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Chinese National Identity, Social Capital and Common Prosperity in Ethnic Minority Regions

—A Moderated Mediation Test Based on Interethnic Interaction, Exchange and Integration

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Abstract: Common prosperity in ethnic minority regions requires not only material accumulation but also the cohesive support of identity bonds. Through what social mechanism is Chinese national identity translated into perceptible development outcomes, and under what conditions does this transformation proceed more smoothly? Drawing on 1,916 respondents from eight ethnic minority provinces and autonomous regions in the 2023 Chinese Social Survey (CSS), this study estimates a moderated mediation model of “Chinese national identity (CNI)—social capital—common prosperity.” Stronger CNI significantly enhances common prosperity; social capital performs the principal transmission function, accounting for about 80% of the total effect; interethnic interaction, exchange and integration (IIEI) moderate both stages of the transmission chain, with the conditional indirect effect increasing in the level of IIEI; quantile regressions show that social capital follows a “charcoal-in-the-snow” pattern—providing critical support where it is most needed—in less prosperous regions, whereas CNI and IIEI follow an “icing-on-the-cake” pattern in more prosperous ones; and a 2021 cross-temporal replication confirms the stability of the chain. These findings clarify how identity cohesion is converted into development performance, offering a reference for multi-ethnic states pursuing inclusive development.

Keywords: Chinese national identity; social capital; common prosperity; interethnic interaction, exchange and integration; ethnic minority regions; moderated mediation model

1 Introduction

How to maintain social cohesion while ensuring that the fruits of development are shared by all is a challenge common to the modernisation of multi-ethnic societies worldwide. Cross-national evidence indicates that ethnic diversity does not necessarily impede development; what proves decisive is whether a society can generate trust and cooperation that transcend group boundaries. This shifts the research focus from the “degree of diversity” to the “generative mechanism of commonality”—the logical point of departure for this study. For China’s ethnic minority regions, shared development is constrained not only by resource endowments and industrial foundations but also by whether members of different ethnic groups can form stable expectations of cooperation through joint contribution and benefit sharing.

Two strands of research are relevant. One focuses on Chinese national identity (CNI) itself: from the classic formulation of the pattern of diversity in unity of the Chinese nation (Fei, 1989) to accounts of its conceptual connotation and elemental structure and more recent studies of its pillars and cultivation among ethnic minority youth, scholars have answered fairly adequately “what national identity is” and “how it is formed.” The other concerns the conditions for achieving common prosperity, approached mostly from material dimensions such as income distribution, public services, and industrial development, with social capital regarded as a key mechanism linking structural conditions to development performance because trust, norms, and relational networks reduce transaction costs and facilitate collective action (Coleman, 1988). A gap persists between the two strands: through what social process is national identity transformed into development performance perceptible in ethnic minority regions, and does this transformation require specific social contexts? Intergroup contact theory holds that everyday contact between groups weakens prejudice and enhances trust (Pettigrew and Tropp, 2006), providing a basis for the cross-group sharing of resources and opportunities—a logic that echoes the interethnic interaction, exchange and integration examined here.

To respond to this gap, this paper constructs an analytical framework of “Chinese national identity—social capital—common prosperity,” with interethnic interaction, exchange and integration as its key contextual condition. The three core concepts answer successive questions: Chinese national identity answers “why cooperate”; social capital answers “on what basis to cooperate,” supplying organised resources such as trust, norms, and relational networks; and common prosperity is the developmental result once cooperation unfolds continuously. Identity that remains merely ideational can hardly alter individuals’ access to resources and opportunities; only when converted into social capital—mobilizable trust, participatory networks, and reciprocity norms—does it acquire the capacity to affect actual development outcomes. Social capital is therefore not a supplementary channel but a necessary intermediate link.

Within this framework, interethnic interaction, exchange and integration are not another antecedent variable but a boundary condition determining the efficiency of transformation: identity

consolidates consensus at the level of the “heart,” social capital is the “bridge” turning consensus into cooperation, and interaction, exchange and integration provide, at the level of “practice,” the arena in which transformation occurs. Without everyday cross-ethnic interaction settings, identity can hardly be externalised into concrete trust relations and participatory behaviour; without such settings, resources within networks can hardly flow across boundaries and be converted into shared development gains. The “co-residence without integration” revealed in resettlement communities portrays precisely such blocked transformation. IIEI is thus expected to act on both the first and second stages of the transmission chain, forming a pattern of dual moderation.

Drawing on 1,916 respondents from eight ethnic minority provinces and autonomous regions in the 2023 Chinese Social Survey, this study answers three progressive questions: whether stronger Chinese national identity significantly promotes common prosperity in ethnic minority regions; whether social capital mediates this relationship; and whether interethnic interaction, exchange and integration moderate the strength of the transmission process. Quantile regressions, province- and region-specific tests, and a 2021 cross-temporal replication further examine the stability of the conclusions across groups, regions, and years.

This paper makes three marginal contributions. First, in research perspective, whereas existing studies mostly focus on the formation mechanism of national identity, we examine its “downstream effects,” identifying social capital as the key intermediate link through which identity is transformed into development performance. Second, in theoretical positioning, we reposition interethnic interaction, exchange and integration from a common antecedent variable to a moderating variable, providing a mechanistic explanation for “abundant identity but insufficient transformation.” Third, in methodological combination, we integrate the moderated mediation model with quantile regression, province-specific tests, and cross-temporal replication, presenting both average effects and their heterogeneity across the distribution and geographic space of ethnic minority regions.

2 Theoretical Analysis and Research Hypotheses

2.1 Chinese National Identity and Common Prosperity in Ethnic Minority Regions

Common prosperity carries the dual connotations of “prosperity” and “sharing”: the former points to the abundance of material and spiritual life, the latter to the equal enjoyment of the fruits of development by all members of society. At the individual level, perceived common prosperity is a comprehensive subjective evaluation of income levels, distributive fairness, and the availability of public services, shaped not only by hard resources such as income and facilities but also by psycho-cultural conditions such as group identity and value consensus. Liao and Yang (2025) note that people of all ethnic groups consolidate consensus through joint contribution and benefit sharing—the core essence of strengthening Chinese national identity through common prosperity—implying a bidirectional conceptual connection between identity and development.

Regarding the theoretical relationship, Zhang and Mao (2024) argue that the two respectively highlight co-creation and sharing at the practical level and all-dimensional identification at the ideological level, presenting an inter-embedded linkage; De's (2026) "isomorphism-co-construction" framework further holds that national identity provides the ideological foundation and endogenous impetus for common prosperity, which in turn provides material support for national identity. These discussions remain mostly at the normative level, however; micro-data tests of whether a stable individual-level association exists between the two, and how strong it is, are still lacking.

Two paths through which national identity affects the perception of common prosperity can be envisioned. On the one hand, national identity helps dissolve estrangement among ethnic groups and consolidate consensus on development, making people more inclined to form expectations of joint contribution and benefit sharing, thereby enhancing positive evaluations of their own circumstances; on the other hand, individuals with stronger identification usually hold stronger confidence in institutional arrangements and the distributive order, reflected in subjective judgments of fairness and security. Based on community surveys in four provinces, Su and Qu (2026) observe a positive association between the strengthening of Chinese national identity and community development outcomes. Integrating theoretical logic with existing observations, this paper proposes:

Hypothesis H1: Chinese national identity exerts a positive promoting effect on common prosperity in ethnic minority regions.

2.2 The Mediating Mechanism of Social Capital

Social capital denotes a set of resources embedded in the structure of social relations that can facilitate actors' actions, and is generally conceptualised from three aspects: trust, norms, and participatory networks. Social capital contributes to common prosperity through three channels—macro institutions, meso organizations, and micro interpersonal relations—providing an analytical framework for understanding its developmental function.

In the context of ethnic minority regions, social capital can become the intermediate link connecting the strengthening of Chinese national identity with development performance because of its dual attributes of "identity-carrying" and "resource mobilisation." As for the former, Zhu and Liang (2024) elaborate the "cognitive shaping—structural embedding—institutional guarantee" logic between social capital and national identity. As for the latter, the strength-of-weak-ties theory (Granovetter, 1973) identifies cross-group networks as important channels for flows of information and resources. The "pomegranate seed effect" of inter-ethnic contact (Guo and Li, 2022) outlines a "contact—network—capital—identity" picture that directly inspires the mediation envisioned in this paper.

The above literature addresses the two ends of the chain separately, without connecting them into a complete transmission process for testing. The inference follows naturally: national identity shapes trust and identification; social capital organises this identification into mobilizable

cooperative capacity; and cooperative capacity in turn acts on development outcomes. Accordingly, this paper proposes:

Hypothesis H2: Social capital plays a mediating role between Chinese national identity and common prosperity in ethnic minority regions; that is, stronger Chinese national identity can enhance the level of common prosperity in ethnic minority regions through the accumulation of social capital.

2.3 The Moderating Role of Interethnic Interaction, Exchange and Integration

Interethnic interaction, exchange and integration (hereafter “IIEI”) refer both to a state in which all ethnic groups live in amity and develop together, and to a historical process moving from the shallow to the deep, in which interaction, exchange, and integration are related in a progressive sequence; its essence is the dynamic trend towards ever-growing commonality among ethnic groups in the political, economic, cultural, and social spheres. Intergroup contact theory provides cross-cultural grounds for understanding the micro-level effects of this process: when conditions such as equal status, common goals, intergroup cooperation, and institutional support are in place, intergroup contact can effectively reduce prejudice, and meta-analysis likewise confirms that intergroup contact generally enhances trust and positive affect.

At the practical level, Meng et al. (2024) construct an evaluation system for inter-embedded social structures from the “five embeddings” perspective, and Ma and Wang (2026), surveying resettlement communities in northwest China, reveal the dilemma of “co-residence without integration”—spatial reorganisation without shared cultural activities, social capital, and economic ties can hardly achieve all-dimensional embeddedness.

Most of these studies treat IIEI as a dependent or antecedent variable, examining its own formation and direct effects while rarely asking how it shapes the strength of other causal paths. This paper instead understands IIEI as a contextual condition: it may not directly determine the level of identity, but it determines whether identity can be smoothly transformed into cooperative resources and whether those resources can be converted into development gains. At the first stage, higher IIEI means richer cross-ethnic interaction settings and a more solid foundation of trust, so that national identity is more readily externalised into social participation and trust accumulation; at the second stage, trust networks and participatory channels in communities with higher IIEI allocate resources across group boundaries more easily, raising the efficiency with which social capital is converted into common prosperity. “Co-residence without integration” confirms this logic from the negative side. Accordingly, this paper proposes dual-moderation hypotheses:

Hypothesis H3: Interethnic interaction, exchange and integration positively moderate the effect of Chinese national identity on social capital, namely the first stage of the transmission chain. The higher the level of IIEI, the stronger the promoting effect of Chinese national identity on the accumulation of social capital.

Hypothesis H4: Interethnic interaction, exchange and integration positively moderate the effect of social capital on common prosperity, namely the second stage of the transmission chain, and thereby moderate the indirect effect transmitted from Chinese national identity through social capital. The higher the level of IIEI, the stronger the promoting effect of social capital on common prosperity, and the larger the indirect effect.

3 Research Design

3.1 Data Source

The data come from the Chinese Social Survey (CSS) conducted by the Institute of Sociology, Chinese Academy of Social Sciences, which adopts multi-stage mixed probability sampling of urban and rural households nationwide; its questionnaire covers social attitudes, social participation, social security, and household economic conditions, matching the measurements required by this study. We take the 2023 wave as the main sample and introduce the 2021 wave for a cross-temporal replication test. Using the provincial codes in the questionnaire, respondents from the eight ethnic minority provinces and autonomous regions—Inner Mongolia, Guangxi, Guizhou, Yunnan, Xizang, Qinghai, Ningxia, and Xinjiang—were screened, yielding 3,171 valid observations after removing missing values on core variables; after further listwise deletion on the variables entering the moderated mediation analysis, the final analytical sample comprises 1,916 observations.

3.2 Variable Selection and Measurement

3.2.1 Dependent variable: common prosperity

Common prosperity is the organic unity of “prosperity” and “sharing.” Drawing on the micro-level measurement approach of Zhang et al. (2022), this paper constructs a composite index from three dimensions—material prosperity, spiritual fulfilment, and the level of sharing—synthesised with the entropy weight method; larger values indicate a higher level of common prosperity.

3.2.2 Core independent variable: Chinese national identity

Following the measurement framework of Wang and Shi (2022), Chinese national identity is operationalised through respondents’ identification along five dimensions—the motherland, the Chinese nation, Chinese culture, the Communist Party of China, and socialism with Chinese characteristics—and synthesised into a composite index using the entropy weight method; larger values indicate a higher level of Chinese national identity.

3.2.3 Mediating variable: social capital

Following the classic three-dimensional division of social capital, this paper measures participatory, normative, and trust capital: participatory capital by volunteer service participation and participation in public affairs such as policy deliberation, hearings, and discussions of major decisions; normative capital by evaluations of social morality and law-abiding levels; and trust

capital by interpersonal trust and trust in governments at the central, county/district, and township levels. All indicators are synthesised into a composite index using the entropy weight method.

3.2.4 Moderating variable: interethnic interaction, exchange and integration

This paper operationalises interethnic interaction, exchange and integration as the degree of inter-embeddedness and integration of ethnic communities. Drawing on the construction method of the “Chang’an Index” Research Group (2026), a measurement system is constructed from three dimensions: ethnic interaction (opportunities and frequency of inter-ethnic contact), ethnic exchange (quality of interaction and mutual acceptance), and ethnic integration (structural embeddedness and dissolution of boundaries). Indicators in all dimensions are synthesised into a composite index using the entropy weight method.

3.2.5 Control variables

To mitigate omitted-variable bias, control variables are selected at three levels: social governance effectiveness, measured by public participation, evaluation of social security, and social satisfaction; digital skills, with five Internet-use behaviours averaged into a composite index; and individual characteristics, including community type, urban–rural status, age, years of schooling, marital status, and self-rated physical health. The full measurement rules for all variables are reported in Supplementary Table S1; negative indicators are reverse-standardised before entropy weighting.

3.3 Model Specification

Since the common prosperity index is continuous, all models are estimated by ordinary least squares (OLS), and a moderated mediation model is constructed to examine, in turn, the direct effect of Chinese national identity on common prosperity, the mediating effect of social capital, and the moderating effects of interethnic interaction, exchange and integration on the two stages of the transmission chain.

First, a baseline regression of the common prosperity index on the Chinese national identity index with all control variables tests Hypothesis H1.

$$CP_i = \alpha + \gamma \cdot CCNC_i + \theta \cdot X_i + p_i + \varepsilon_i \quad (1)$$

Second, following the mediation testing procedure of Wen and Ye (2014), the equation of Chinese national identity on social capital and the equation of common prosperity incorporating both Chinese national identity and social capital are estimated in turn to test Hypothesis H2; if both coefficients are significant and the Chinese national identity coefficient falls in absolute value below the total effect, social capital plays a (partial) mediating role.

$$SC_i = \alpha_1 + \delta \cdot CCNC_i + \theta_1 \cdot X_i + \varepsilon_i \quad (2)$$

$$CP_i = \alpha_2 + \beta_1 \cdot CCNC_i + \beta_2 \cdot SC_i + \theta_2 \cdot X_i + \varepsilon_i \quad (3)$$

Finally, the moderating variable and its interaction terms are introduced into the mediation model to test Hypotheses H3 and H4: the interaction term between Chinese national identity and IIEI enters the social capital equation, and that between social capital and IIEI enters the common prosperity equation; a significantly positive interaction coefficient indicates positive moderation of the respective stage. To mitigate multicollinearity, the continuous variables involved in the interaction terms are mean-centred before construction.

$$SC_i = \alpha_3 + \lambda_1 \cdot CCNC_i + \lambda_2 \cdot EE_i + \lambda_3 \cdot (CCNC_i \times EE_i) + \theta_3 \cdot X_i + \varepsilon_i \quad (4)$$

$$CP_i = \alpha_4 + \varphi_1' CCNC_i + \varphi_2 SC_i + \varphi_3 EE_i + \varphi_4 (SC_i \times EE_i) + \theta_4 X_i + \varepsilon_i \quad (5)$$

4 Empirical Analysis

The empirical strategy proceeds stepwise: baseline regressions examine the main effect; the stepwise method verifies the mediating mechanism of social capital; a moderated mediation model with bootstrapped standard errors tests the moderating effects of IIEI; quantile regressions examine heterogeneity across the distribution of common prosperity; and province- and region-specific models assess regional applicability. All models include the full set of control variables and use heteroskedasticity-robust standard errors. Mediation and moderated mediation effects are evaluated with bias-corrected bootstrap 95% confidence intervals (5,000 resamples), with significance declared when the interval excludes zero; Sobel test values are additionally reported, and the two sets of conclusions are consistent.

4.1 Descriptive Statistics

Table 1 reports the descriptive statistics of the variables. The common prosperity index averages 0.469 (SD = 0.164), indicating a medium level of perceived common prosperity with marked individual differences. The Chinese national identity index averages 0.448, suggesting a relatively solid identity foundation. Social capital averages 0.603, the highest among the composite indices, whereas the IIEI index averages only 0.148, the lowest of the four, suggesting that substantive interethnic interaction, exchange and integration remains insufficient—precisely the background against which this paper examines moderating effects. Among the control variables, the means of social governance effectiveness and digital skills are 0.137 and 0.362, identifying weak links in the development of ethnic minority regions.

Table 1 Descriptive statistics of variables

Variable	N	Mean	SD	Min	Max
Common prosperity	1916	0.4690	0.1636	0.0000	1.0000
Chinese national identity	1916	0.4484	0.3290	0.0000	1.0000
Social capital	1916	0.6033	0.1804	0.2760	0.9038
Interethnic interaction, exchange and integration	1916	0.1479	0.0648	0.0560	0.3217
Digital skills	1916	0.3618	0.2485	0.0000	0.7333

Social governance effectiveness	1916	0.1371	0.0740	0.0148	0.9852
Community type	1916	5.7179	1.8445	1.0000	7.0000
Urban–rural status	1916	1.5532	0.4973	1.0000	2.0000
Age	1916	45.6130	13.6452	20.0000	66.0000
Educational attainment	1916	8.5512	4.5020	0.0000	16.0000
Health status	1916	7.1345	2.2869	2.0000	10.0000
Marital status	1916	4.8571	1.9301	1.0000	6.0000

Note: Composite indices are synthesised using the entropy weight method and range from 0 to 1; means and standard deviations are reported for continuous variables.

4.2 Baseline Regression: The Main Effect of the Chinese National Identity on Common Prosperity

Table 2 reports the baseline regression results. Model (1) contains only the core independent variable; Model (2) only the control variables; and Model (3) is the full model.

In Model (1), the coefficient of Chinese national identity is significantly positive at the 1% level, and it remains so in the full Model (3) without attenuation, indicating that the association is not driven by structural factors such as urban–rural status or educational attainment; Hypothesis H1 is supported. A one-standard-deviation increase in the Chinese national identity index is associated with an increase of about 0.64 standard deviations in the common prosperity index—a moderately strong effect size. This result brings the coupling relationship elaborated theoretically by Zhang and Mao (2024) and De (2026) to the individual empirical level.

The control variables behave as expected. Digital skills, social governance effectiveness, age, educational attainment, health status, and marital status are all significantly positive, while community type and urban–rural status are significantly negative, reflecting the structural constraint of the urban–rural dual structure on perceived common prosperity; subsequent mechanism analyses are therefore conducted conditional on urban–rural differences.

Table 2 Baseline regression results

Variable	Model (1)	Model (2)	Model (3)
Chinese national identity	1.8301*** (0.0972)	—	1.9514*** (0.0863)
Digital skills	—	0.5916*** (0.0866)	0.5825*** (0.0775)
Social governance effectiveness	—	0.7005** (0.2901)	0.9721*** (0.2605)
Community type	—	-0.0427*** (0.0113)	-0.0409*** (0.0100)
Urban–rural status	—	-0.1397*** (0.0430)	-0.1326*** (0.0388)
Age	—	0.0053*** (0.0016)	0.0058*** (0.0014)
Educational attainment	—	0.0239*** (0.0050)	0.0273*** (0.0045)
Health status	—	0.0925*** (0.0078)	0.0980*** (0.0071)
Marital status	—	0.0238** (0.0097)	0.0234*** (0.0084)
N	1916	1916	1916
R ²	0.1505	0.1563	0.3262

Note: Heteroskedasticity-robust standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

4.3 Mediation Test: The Transmission Mechanism of Social Capital

To test Hypothesis H2, the stepwise testing procedure estimates three paths in turn: the total-effect path from Chinese national identity to common prosperity; the path from Chinese national identity to social capital; and the path from social capital to common prosperity after controlling for Chinese national identity. All three equations include the full set of control variables; Table 3 reports the results.

The total-effect path is given by baseline Model (3), with a significantly positive coefficient. For the path from Chinese national identity to social capital, the coefficient is significantly positive at the 1% level, indicating that individuals with stronger identification indeed accumulate more trust, normative, and participatory resources, corroborating the “cognitive shaping—structural embedding” logic of Zhu and Liang (2024) as a quantifiable association. The coefficient of social capital in the common prosperity equation is likewise significant at the 1% level and the largest in magnitude, confirming the direct empowerment of the sharing dimension by resources such as trust and networks.

The key lies in their joint performance. After social capital is added, the coefficient of Chinese national identity falls from 1.9514 to 0.4365; although still significant at the 1% level, its absolute value shrinks substantially, indicating significant partial mediation. The indirect effect is 1.5149, and the bootstrap 95% confidence interval excludes zero. Theoretically, the promotion of common prosperity by national identity does not mainly occur directly but requires transit through social relational resources; by identifying the upstream source of social capital, this paper extends the “contact—network—capital—identity” picture into a complete chain pointing to development outcomes. Hypothesis H2 is supported.

Table 3 Mediation test results (stepwise method)

Variable	Path 1: CNI → Social capital	Path 2: CNI, Social capital → Common prosperity
Chinese national identity	0.5969*** (0.0191)	0.4365*** (0.0957)
Social capital	—	2.5379*** (0.0908)
Digital skills	0.0465*** (0.0164)	0.4646*** (0.0642)
Social governance effectiveness	0.1062** (0.0475)	0.7027*** (0.1900)
Community type	-0.0036 (0.0022)	-0.0318*** (0.0084)
Urban–rural status	-0.0434*** (0.0087)	-0.0224 (0.0320)
Age	0.0006* (0.0003)	0.0044*** (0.0012)
Educational attainment	0.0026*** (0.0010)	0.0207*** (0.0036)
Health status	0.0167*** (0.0015)	0.0557*** (0.0061)
Marital status	-0.0044** (0.0018)	0.0345*** (0.0072)
Sobel test	20.8312***	Indirect effect = 1.5149
N	1916	1916

R ²	0.3676	0.5347
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Note: Heteroskedasticity-robust standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01.

4.4 Moderated Mediation Model: The Moderating Effects of Interethnic Interaction, Exchange and Integration

Hypotheses H3 and H4 predict that IIEI positively moderates the first and second stages of the transmission chain, respectively. The moderated mediation model accordingly includes IIEI and its interaction terms with Chinese national identity and with social capital in the two equations. The model is estimated by structural equation path analysis, with standard errors and confidence intervals from 5,000 bootstrap resamples; continuous variables are mean-centred, and both equations include the full set of control variables.

4.4.1 Path coefficient estimates

Table 4 reports the path coefficient estimates. The R² values of the social capital and common prosperity equations are 0.3795 and 0.5412, indicating strong explanatory power.

Table 4 Path coefficient estimates of the moderated mediation model

Variable	Eq. 1: Social capital	Eq. 2: Common prosperity
Chinese national identity (CNI)	0.6254*** (0.0217)	0.5395*** (0.0983)
Social capital	—	2.5247*** (0.0875)
Interethnic interaction, exchange and integration (IIEI)	0.4679*** (0.1005)	1.2825*** (0.2641)
CNI × IIEI	1.9958*** (0.4669)	—
Social capital × IIEI	—	3.7671** (1.5763)
Digital skills	0.0304* (0.0178)	0.4003*** (0.0752)
Social governance effectiveness	0.0912* (0.0455)	0.5732*** (0.2194)
Community type	-0.0042* (0.0027)	-0.0359*** (0.0081)
Urban–rural status	-0.0436*** (0.0087)	-0.0201 (0.0280)
Age	0.0005 (0.0003)	0.0041*** (0.0014)
Educational attainment	0.0024** (0.0011)	0.0201*** (0.0033)
Health status	0.0161*** (0.0015)	0.0545*** (0.0053)
Marital status	-0.0048*** (0.0018)	0.0298*** (0.0072)
R ²	0.3795	0.5412

Note: *** p < 0.01, ** p < 0.05, * p < 0.1; bootstrap standard errors (5,000 resamples) are in parentheses.

In the social capital equation, both Chinese national identity and IIEI exert significantly positive effects on social capital, and the coefficient of their interaction term is significantly positive at the 1% level; Hypothesis H3 is supported. IIEI thus changes the efficiency with which Chinese national identity takes effect: in environments with higher levels of interaction, exchange and integration, the

same degree of identification can be converted into more social capital. This finding provides a mechanism-level explanation for multiple inter-embeddedness practices, and also suggests that raising the level of identity alone while neglecting the construction of interaction arenas may fail to achieve the expected effects.

In the common prosperity equation, the coefficients of Chinese national identity, social capital, and IIEI are all significantly positive, and the interaction between social capital and IIEI is significantly positive at the 5% level; Hypothesis H4 is supported. The same stock of social capital can thus be converted into greater development outcomes in communities with a higher degree of interaction, exchange and integration. This corroborates the “co-residence without integration” dilemma revealed by Ma and Wang (2026): with spatial proximity but insufficient interaction, exchange and integration, resources within social networks can hardly flow across group boundaries.

4.4.2 Effect decomposition and conditional indirect effects

Table 5 reports the effect decomposition at the mean level of IIEI. The direct effect is 0.5395 and the indirect effect 2.3242, both significant at the 1% level, with the indirect effect accounting for about 81.16% of the total effect—corroborating that social capital undertakes the principal transmission function rather than serving as an auxiliary channel.

Table 5 Decomposition of direct and indirect effects (at the mean level of IIEI)

Effect type	Estimate	Bootstrap SE	95% CI
Direct effect	0.5395***	(0.0983)	[0.4162, 0.7496]
Indirect effect	2.3242***	(0.2182)	[1.9343, 2.6985]
Total effect	2.8637***	(0.2302)	[2.4839, 3.2683]

Note: The indirect effect is computed at the mean level of the moderating variable and equals the weighted sum of the first-stage path coefficient and the interaction coefficient, weighted by the mean of the moderating variable, multiplied by the second-stage path coefficient. *** $p < 0.01$.

Table 6 further reports the conditional indirect effects at one standard deviation below and above the mean of IIEI: 1.9976, 2.3242, and 2.6509 at the low, mean, and high levels, respectively—a monotonically increasing gradient with bootstrap confidence intervals excluding zero at all levels. From low to high, the conditional indirect effect increases by about 33%, indicating that improvements in IIEI conditions can substantially amplify the developmental efficacy of the strengthening of Chinese national identity.

Table 6 Conditional indirect effects

IIEI level	IIEI value	Conditional indirect effect	Bootstrap SE	95% CI
Low	0.0831	1.9976***	(0.1449)	[1.7471, 2.2294]
Mean	0.1479	2.3242***	(0.2182)	[1.9343, 2.6985]
High	0.2128	2.6509***	(0.2950)	[2.1159, 3.1676]

Note: The mean of IIEI is 0.1479 with a standard deviation of 0.0648. The conditional indirect effect is computed as the weighted sum of the first-stage path coefficient and the interaction coefficient at given values of the moderating variable, multiplied by the second-stage path coefficient. *** $p < 0.01$.

4.5 Quantile Regression and Heterogeneity Analysis

The above estimates characterise average effects, which may mask heterogeneity. To examine how the effects of the core variables vary across the conditional distribution of common prosperity, this paper estimates models at the 25th, 50th, and 75th percentiles, taking the least-squares mean regression as the reference benchmark. Table 7 reports the estimation results.

$$Q_{CP_i(\tau)} = \alpha_{5(\tau)} + \eta_{1(\tau)}CCNC_i + \eta_{2(\tau)}SC_i + \eta_{3(\tau)}EE_i + \eta_{4(\tau)}(SC_i \times EE_i) + \theta_5 X_i + \varepsilon_i \quad (6)$$

Table 7 Quantile regression estimates

Variable	OLS	Q25	Q50	Q75
Chinese national identity	0.5395*** (0.0965)	0.2904** (0.1259)	0.6285*** (0.1097)	0.7189*** (0.1139)
Social capital	2.5247*** (0.0902)	2.7641*** (0.1132)	2.4359*** (0.1036)	2.3109*** (0.1141)
Interethnic interaction, exchange and integration	1.2825*** (0.2362)	0.7597** (0.3429)	1.3992*** (0.2934)	1.7677*** (0.3040)
Social capital $\times$ IIEI	3.7671** (1.4855)	0.9538 (1.9954)	2.8738 (1.7627)	6.3373*** (1.9389)
Digital skills	0.4003*** (0.0655)	0.2610*** (0.0832)	0.3386*** (0.0771)	0.4866*** (0.0842)
Social governance effectiveness	0.5732*** (0.1893)	0.3984 (0.2745)	0.6012*** (0.2032)	0.9712*** (0.1739)
Community type	-0.0359*** (0.0085)	-0.0308*** (0.0119)	-0.0372*** (0.0104)	-0.0489*** (0.0107)
Urban–rural status	-0.0201 (0.0319)	0.0193 (0.0436)	-0.0782** (0.0383)	-0.0528 (0.0403)
Age	0.0041*** (0.0012)	0.0037** (0.0017)	0.0033** (0.0015)	0.0068*** (0.0015)
Educational attainment	0.0201*** (0.0036)	0.0120** (0.0047)	0.0162*** (0.0042)	0.0219*** (0.0047)
Health status	0.0545*** (0.0061)	0.0584*** (0.0076)	0.0649*** (0.0069)	0.0600*** (0.0076)
Marital status	0.0298*** (0.0073)	0.0292*** (0.0094)	0.0403*** (0.0087)	0.0211** (0.0096)
N	1916	1916	1916	1916
R ² /Pseudo R ²	0.5412	0.3218	0.3369	0.3433

Note: Standard errors are in parentheses; *** p < 0.01, ** p < 0.05, * p < 0.1. Interaction terms are constructed after mean-centring.

The core variables present two distributional patterns in opposite directions. The coefficient of the Chinese national identity index rises from 0.2904 at the lower quantile to 0.7189 at the upper quantile and is significantly positive at all three quantiles—an “icing-on-the-cake” pattern whereby, in ethnic minority regions with better development foundations, the spiritual momentum embedded in identity is more readily converted into actual efficacy. The IIEI index displays the same increasing pattern, with its coefficient rising from 0.7597 to 1.7677. By contrast, the coefficient of social capital declines from 2.7641 to 2.3109—a “charcoal-in-the-snow” pattern (defined in the Abstract) consistent with the general law of diminishing marginal utility: for ethnic minority regions relatively deprived of resources, the substitutive support provided by trust and networks is more critical.

The interaction term exhibits similar distributional features. The coefficient of the interaction between social capital and IIEI is positive at all three quantiles but reaches the 1% significance level only at the 75th percentile, indicating that the amplifying effect of IIEI on the transmission path of

social capital operates mainly in ethnic minority regions with higher levels of common prosperity; for regions with weak foundations, the binding constraints may be, first and foremost, the absolute insufficiency of resources and networks rather than the conditions of interaction, exchange and integration. This suggests that the marginal effects of the same policy instrument differ systematically across ethnic minority regions.

4.6 Regional Heterogeneity Tests

The foregoing estimates are based on the pooled sample of eight provinces and implicitly assume homogeneous effects. However, the eight ethnic minority provinces and autonomous regions differ markedly in economic foundations, social structures, and ethnic composition, and the operating strength of the transmission chain may vary from place to place. This section retests the four hypotheses by province and by region—Southwest (Guangxi, Yunnan, Guizhou, and Xizang), Northwest (Xinjiang, Ningxia, and Qinghai), and Inner Mongolia—with variable definitions, model specifications, and estimation methods identical to those for the full sample. Table 8 reports the region-specific results, and the province-specific results are reported in Supplementary Table S2.

Table 8 Summary of region-specific hypothesis tests

Hypothesis	Path tested	Southwest	Northwest	Inner Mongolia	Full sample
H1	CNI → Common prosperity	1.942***	2.345***	2.068***	1.951***
H2	Sobel test	16.72***	9.42***	5.35***	20.83***
H2	Indirect effect	1.476	1.601	1.318	1.515
H2	Mediation share	76.0%	68.3%	63.8%	77.6%
H3	CNI × IIEI → Social capital	1.647**	3.546***	0.766	1.996***
H4	Social capital × IIEI → Common prosperity	1.896	3.958	7.944	3.767**

Note: All regional models include the full set of control variables and use heteroskedasticity-robust standard errors;

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

H1 and H2 are significantly supported at the 1% level in all three regions. At the province level, the total-effect coefficients of Chinese national identity are significantly positive in all eight provinces, ranging from 1.863 in Yunnan to 2.833 in Xizang, with larger effects in the border autonomous regions; the mediation shares range from 41.6% to 82.9% and are generally higher in the southwest. The first-stage moderation is significantly positive in the Northwest and the Southwest but not in Inner Mongolia, one possible explanation being that the within-sample variation of IIEI there is relatively limited, constraining identification of the interaction term. The second-stage moderation is directionally consistent—positive in seven of the eight provinces—but does not reach conventional significance at the province or region level; given that the statistical power of interaction terms is highly sensitive to sample size (Aguinis et al., 2005) and the smallest single-province sample contains only 81 observations, such insignificance reflects insufficient power rather than the absence of an effect.

Overall, the province- and region-specific tests do not undermine the full-sample conclusions: the directions of the effects for the four hypotheses are highly consistent, and H1 and H2 hold significantly everywhere. The inter-provincial gradients in effect magnitude—larger total effects in

the border autonomous regions, stronger first-stage moderation in the Northwest, higher mediation shares in the Southwest, and a “strong mediation, weak moderation” pattern in Inner Mongolia—enrich the understanding of the conditions under which the transmission chain operates, providing an empirical basis for differentiated policy-making.

5 Robustness Test: A Cross-Temporal Replication Based on 2021 Data

The foregoing conclusions are based on the 2023 cross-section, and their inter-temporal robustness awaits corroboration by independent samples. This section therefore introduces the 2021 wave of the CSS for a replication test. Sample screening follows the same provincial codes, and index synthesis follows the same procedure of “normalisation—entropy weighting within dimensions—equal weighting across dimensions,” ensuring comparability between the two waves.

Three technical treatments need to be stated. First, questionnaire-version dummy variables are included in the regressions to absorb index-level differences induced by split-ballot administration; second, the 2021 questionnaire did not include a physical health item, and the control variables are reduced accordingly; third, constrained by item coverage, the IIEI index is synthesised from twelve items under a cross-wave comparable caliber, fewer than the eighteen-item caliber of 2023, and thus of relatively lower measurement precision. After removing missing values according to the above calibers, 1,255 valid samples enter the replication test.

5.1 Cross-Temporal Replication of Path Coefficients

The replication test follows the main model specification, with standard errors estimated by the bootstrap method; because the 2021 sample is smaller ($n = 1,255$) and the item caliber of the moderating variable narrows from 18 to 12 items, 2,000 resamples are used, at which the confidence interval estimates have stabilised and the conclusions are consistent with those of the 2023 main model with 5,000 resamples. Table 9 reports the path coefficient estimates for the 2021 sample, with the 2023 estimates presented alongside for comparison.

Table 9 2021 replication test: path coefficients of the moderated mediation model (with 2023 comparison)

Variable	Eq. 1: Social capital (2021)	Eq. 1: Social capital (2023)	Eq. 2: Common prosperity (2021)	Eq. 2: Common prosperity (2023)
Chinese national identity (CNI)	0.2203*** (0.0201)	0.6254*** (0.0217)	0.1723*** (0.0467)	0.5395*** (0.0983)
Social capital	—	—	0.2112*** (0.0648)	2.5247*** (0.0875)
Interethnic interaction, exchange and integration (IIEI)	0.1531*** (0.0206)	0.4679*** (0.1005)	0.0534 (0.0478)	1.2825*** (0.2641)
CNI × IIEI	0.3399*** (0.1305)	1.9958*** (0.4669)	—	—
Social capital × IIEI	—	—	0.0530* (0.0233)	3.7671** (1.5763)
Digital skills	0.0128 (0.0113)	0.0304* (0.0178)	-0.0034 (0.0274)	0.4003*** (0.0752)
Social governance	0.2470*** (0.0207)	0.0912*	-0.0030	0.5732***

effectiveness		(0.0455)	(0.0532)	(0.2194)
Community type	0.0031*	-0.0042*	-0.0143***	-0.0359***
	(0.0019)	(0.0027)	(0.0046)	(0.0081)
Urban–rural status	0.0015	-0.0436***	-0.0119	-0.0201
	(0.0066)	(0.0087)	(0.0160)	(0.0280)
Age	0.0005**	0.0005	-0.0005	0.0041***
	(0.0002)	(0.0003)	(0.0005)	(0.0014)
Educational attainment	-0.0001	0.0024**	-0.0008	0.0201***
	(0.0006)	(0.0011)	(0.0016)	(0.0033)
Marital status	-0.0011	-0.0048***	0.0068**	0.0298***
	(0.0014)	(0.0018)	(0.0033)	(0.0072)
Health status	—	0.0161***	—	0.0545***
		(0.0015)		(0.0053)
R ²	0.3604	0.3795	0.1703	0.5412

Note: Bootstrap standard errors (2,000 resamples) are in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; “—” indicates that the variable does not enter the equation; one-tailed tests are applied to the interethnic interaction, exchange and integration variable.

The two segments of the mediation chain are both replicated in the 2021 data: the coefficients of social capital are significantly positive at the 1% level, with direction and significance consistent with the main model. The direct effect is likewise replicated, with the coefficient of Chinese national identity in the common prosperity equation significant at the 1% level. Hypotheses H1 and H2 are again supported. The first-stage interaction coefficient (Chinese national identity $\times$ IIEI) is significant at the 1% level, so Hypothesis H3 receives cross-temporal support. The second-stage interaction (social capital $\times$ IIEI) is marginally significant at the 10% level with a direction consistent with the main model, so Hypothesis H4 receives directional support. The second-stage path coefficient exhibits a cross-temporal difference (0.2112 in 2021 versus 2.5247 in 2023), which mainly stems from the narrowing of the IIEI item caliber from 18 to 12 items: the decline in index reliability exposes the interaction term to attenuation bias, shrinking the estimate towards zero and weakening statistical power—a common phenomenon in small-sample replications.

5.2 Effect Decomposition and Conditional Indirect Effects

Table 10 reports the effect decomposition for the 2021 sample. The total effect is 0.2188 and the direct effect is 0.1723, both significant at the 1% level; the indirect effect transmitted through social capital is 0.0465, with the bootstrap 95% confidence interval excluding zero and a Sobel test value of 3.16, so the mediating mechanism is established once again in an independent sample.

Table 10 2021 replication test: decomposition of direct, indirect, and total effects

Effect type	Estimate (2021)	Bootstrap SE	95% CI	2023 comparison
Direct effect	0.1723***	0.0467	[0.0824, 0.2622]	0.5395***
Indirect effect	0.0465***	0.0147	[0.0180, 0.0759]	2.3242***
Total effect	0.2188***	0.0437	[0.1348, 0.3059]	2.8637***

Note: The indirect effect is computed at the mean level of the moderating variable, and the confidence interval is given by the bootstrap method; Sobel test $Z = 3.16$ ($p < 0.01$); the 2023 comparison column is taken from Table 5.

Table 11 further reports the conditional indirect effects at different IIEI levels. They are 0.0762, 0.0848, and 0.0933 at the low, medium, and high levels respectively, likewise presenting a gradient

that increases with the level of interethnic interaction, exchange and integration—consistent with the pattern of the main model and mutually corroborating the significance of the first-stage moderation.

Table 11 2021 replication test: conditional indirect effects at different levels of IIEI

IIEI level	IIEI value	Conditional indirect effect	Bootstrap 95% CI	2023 comparison
Low (Mean – 1SD)	0.4142	0.0762	[0.0284, 0.1313]	1.9976***
Mean	0.5331	0.0848	[0.0303, 0.1475]	2.3242***
High (Mean + 1SD)	0.6520	0.0933	[0.0326, 0.1643]	2.6509***

Note: The mean of the moderating variable is 0.5331 with a standard deviation of 0.1189; the conditional indirect effects are computed in the same way as in Table 6; the 2023 comparison column is taken from Table 6.

Supplementary Table S3 summarises the cross-temporal validation of the four hypotheses. Taken together, the promoting effect of Chinese national identity on common prosperity and its mediating mechanism transmitted through social capital are again supported in the independent 2021 sample; the first-stage moderating effect of IIEI is significant, and the second-stage moderating effect is consistent in direction and marginally supported. The cross-temporal stability of the “Chinese national identity—social capital—common prosperity” transmission chain is thus confirmed.

6 Conclusions and Policy Implications

6.1 Research Conclusions

Based on micro-level survey data from eight ethnic minority provinces and autonomous regions, this paper constructs a moderated mediation model of “Chinese national identity—social capital—common prosperity” to examine the social mechanism and boundary conditions through which the strengthening of Chinese national identity is transformed into development performance. Three general regularities run through the tests: spiritual identity is fully translated into development performance only when organised into social relational resources; the efficiency of this transformation depends on the contextual conditions provided by interaction, exchange and integration; and the mechanism exhibits “consistent direction with stratified magnitude” across groups and regions. The main conclusions are fourfold.

First, Chinese national identity exerts a stable positive promoting effect on common prosperity in ethnic minority regions. This effect holds after controlling for structural factors at the individual and community levels, indicating that Chinese national identity is not only a cohesive symbol at the value level but also a development momentum that can be genuinely perceived by the people.

Second, social capital is the main channel through which Chinese national identity is transformed into development outcomes, rather than an auxiliary channel. About 80% of the effect in the transmission chain is realised through social capital, suggesting that if the strengthening of Chinese national identity does not materialise into concrete trust relations, participatory networks, and reciprocity norms, its developmental efficacy will be greatly diminished. By identifying the

upstream source of social capital, this paper gives the question of why stronger Chinese national identity promotes common prosperity a testable mechanistic explanation.

Third, interethnic interaction, exchange and integration are the key contextual condition determining the efficiency of transformation, acting simultaneously on the first and second stages of the chain, with the conditional indirect effect increasing monotonically as the level of IIEI rises. This finding repositions IIEI from a common antecedent variable to a boundary condition, and provides a mechanism-level explanation for “co-residence without integration”: when interaction, exchange and integration are insufficient, identity and networks exist, yet transformation can hardly be completed.

Fourth, the above mechanisms exhibit regular differentiation across the group distribution and geographic space. Across the distribution, the effect of social capital declines as the level of common prosperity rises, whereas the effects of Chinese national identity and IIEI increase, constituting a complementary pattern of “charcoal-in-the-snow” and “icing-on-the-cake.” Across space, the transmission chain is characterised by “consistent direction with stratified magnitude”: the border autonomous regions exhibit larger total effects, the Northwest stronger first-stage moderation, the Southwest higher mediation shares, and Inner Mongolia “strong mediation with weak moderation.” This stratified pattern does not weaken the generality of the conclusions; rather, it shows that the operating strength of the transmission chain is constrained by regional foundations of interaction, exchange and integration. The 2021 cross-temporal replication further confirms that the core mechanism does not depend on a single survey year.

6.2 Theoretical Contributions

The theoretical significance of this paper is threefold. First, it turns the study of national identity from “how it is formed” to “how it functions after formation,” constructing and testing the complete transmission chain of “Chinese national identity—social capital—common prosperity.” Second, it redefines IIEI from an antecedent variable to a moderating variable, which complements the structural-morphology orientation of the “five embeddings” perspective (Meng et al., 2024) and provides a causal-mechanism explanation for “co-residence without integration” (Ma and Wang, 2026). Third, it finds that social capital on the one hand and Chinese national identity and IIEI on the other exhibit marginal effects in opposite directions across the distribution—a feature that mean regressions cannot reveal—suggesting that policy judgments derived from average effects need to be refined by group quantiles.

6.3 Policy Implications

First, consolidate the identity foundation without remaining at the ideational level. Since the effect of Chinese national identity on common prosperity is mainly realised through social capital, identity cultivation should be integrated into economic and social development in ethnic minority regions and combined with concrete scenes of social participation in people’s daily lives.

Second, unblock the transformation channel by cultivating social capital: build public spaces for regular interaction among all ethnic groups, cultivate participatory platforms such as volunteer service and community deliberation, and enhance interpersonal trust and trust in government. Given the “charcoal-in-the-snow” effect of social capital for medium- and low-level groups, relevant resources should be tilted towards regions and groups with weak development foundations.

Third, optimise the boundary conditions by deepening interaction, exchange and integration: advance inter-embedded community construction, expand cross-ethnic interaction scenes in tourism, employment, and education, and strengthen cross-regional ethnic collaboration, with particular vigilance against “co-residence without integration”—spatial proximity without substantive interaction, exchange and integration.

Fourth, implement differentiated policy combinations. For regions and groups with lower levels of common prosperity, priority should go to cultivating social capital; for those with higher levels, to the leading role of Chinese national identity and the deepening of interaction, exchange and integration. The northwestern provinces should deepen interaction, exchange and integration to amplify the first-stage moderating effect; the southwestern provinces can build on their higher mediation shares to further unblock the conversion channel of social capital; and regions with limited variation in IIEI, such as Inner Mongolia, need to expand the arenas and carriers of interaction, exchange and integration.

6.4 Limitations and Prospects

This paper uses cross-sectional data, which has inherent limits for causal identification, and bidirectional influences may exist between Chinese national identity and common prosperity; subsequent research can strengthen inference with panel data or instrumental variable strategies and introduce spatial econometric methods to examine spillover effects. In terms of measurement, the core variables are constructed from existing items of a national comprehensive survey—advantageous for sample representativeness and cross-wave comparability, but not designed specifically for ethnic issues, so the portrayal of the multidimensional connotation of IIEI can be further refined. The narrower 12-item caliber of the 2021 moderating variable likewise leaves the cross-temporal validation of the second-stage moderating effect to re-examination. Subsequent research will conduct targeted field investigations based on the indicator system of the “Chang’an Index” Research Group (2026), extend the sample to communities with dispersed ethnic populations in central and eastern China, and further decompose the differentiated effects of the sub-dimensions of social capital and IIEI.

In sum, this paper reveals the transmission mechanism through which Chinese national identity is converted via social capital into common prosperity in ethnic minority regions, as well as the boundary conditions constituted by interethnic interaction, exchange and integration. For multi-ethnic states that commonly face the dual challenges of ethnic diversity and development inclusiveness, how to transform national identity into cooperative resources that cross group

boundaries and thereby support universally shared development outcomes is a proposition of general relevance, and the mechanistic evidence provided by this paper can serve as a reference for related explorations.

Data availability

The data analysed in this study are from the 2021 and 2023 waves of the Chinese Social Survey (CSS), conducted by the Institute of Sociology, Chinese Academy of Social Sciences. The raw data are publicly available from the CSS project (<http://css.cssn.cn>) upon registration and approval; redistribution of the raw individual-level data by the authors is restricted under the CSS data-use agreement. The derived materials underpinning the findings of this study—including the analytical samples of the eight ethnic minority provinces and autonomous regions for 2023 (main sample) and 2021 (replication sample), the complete variable-construction documentation (questionnaire items, coding schemes, reverse-coding and standardisation rules, and entropy weights), and the Stata and Python scripts used for data processing, index synthesis, model estimation, and robustness checks—are provided as Supplementary Files accompanying this submission. Supplementary Tables S1–S3 report the full variable-measurement rules, the province-specific test results, and the cross-temporal validation of the research hypotheses. Any further information is available from the corresponding author upon reasonable request.

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Author contributions

Q. Liu: Conceptualization, Supervision, Writing—review & editing. Z. Ke: Data curation, Formal analysis, Methodology, Writing—original draft. Both authors read and approved the final manuscript.

Competing interests

The author(s) declare no competing interests.

Ethics declaration

This study is a secondary analysis of anonymised, publicly available survey data from the Chinese Social Survey (CSS). The original data collection was conducted by the Institute of Sociology,

Chinese Academy of Social Sciences, in accordance with relevant ethical guidelines, with informed consent obtained from all participants. No additional ethics approval was required for this secondary analysis.

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