Intrinsic Motivation, Language Proficiency, and Intercultural Sensitivity in Sino-Foreign Cooperative Education: Nonlinear Pathways to Intercultural Communicative Competence across Language Immersion Levels

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ABSTRACT:

The development of intercultural communicative competence (ICC) is a central goal of internationalized higher education, yet the psychological and contextual mechanisms underlying ICC remain insufficiently understood in Sino-foreign cooperative education (SFCE) settings. Drawing on Self-Determination Theory, Byram's ICC model, and Allport's contact hypothesis, this cross-sectional survey study examined 462 undergraduates across three immersion levels at a Sino-foreign joint institution using PLS-SEM and multi-group analysis. Results show that intrinsic motivation is the strongest predictor and key mediator of ICC ($\beta = 0.463$, $f^2 = 0.262$): language proficiency and intercultural sensitivity operate primarily through intrinsic motivation rather than directly, while intercultural contact frequency showed no significant effect. Language environment moderates these pathways non-linearly — higher immersion amplifies the motivational route to ICC, language proficiency functions as a significant direct predictor only in low-immersion contexts, and intercultural sensitivity exhibits an inverted-U pattern across immersion levels. The structural model accounted for 71.1% of the variance in ICC, indicating strong explanatory power. These findings challenge linear assumptions in ICC research, extend SDT into the SFCE domain, and carry important implications for the design of autonomy-supportive curricula and quality assurance frameworks in SFCE programs, particularly those operating under domestically-based "N+0" delivery models.

Keywords: Intercultural Communicative Competence; Sino-foreign cooperative education; Intrinsic motivation; Self-Determination Theory, Higher education

1. Introduction

The internationalization of higher education has repositioned intercultural communicative competence (ICC) as a core graduate outcome, one that integrates cultural knowledge, attitudes, interpretive skills, and critical cultural awareness rather than linguistic fluency alone (Byram, 1997; Deardorff, 2006). Over four decades of theoretical development, researchers have moved from descriptive taxonomies of cultural difference toward explanatory models that identify the psychological and contextual mechanisms driving ICC development (Peifer et al., 2023).

Sino-foreign cooperative education (SFCE) institutions represent a particularly significant and understudied context for this inquiry. These programs bring together Chinese and international educational systems, exposing students to varying degrees of authentic cross-cultural immersion depending on whether they are located at domestic or overseas campuses. SFCE has emerged as a distinctive mode of transnational higher education in China, shaping students' motivations for enrolment, their employment trajectories, and the institutional alignment of cross-border partnerships (Dai, 2019; Wang et al., 2025; Wu et al., 2022). Despite rapid institutional growth, China now hosts thousands of such joint programs; however, empirical research on the specific motivational and contextual mechanisms that shape ICC development within these settings remains sparse. (Yang et al., 2025).

Three variables are frequently identified as key drivers of ICC: language proficiency(LP), intercultural sensitivity(IS), and intercultural contact(IM). However, existing studies tend to examine these variables in isolation or without accounting for the motivational processes that may mediate their influence. Self-Determination Theory (SDT) emphasizes that when environments support autonomy, competence, and relatedness, individuals are more likely to develop intrinsic motivation, understood as self-directed engagement grounded in genuine interest and internalized values, which in turn fosters deeper and more persistent learning.(Deci & Ryan, 1985, 2000). Extending SDT to the ICC domain suggests that intrinsic motivation may serve as a critical psychological mechanism transmitting the effects of language proficiency, intercultural sensitivity, and intercultural contact to ICC outcomes .

A second neglected dimension is how language environment moderates these pathways. Students studying at overseas partner campuses experience a qualitatively different type of English exposure than their domestically enrolled counterparts, with implications for their intercultural engagement and psychological adaptation (Mak et al., 2015). Yet whether this immersion intensifies, attenuates, or reconfigures the motivational pathways to ICC has not been rigorously tested in a multi-group comparative framework. This study addresses both gaps by examining intrinsic motivation as a mediator and language environment as a moderator within a single integrated structural model (Yang et al., 2025).

The present study makes two specific contributions to the literature. First, it provides a theory-driven, empirically tested model of ICC development that integrates SDT with Byram's five-dimensional framework and Allport's contact hypothesis, offering a more complete account of the formation of ICC than single-variable or purely skills-based models. Second, the findings reveal non-linear, contextually contingent effects, including threshold and inverted-U patterns across immersion levels, that challenge the linear assumptions prevalent in prior ICC research.

Intercultural Communicative Competence: Conceptual Foundations

Intercultural communicative competence (ICC) has been theorized from multiple disciplinary perspectives. Among the various conceptualizations, Byram's (1997) five-dimensional model, encompassing attitudes (savoir être), knowledge (savoirs), skills of interpreting and relating (savoir comprendre), skills of discovery and interaction (savoir apprendre/faire), and critical cultural awareness

(savoir s'engager), has been particularly influential in language education and serves as the primary competence framework adopted in the present study.Deardorff's (2006) Pyramid Model complements Byram's framework by specifying a developmental process from foundational attitudes and knowledge through internal outcomes (adaptability, empathy) to external behavioral performance in intercultural contexts. Both models emphasize that ICC is not a static trait but a dynamic, learnable capability that unfolds through education, experience, and reflection (Yang et al., 2025; Deardorff, 2006).

More recent systematic reviews confirm that ICC research has shifted from knowledge-focused frameworks toward more integrative approaches that incorporate motivation, affect, and context as central drivers of competence development. A 2026 PRISMA review of digital ICC interventions in higher education found that the most consistent ICC gains occur when structured intercultural contact is paired with facilitation, authentic co-production, and guided reflection, underscoring the critical role of environmental and motivational conditions rather than contact frequency alone (Naranjo-Toro et al., 2026).

Predictors of ICC: Language Proficiency, Intercultural Sensitivity, and Intercultural Contact Language Proficiency.

Language proficiency is consistently identified as a foundational predictor of ICC in the empirical literature. However, Byram's framework explicitly rejects the equation of native-like fluency with ICC, noting that "fluent fools" may speak accurately yet lack cultural awareness, empathy, or reflexivity. Recent empirical evidence from Sino-foreign contexts supports this nuanced view: LP predicts ICC directly in low-immersion settings, but its effect diminishes substantially once students are embedded in high-immersion environments where contextual affordances compensate for linguistic variation (Yang et al., 2025).

Intercultural Sensitivity. Bennett's (1993) Developmental Model of Intercultural Sensitivity (DMIS) conceptualizes Intercultural Sensitivity.(IS) as the affective and perceptual dimension of intercultural development, progressing from ethnocentric to ethnorelative orientations. Empirically, IS is reliably associated with ICC outcomes across cultural groups, though the magnitude and nature of the relationship vary by measurement context and student background. In the Chinese university context, Huang's (2015) localized Chinese Intercultural Sensitivity Scale has been validated as a culturally appropriate instrument that captures the specific attitudinal and affective dimensions relevant to Chinese students' intercultural encounters (Deardorff, 2006; Yang et al., 2025).

Intercultural Contact. Allport's (1954) contact hypothesis holds that structured, equal-status contact between cultural groups, supported by shared goals and institutional backing, reduces prejudice and fosters intergroup understanding, conditions that are directly relevant to ICC development. Meta-analyses by Pettigrew and Tropp confirm that intercultural contact is associated with lower prejudice and greater empathy. However, recent empirical work in Chinese higher education suggests that contact frequency alone does not predict ICC; quality of interaction, guided reflection, and the motivational orientation of participants are critical moderating conditions (Naranjo-Toro et al., 2026).

The Mediating Role of Intrinsic Motivation

Self-Determination Theory (Deci & Ryan, 1985, 2000) distinguishes intrinsic motivation, defined as engagement driven by inherent interest and satisfaction, from extrinsic motivation, which arises from external contingencies. SDT's three basic psychological needs (autonomy, competence, and relatedness) function as the proximate antecedents of intrinsic motivation: when environments support these needs, individuals are more likely to internalize goals, persist through challenges, and achieve deeper learning outcomes. In the intercultural domain, SDT has been applied to explain why individuals actively seek out cross-cultural experiences, develop tolerance and empathy, and sustain

engagement in the demanding process of cultural learning .

Several studies have identified intrinsic motivation as a significant predictor of ICC. A study of 273 Malaysian undergraduates found intrinsic motivation significantly and positively correlated with ICC, while extrinsic motivational orientations showed no significant association.(Liu & Yin, 2024). A training study in U.S. higher education found that participants with higher pre-training intrinsic motivation demonstrated greater ICC gains following a 12-hour intercultural competence programme. However, these studies treat motivation as a direct antecedent of ICC rather than as a mechanism through which other key predictors operate. The present study advances this line of work by specifying and testing intrinsic motivation's role as a mediator in an integrated structural model .(Hall et al., 2025)

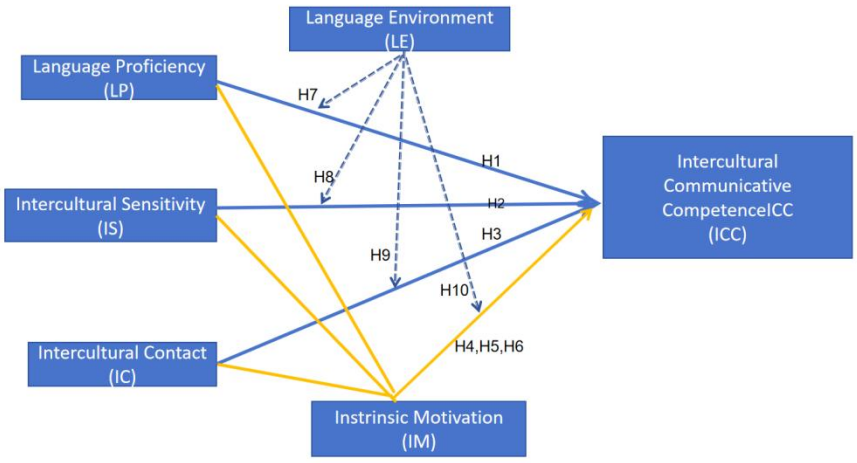
The Moderating Role of Language Environment

Edward Hall's distinction between high-context and low-context communication cultures provides a macro-level rationale for expecting language environment effects on ICC: students embedded in an English-dominant, culturally diverse overseas setting encounter fundamentally different communicative demands than those experiencing English primarily through foreign faculty-taught courses on a domestic campus. Empirical work supports this expectation: Lee and Song (2019) found that study-abroad and online collaboration contexts produced significantly greater ICC gains than domestic international classrooms alone. The degree of language immersion thus plausibly functions as a boundary condition for the motivational and communicative pathways to ICC (Yang et al., 2025).

Hypothesis Development

Building on the theoretical synthesis above, the study proposes the following model: LP, IS, and IC each directly influence ICC and also operate through IM as a partial or full mediator. Language environment moderates the paths from LP, IS, IC, and IM to ICC, with higher immersion levels expected to either strengthen or reconfigure these relationships.

Figure 1: Conceptual Framework of Intercultural Communication Competence



Based on the literature review, the following hypotheses are proposed.

H1:Language proficiency (LP) is positively associated with ICC.

H2:Intercultural sensitivity (IS) is positively associated with ICC.

H3:Intercultural contact (IC) is positively associated with ICC.

H4: Intrinsic motivation (IM) mediates the relationship between LP and ICC.

H5: Intrinsic motivation (IM) mediates the relationship between IS and ICC.

H6: Intrinsic motivation (IM) mediates the relationship between IC and ICC.

H7: Language environment (LE) moderates the relationship between LP and ICC, such that the LP→ICC path varies across immersion levels.

H8: Language environment (LE) moderates the relationship between IS and ICC, such that the IS→ICC path varies across immersion levels.

H9: Language environment (LE) moderates the relationship between IC and ICC, such that the IC→ICC path varies across immersion levels.

H10: Language environment (LE) moderates the relationship between IM and ICC, such that the IM→ICC path is stronger in higher-immersion contexts.

2. Methodology

Research Design and Paradigm

A quantitative, cross-sectional survey design was adopted, grounded in a positivist paradigm that emphasizes hypothesis testing, reproducibility, and the quantification of relationships among theoretically derived constructs. Deductive reasoning proceeds from the theoretical framework to ten empirically testable hypotheses evaluated through PLS-SEM. This approach is consistent with recent methodological guidelines for ICC research in higher education and is particularly suitable for testing mediated and moderated structural models in a single-institution, multi-group context .

Study Site and Population

The study was conducted at a Sino-foreign joint institution established between a Chinese university (University A) and a Southeast Asian university (University B). The institution offers three undergraduate programs: Bachelor of Traditional Chinese Medicine (BTCM), Bachelor of Pharmacy (BPH), and Bachelor of Pharmaceutical Engineering (BPE). At the time of data collection (November 2025), the BTCM cohorts (academic years 2022 and 2023) were enrolled at the overseas partner campus in Southeast Asia in a fully English-immersive environment (high-immersion group). All BPH and BPE students were enrolled at the domestic campus in China, where major courses are delivered in English by foreign instructors seconded from the partner university; third- and fourth-year students constituted the medium-immersion group (while first- and second-year students constituted the low-immersion group. The total population was 990 students.

Sampling and Data Collection

Proportional stratified random sampling was employed, stratifying by programme (BTCM, BPH, BPE) and academic year to ensure representativeness across all subgroups. Based on the Krejcie-Morgan table, the minimum required sample for a population of 990 was 278; a total of 500 questionnaires were distributed to provide a generous buffer above this minimum and to support multi-group analyses requiring adequate subgroup sample sizes. Questionnaires were administered online via an online survey platform, with the researcher present to provide standardized instructions and monitor completion. After removing 38 irrational response patterns, 462 valid responses were retained for analysis .

Proportional stratified sampling was applied across the three immersion levels based on their shares in the total student population of 990. This procedure ensured that each stratum was represented in line with its actual size, while also providing sufficient cases per group for multi-group structural modelling. The final sample comprised 64 high-immersion (overseas campus), 178 medium-immersion (China, years 3–4), and 220 low-immersion students (China, years 1–2).

Descriptive statistics for gender, academic year, study location, and programme are summarised in Table 1. The sample was predominantly female, largely based at the home campus in China, and broadly balanced across academic years and the three joint programmes.

Table 1. Sample Characteristics

Character	Category	Frequency	Percent (%)
Gender	Male	137	29.7
	Female	325	70.3
Academic Year	1st Year	114	24.7
	2nd Year	106	22.9
	3rd Year	127	27.5
	4th Year	115	24.9
Study Location	Home campus in China	398	86.1
	Overseas campus in Malaysia	64	3.9
Programme	BTCM(Bachelor of Traditional Chienese Medicine)	64	13.9
	BPH(Bachelor of Pharmacy)	229	49.6
	BPE (Bachelor of Pharmaceutical Engineering)	169	36.6

Measurement

All constructs were measured using instruments developed or adapted for Chinese university student populations, with all items rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Table 2 summary the measurement instruments, number of items, and scale format for each construct.

Table 2 Measurement instruments summary

Construct	Instrument	No. of Items	Scale
Intercultural Sensitivity (IS)	Huang et al. (2015)	8	5-point Likert
Intercultural Contact (IC)	Peng & Wu (2018)	10	5-point Likert
Intrinsic Motivation (IM)	Chi (2003; WPI-Chinese)	5	5-point Likert
Language Proficiency (LP)	Researcher-developed	3	5-point Likert
Language Environment (LE)	Researcher-developed	3	5-point Likert
Intercultural Communicative Competence (ICC)	Peng (AIC-CCS)	14	5-point Likert

Analytical Strategy

PLS-SEM was used to estimate a complex structural model with mediation and moderation and to accommodate Likert-type indicators. Analyses followed by measurement and structural model evaluation in SmartPLS 4.0. Mediation was tested using bootstrapping, and moderation by language environment was examined via multi-group analysis after confirming measurement invariance.

3. Results

Measurement Model Assessment

As shown in Table 3, all constructs demonstrated satisfactory internal consistency reliability (Cronbach's α ranging from 0.850 to 0.945; CR ranging from 0.897 to 0.952) and convergent validity (AVE ranging from 0.525 to 0.829). All standardized outer loadings exceeded 0.50, with the majority above 0.70, indicating adequate indicator reliability.

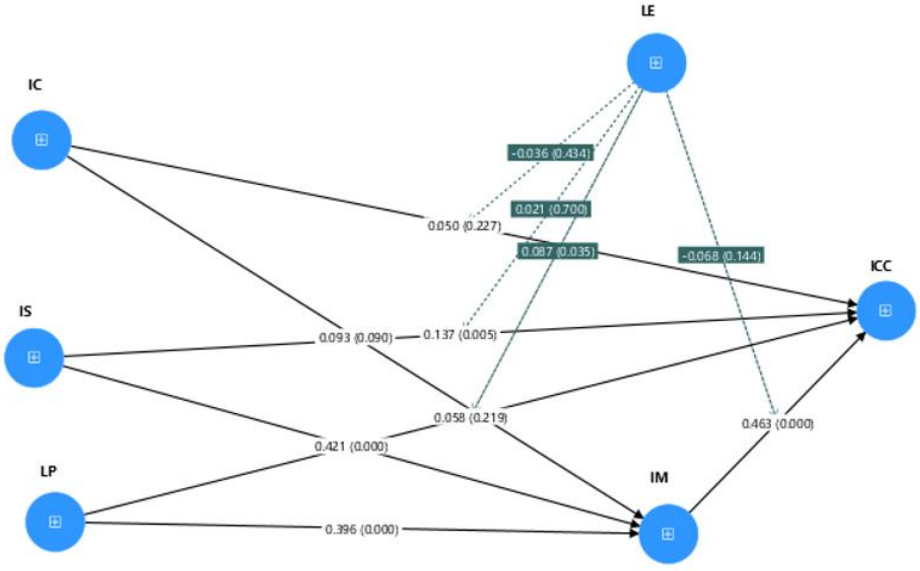
Table 3 Measurement Model Statistics

Construct	Items	Cronbach's α	CR (ρ_c)	AVE
Intercultural Contact (IC)	10	0.902	0.917	0.525
Intercultural Sensitivity (IS)	8	0.873	0.905	0.557
Language Proficiency (LP)	3	0.897	0.936	0.829
Language Environment (LE)	3	0.850	0.909	0.769
Intrinsic Motivation (IM)	5	0.856	0.897	0.636
ICC	14	0.945	0.952	0.592

Discriminant validity was examined using the Fornell–Larcker criterion and HTMT ratios, both of which indicated satisfactory separation among the six constructs. All variance inflation factor (VIF) values were below 3.3,which is commonly accepted thresholds, suggesting that multicollinearity was not a concern. To address potential common method bias, both procedural remedies (e.g., anonymous administration and item randomisation) and post hoc statistical checks were applied, and the results indicated that common method variance was unlikely to threaten the validity of the findings.

Structural Model and Direct Effects

The structural model explained 56.1% of the variance in intrinsic motivation ($R^2 = 0.561$) and 71.1% of the variance in ICC ($R^2 = 0.711$), Both values exceed the 0.50 threshold recommended by Hair et al. (2019) for social science applications of PLS-SEM, indicating substantial explanatory power consistent with Hair et al.'s benchmarks for social science PLS-SEM applications.The estimated structural model with standardised path coefficients is presented in Figure 2.



Intrinsic motivation emerged as the dominant direct predictor of ICC (β = 0.463, f^2 = 0.262, p < 0.001), accounting for a medium-to-large effect on ICC variance. Language environment demonstrated a significant positive direct effect (β = 0.253, p < 0.001), while intercultural sensitivity showed a statistically significant but small direct effect (β = 0.137, p = 0.005). Language proficiency and intercultural contact did not exert significant direct effects on ICC, consistent with theoretical arguments that their influence is primarily channeled through motivational processes.

Table 4 Structural Path Coefficients and Hypothesis Testing

Path	β	t-value	p-value	95% CI	Result
LP → ICC	0.058	1.228	0.219	[–0.035, 0.150]	Not Supported
IS → ICC	0.137	2.794	0.005	[0.059, 0.248]	Supported
IC → ICC	0.050	1.207	0.227	[–0.033, 0.129]	Not Supported
IM → ICC	0.463	8.329	<0.001	[0.342, 0.559]	Supported
LE → ICC	0.253	3.816	<0.001	[0.119, 0.381]	Supported
LP → IM	0.396	7.360	<0.001	[0.287, 0.496]	Supported
IS → IM	0.421	8.828	<0.001	[0.333, 0.518]	Supported
IC → IM	0.093	1.696	0.090	[–0.016, 0.199]	Not Supported

Mediation Effects

Bootstrapped indirect effect estimates (5,000 subsamples, bias-corrected 95% CI) are reported in Table 5.

Table 5 Indirect Effects of IM as Mediator

Indirect Path	Indirect β	SE	t	p	95% CI	Result
LP → IM → ICC	0.183	0.035	5.225	<0.001	[0.113, 0.250]	Supported (H4)
IS → IM → ICC	0.195	0.031	6.368	<0.001	[0.135, 0.254]	Supported (H5)
IC → IM → ICC	0.043	0.025	1.747	0.081	[–0.007, 0.090]	Not Supported (H6)

H4 and H5 are fully supported: intrinsic motivation fully mediates the LP→ICC relationship (the direct LP→ICC path is non-significant while the indirect path is significant and substantial) and partially mediates the IS→ICC relationship (IS retains a small but significant direct effect alongside the significant indirect path). H6 is not supported: neither the direct path from IC to IM nor the indirect path from IC through IM to ICC reaches conventional significance. These results suggest that it is not the frequency or breadth of intercultural contact per se, but rather the motivational orientation that such contact elicits or fails to elicit that determines ICC development.

Moderation Effects: Multi-Group Analysis

Before conducting the multi-group analysis (MGA), measurement invariance was established, allowing meaningful comparisons across the three immersion groups. As shown in Table 6, the IM→ICC path was strongest in the high-immersion group ($\beta = 0.673$, $p < .001$) and medium-immersion group ($\beta = 0.579$, $p < .001$), and substantially weaker in the low-immersion group ($\beta = 0.285$, $p < .001$), indicating that language immersion amplifies the motivational pathway to ICC. In contrast, language proficiency directly predicted ICC only in the low-immersion group, while intercultural sensitivity predicted ICC in the low- and medium-immersion groups but not in the high-immersion group. Intercultural contact showed no significant direct effect in any group. Overall, these patterns support the hypothesised moderating role of language environment and suggest that key predictors of ICC operate differently across immersion levels.

Table 6 Within-Group Path Coefficients by Language Environment Level

Path	High Immersion (N = 64)	Medium Immersion (N = 178)	Low Immersion (N = 241)
IM → ICC	0.673***	0.579***	0.285***
IS → ICC	–0.081 (ns)	0.249***	0.178**
LP → ICC	–0.063 (ns)	–0.061 (ns)	0.171*
IC → ICC	0.021 (ns)	–0.085 (ns)	0.109 (ns)
LE → ICC	0.277†	0.281**	0.259**

Note. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.10$, ns = not significant.

As shown in Table 7, only intercultural sensitivity had a significant direct effect on ICC (H2), while the effects of language proficiency and intercultural contact were transmitted primarily through intrinsic motivation (H4–H6). The multi-group results further indicate that language environment significantly moderated the roles of language proficiency, intercultural sensitivity, and intrinsic motivation (H7, H8, H10), whereas intercultural contact did not emerge as a robust predictor under any immersion level (H3, H6, H9).

Table 7. Hypothesis Summary

Hypothesis	Path	Outcome
H1	LP → ICC (direct)	Not Supported
H2	IS → ICC (direct)	Supported
H3	IC → ICC (direct)	Not Supported
H4	LP → IM → ICC	Supported (full mediation)
H5	IS → IM → ICC	Supported (partial mediation)
H6	IC → IM → ICC	Not Supported
H7	LE moderates LP → ICC	Supported
H8	LE moderates IS → ICC	Supported (inverted-U pattern)
H9	LE moderates IC → ICC	Not Supported
H10	LE moderates IM → ICC	Supported

4. Discussion

The Primacy of Intrinsic Motivation in ICC Development

That intrinsic motivation emerged as the single strongest predictor and the primary mediating mechanism in the model ($\beta = 0.463$, $f^2 = 0.262$) provides direct empirical support for SDT's central proposition: autonomous, self-determined engagement produces deeper and more persistent learning than skill accumulation or contact frequency alone (Deci & Ryan, 2000; Law & Liu, 2023)., IM functions as the pivotal mechanism through which language proficiency and intercultural sensitivity are translated into intercultural competence, extending prior developmental pathway models by establishing that motivational orientation rather than skill accumulation is the primary conduit for ICC gains (Peifer et al., 2023; Yang et al., 2025). The full mediation of LP→ICC through IM reconciles Byram's 'fluent fool' warning with the empirical regularity of LP-ICC correlations: LP matters not because it mechanically produces ICC, but because higher proficiency fosters greater autonomy and competence in intercultural encounters, thereby elevating intrinsic motivation (Yang et al., 2025).

Contextual Contingency:Language Environment as Moderator

The MGA findings reveal three non-linear moderation patterns that challenge assumptions of cross-contextual invariance (Yang et al., 2025).

First, the IM→ICC relationship strengthens markedly across immersion levels , indicating that immersive environments amplify motivational returns: without sufficient environmental scaffolding, even intrinsically motivated students cannot translate motivation into observable ICC gains. Second, LP→ICC follows a threshold pattern, reaching significance only in the low-immersion group, where linguistic skills constitute a binding constraint; beyond this threshold, contextual immersion compensates for linguistic variation, suggesting intensive language training yields its greatest ICC benefit in the pre-immersion phase (Mak et al., 2015. Third, IS exhibits an inverted-U pattern: it predicts ICC positively in low- and medium-immersion contexts but not in the high-immersion group. Two explanations may account for this pattern. First, IS variance may be attenuated in the high-immersion group if sustained overseas contact produces more uniform sensitivity levels, reducing its predictive power. Second, the transitional demands of overseas immersion, such as cultural adjustment, academic recalibration, and social network rebuilding, may temporarily disrupt the link between affective sensitivity and competence. These interpretations are speculative and should be tested in future longitudinal designs.

The Limited Role of Intercultural Contact

Intercultural contact showed no significant direct or mediated effects on ICC across the full sample or any immersion subgroup, failing to support H3, H6, and H9. This null result is consistent with work indicating that contact frequency alone does not predict intercultural competence; instead, the quality of contact, equal-status interaction, shared goals, and guided reflection, is the key mechanism. In the present model, the IC→ICC path coefficient was small and non-significant and its effect size far below the conventional threshold for a small effect, indicating that the direct contribution of IC to ICC variance is weak and empirically unstable.

From a theoretical standpoint, Allport's optimal contact conditions and Byram's competence model both treat contact as necessary but not sufficient: intercultural experiences become ICC only when they are embedded in supportive structures and processed through sensitivity and motivation. In the SFCE context examined here, much of the reported contact occurs in formal classroom settings with clear status differentials and limited institutionally scaffolded intercultural engagement, so even relatively frequent contact may not meet these quality thresholds. This pattern suggests that, in this setting, intercultural contact contributes to ICC primarily through indirect pathways involving intercultural sensitivity and intrinsic motivation rather than through a strong direct effect, and that simply increasing contact opportunities or frequency is unlikely to yield substantial ICC gains.

Implications for Theory

This study advances ICC theory in three ways: it establishes intrinsic motivation as a general-purpose mediator within an integrated multi-predictor model, extending SDT into SFCE contexts; it demonstrates that language environment is a theoretically meaningful boundary condition that reconfigures ICC developmental pathways rather than a mere sampling covariate (Hanley & Chankseliani, 2025); and it contributes empirical evidence of non-linearity in ICC development —a theme anticipated by Bennett's DMIS but rarely tested through multi-group structural modelling. The validated, localized measurement battery further contributes to culturally appropriate ICC assessment in Chinese higher education (Jin et al., 2025; Deardorff, 2006; Yang et al., 2025).

Policy Implications for Sino-Foreign Cooperative Education

The present findings suggest that the effectiveness of China's SFCE policy aspiration, cultivating internationally competent graduates under the Regulations on Chinese-Foreign Cooperation in Running Schools ((State Council Decree No. 372, promulgated in 2003 and amended in 2013 and 2019), is critically mediated by institutional design choices below the level of formal regulatory requirement. Motivational climate and structured intercultural contact quality are far more consequential for ICC

development than linguistic exposure or contact frequency alone, yet existing QA frameworks lack systematic indicators for either (Yang, 2023). Policymakers overseeing SFCE accreditation should therefore consider incorporating evidence-based ICC outcome measures, including assessments of autonomy-supportive pedagogical conditions, into programme review protocols.

Practical Implications

The findings have clear implications for curriculum and programme design in SFCE settings. For curriculum designers, the fact that intrinsic motivation mediates the main pathways to ICC suggests that teaching should give students more choice, a sense of progress, and meaningful intercultural tasks. Task-and project-based work that sets real intercultural communication goals and requires students to negotiate meaning across cultural differences is particularly suitable. Designing courses "backwards" from explicit intercultural learning outcomes helps to ensure that language and content tasks genuinely engage students with cultural difference, and can partially recreate the conditions of effective intercultural contact even in domestic N+0 classrooms.

For institutional leaders, the results reinforce that ICC development is not just an individual matter but a programme responsibility. Institutions that operate N+0 models need to treat ICC as a core quality indicator, aligning curricula, assessment practices and co-curricular activities with clear intercultural aims and supporting staff to design autonomy-supportive, intercultural learning environments. The moderation results also point to a useful sequence: in the low-immersion years, programmes should focus on building language proficiency and intercultural sensitivity; in the medium-immersion years, on guided reflection and structured contact; and, where possible, use overseas study in the high-immersion stage to turn intrinsic motivation into visible gains in ICC. When physical mobility is limited, well-designed online intercultural projects can offer a partial substitute, but only if they are embedded in a deliberate, institution-led ICC strategy rather than added as stand-alone technology initiatives.

5. Conclusion

This study investigated the motivational and contextual mechanisms underlying ICC development among undergraduates enrolled across three language immersion levels at a Sino-foreign cooperative education institution. Using PLS-SEM and multi-group analysis, the findings establish intrinsic motivation as the dominant predictor and primary mediating mechanism of ICC: both language proficiency and intercultural sensitivity operate on ICC largely through motivational pathways rather than directly, while intercultural contact frequency showed no significant effect at any immersion level. Language environment moderated these relationships in non-linear, theoretically meaningful ways, higher immersion amplified the motivational route to ICC, linguistic proficiency mattered most as a direct predictor in low-immersion contexts, and intercultural sensitivity exhibited an inverted-U pattern across immersion levels.

These results extend Self-Determination Theory into the SFCE domain and provide empirical evidence that institutional context actively shapes how psychological antecedents translate into intercultural competence. For practitioners and policymakers, the findings argue for designing ICC-oriented curricula and institutional environments that sustain intrinsic motivation at every immersion stage, rather than relying on linguistic exposure or contact frequency alone. Future research should pursue longitudinal, multi-site replications to test the generalisability of these mechanisms across diverse transnational higher education contexts.

Limitations and Future Directions

Several limitations of this study warrant acknowledgement. First, the cross-sectional design precludes causal inference; longitudinal designs tracking intercultural contact (IC) across multiple time points in the SFCE programme would better elucidate causal mechanisms.

Second, the single-institution sample, although spanning three immersion levels, limits the generalisability of the findings to other institutions, programme structures, partner countries, and student populations. Third, intercultural contact is measured in terms of frequency rather than quality, which may explain the non-significant ICC effects; future research should adopt mixed-method approaches capturing both the breadth and depth of contact, including qualitative data on contact events and institutional structures (Naranjo-Toro et al., 2026; Yang et al., 2025).

The SFCE context examined here involves collaboration between China and Southeast Asia. The extent to which the identified motivational and contextual mechanisms generalise to other forms of transnational higher education (TNE), such as European–Chinese dual-degree programs, branch campuses, or online partnerships, requires direct empirical testing. Future studies should employ longitudinal, multi-site designs across diverse contexts, integrating qualitative methods to explain the observed quantitative patterns. Further work should also examine how digitally mediated exchange and AI-enhanced pedagogies in SFCE programs shape the motivational and competence development pathways identified here, thereby extending the model to N+0 contexts.

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The authors declare that there are no conflicts of interest associated with this study. No financial, institutional, or personal relationships have influenced the design, conduct, or reporting of the research. The findings and conclusions are presented objectively, without any external bias. This declaration ensures transparency and credibility in the dissemination of the research outcomes.

Conflict of Interest

The authors declare no conflict of interest.