risk). Model test: LLR p = 0.235 (ns)

Discussion

This study used a person-centred approach to clarify how intolerance of uncertainty (IU) and anxiety sensitivity–cognitive concerns (AS-CC) co-occur among Chinese international postgraduates in Malaysia and how these configurations relate to psychosocial well-being (PWB). The latent profile analysis identified three profiles—Low-Risk, Moderate-Risk, and High-Risk—reflecting a graded pattern of cognitive risk. Notably, lower well-being was concentrated in the High-Risk subgroup, whereas the Moderate-Risk subgroup did not differ significantly from the Low-Risk group. In addition, programme level (Master's vs. PhD) was not associated with profile membership, indicating no evidence in this sample that these profiles are confined to a particular academic stage.

One consistent pattern across profiles was the clustering of IU and AS-CC. Students who reported greater difficulty tolerating uncertainty also tended to report stronger fears of cognitive dyscontrol when anxious. This co-occurrence aligns with prior work suggesting that "fear of the unknown" may heighten concern about one's own anxiety responses, potentially reinforcing distress (Allan et al., 2014; Oglesby et al., 2017). In postgraduate contexts, uncertainty around research progress or evaluation may trigger cognitive arousal (e.g., racing thoughts or concentration problems). If these sensations are interpreted as alarming or uncontrollable, worry may intensify and become more difficult to regulate. This account is theoretically plausible, but the present cross-sectional design does not allow conclusions about directionality.

A second observation was the threshold-like pattern within this sample in the association with well-being. Despite moderately elevated IU and AS-CC, students in the Moderate-Risk profile did not report significantly lower PWB than the Low-Risk profile, whereas the High-Risk profile showed a marked decrease. This pattern may reflect buffering factors that were not measured here, such as coping resources, social supports, or established academic routines. It is also possible that moderate risk is more heterogeneous than it appears, or that differences become clearer under particular stressors or time points. Importantly, the present findings should be interpreted as profile-specific associations rather than evidence of a universal threshold effect. Nonetheless, the pattern is consistent with broader views that psychological risks do not always operate in a strictly linear fashion (Hofmann et al., 2010).

The absence of programme-level differences in profile membership also warrants a cautious interpretation. Although doctoral training is often assumed to carry higher psychological burden, the current results suggest that IU and AS-CC may function more like individual-difference vulnerabilities than direct reflections of programme type. Practically, this implies that elevated risk configurations may emerge among both Master's and PhD students. At the same time, the sample was drawn from a single institutional context, and replication across universities and cohorts is needed before drawing broader conclusions.

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From an educational counselling perspective, the three-profile solution provides a practical framework for translating risk evidence into targeted support. Rather than allocating support solely by programme level, student affairs and counselling services may consider brief screening of IU-PA, IU-IA, and AS-CC to help identify students who may benefit from further assessment or proactive support. For those who resemble the High-Risk profile, support could prioritise: (a) psychoeducation to normalise anxiety-related cognitions and reduce catastrophic interpretations of cognitive symptoms; (b) skills for tolerating uncertainty during research, assessment, and evaluation periods; and (c) structured coping and help-seeking plans that fit postgraduate academic routines. Where appropriate, cognitive-behavioural strategies may be adapted to support cognitive reframing of anxiety-related thoughts and gradual exposure to manageable uncertainty in academic tasks (McEvoy & Mahoney, 2011). At a broader level, universities may embed uncertainty-management and coping resources into orientation, research-methods training, and supervisory communication guidance, with attention to cultural responsiveness for diverse international cohorts. Because programme level was not linked to profile membership, such supports may be offered across Master’s and PhD programmes, with intensity guided by profile-based need rather than programme type.

Several limitations should be noted. First, the cross-sectional design prevents causal inference; lower well-being may both result from and contribute to heightened IU and AS-CC. Longitudinal research is needed to test directionality and profile stability over time. Second, the study focused on Chinese postgraduates in Malaysia from a single institutional context, which supports contextual relevance but limits generalisability to other international student groups and host settings. Third, the questionnaire did not collect demographic information such as age and gender, which prevents examining whether profiles differ across these characteristics. Fourth, group comparisons were conducted using most-likely class assignment; although classification quality was acceptable, future studies may adopt approaches that better account for classification uncertainty. Finally, extending the model to include coping strategies, social support, and academic stressors may clarify why moderate risk does not always translate into poorer well-being and may inform more comprehensive, culturally responsive interventions.

Conclusion

This study highlights the value of examining how intolerance of uncertainty and anxiety sensitivity co-occur among Chinese international postgraduate students. Using a person-centered approach, three profiles were identified, and lower psychosocial well-being was concentrated among students in the High-Risk profile. These findings suggest that university support services may benefit from complementing general wellness programmes with brief, targeted screening and profile-informed, culturally responsive support to promote academic adjustment and mental health.

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Ethics Statement: This study was conducted in accordance with ethical research standards. All procedures involving human participants were reviewed and approved by the UTM Research Ethics Committee at Universiti Teknologi Malaysia, approval number UTMREC-2025-105. Informed consent was obtained from all participants prior to data collection. Participation was voluntary, and participants were assured of confidentiality and anonymity. The data collected were used solely for academic purposes.

Author Contribution Statement: Yanhui Wang was responsible for data collection, data analysis, interpretation of results, literature review, drafting the original manuscript, and conducting critical revisions. Yeo Kee Jiar and Shih Hui Lee contributed to the conceptualization, methodology development, and overall supervision of the study. All authors read and approved the final version of the manuscript prior to submission.

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