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Research article

# Similarity enhances psychological compatibility: Serial mediation effect of psychological kinship and intergroup contact

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ABSTRACT

*Purpose:* This study elucidates the relationship between similarity and ethnic psychological compatibility and its underlying psychological mechanisms. According to kin selection theory, similarity can promote ethnic psychological compatibility by enhancing psychological kinship and intergroup contact.
*Participants:* and methods: A questionnaire survey was administered to 1523 participants from 25 ethnic groups in China. Data analysis was carried out via conditional process modelling. A multigroup comparison of mediation models between the ethnic majority and minorities was detected via the Stats Tools Package.
*Results:* Our findings demonstrated that: (1) cultural and attitude similarity both showed a significant positive correlation with ethnic psychological compatibility; (2) psychological kinship and intergroup contact served as mediators in the relationship of attitude and cultural similarity with ethnic psychological compatibility and psychological kinship and intergroup contact were independent mediators, while psychological kinship–intergroup contact showed a significant serial mediation effect; (3) there were no significant differences in mediation effects between different ethnic groups.
*Conclusion:* Our findings expand on kin selection theory and provide valuable paths for psychologically supporting ethnic psychological compatibility.

## 1. Introduction

Kin selection theory posits that humans have evolved psychological mechanisms for the recognition of kin and non-kin to pass on their genes effectively [1]. As phenotypic similarities can often be found between kin, these similarities are important cues for the recognition of kinship [2]. However, similarities between non-kin can also able to activate kin cognitions, which can reduce the psychological and social distance with others [3] and lead to the erroneous recognition of non-kin as kin (i.e., "false-positive errors" in

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kin recognition). Perceived similarity is the outcome of individuals evaluating and comparing the similarities between themselves and others [4]. It can elicit group identity and arouse unity. Hence, it is a fundamental psychological mechanism underlying the formation of a sense of community among Chinese ethnic groups [5]. Ethnic psychological compatibility is a psychological representation of the Chinese ethnic community's smooth operation [6]. The higher the level of psychological compatibility between two ethnic groups, the smaller the psychological and social distance between them [6–8]. Therefore, following kin selection theory, the presence of similarity cues between two ethnic groups can elicit recognition and promote ethnic psychological compatibility. In addition, with the changes in Chinese society and the combination of cultural traditions, "kin-like" relationships have been formed; specifically, "kin-like" relationships are relationships that are not biologically based but that instead reflect emotional ties between people [9]. In other words, in Chinese society, kinship affects intergroup relations in a special and more common way. On the basis of the above, this research wanted to explore the factors that trigger psychological kinship and the role of psychological kinship on intergroup relations.

### *1.1. Similarity and psychological compatibility*

Perceived similarity can influence interpersonal and intergroup relationships. Higher levels of similarity can increase the level of interpersonal attraction between strangers and acquaintances [10]. Furthermore, the greater the extent to which an outgroup is perceived to be similar to an in-group [11], the more it contributes to a sense of familiarity with the outgroup [12]. A study on common in-group identity revealed that perceived similarity—serving as an internal mechanism to promote ethnic psychological compatibility—facilitated explicit and implicit psychological compatibility [13].

Kin selection theory posits that "false-positive" kin recognition leads to the automatic association of similar targets with kinship [3]. Attitude similarity is a type of deep-level similarity [14] that can serve as a heuristic cue for kinship and activate an individual's kin-recognition response [15].

Culture encompasses the thoughts, emotions, and values of a group [16]. Therefore, cultural similarities can be extensively found across different groups, especially ethnic ones [17]. The presence of greater cultural similarities between parties in intergroup interactions can lead to a greater willingness to cooperate [18]. In the process of their formation and development, the different Chinese ethnic groups shared similar living and social environments [19], which have helped to shape similar values [20] and written scripts [21,22]. Hence, these groups possess a high level of similarity [5] and are more likely to be recognized as kin. Based on this, we propose Hypothesis 1: Similarity (including attitude and cultural similarity) promotes psychological compatibility among Chinese ethnic groups.

### *1.2. The relationships among psychological kinship, similarity, and psychological compatibility*

From the perspective of kin selection theory, the effect of similarity on ethnic psychological compatibility may be related to psychological kinship, which refers to the behaviors and feelings elicited when treating others as kin despite being genetically unrelated [23] and the resulting responses of emotional closeness [24]. Perceiving shared characteristics with other group members can promote the formation of psychological kinship within the group [25]. Psychological kinship causes individuals to view members of the in-group or outgroup as intimates, thereby forging close interpersonal relationships [26]. As a manifestation of positive ethnic relations [27], ethnic psychological compatibility is embodied by positive attitudes toward outgroups and close intergroup distance [6]. Psychological kinship facilitates the generation of intimate emotional or behavioral responses towards outgroups and promotes psychological compatibility with them. Thus, Hypothesis 2 states that psychological kinship mediates similarity (including attitude and cultural similarity) and ethnic psychological compatibility.

### *1.3. The relationships among intergroup contact, similarity, and psychological compatibility*

Intergroup contact theory posits that contact with outgroup members will enhance understanding of the outgroup, increase positive emotional experiences towards outgroup members or even the entire outgroup, and improve intergroup relations [28]. Perceived similarity is a key indicator for predicting attraction and evaluating interpersonal relations [4]. Individuals who perceive a greater degree of similarity with the outgroup are more likely to engage in social contact with them, thereby promoting proactive interpersonal behaviors [11]. A study demonstrated that a higher level of similarity between a mentor and protégé can lead to more frequent contact between them. This contact increases the expert's willingness to mentor the protégé [29]. Therefore, similarity may encourage both parties to interact, enhancing the psychological compatibility among ethnic groups by increasing intergroup contact. In addition, intergroup contact can reduce prejudice, promote positive communication between ethnic groups [30], and enhance ethnic psychological compatibility [27]. Therefore, we propose Hypothesis 3: Intergroup contact mediates similarity (including attitude and cultural similarity) and ethnic psychological compatibility.

### *1.4. The relationships among similarity, psychological kinship, intergroup contact, and psychological compatibility*

The kin preference exhibited by humans can enhance their willingness to engage in more supportive behaviors towards their psychological kin [31], while psychological kinship and positive intergroup interactions can both promote the wellbeing of immigrant groups [32]. Higher genetic relatedness between kin can increase the frequency and amount of interaction between them, increasing their willingness to help. This phenomenon may also occur among non-kin with close emotional connections [33]. Psychological kinship refers to the close, "as-if-family" relationships among non-kin [23]. Psychological kinship can enhance emotional closeness by

increasing the frequency of interaction between two individuals. Therefore, we propose Hypothesis 4: Psychological kinship and intergroup contact play a serial mediating role between similarity (including attitude and cultural similarity) and ethnic psychological compatibility. Based on the above, we propose the following study model (see Fig. 1).

### 1.5. Ethnic differences in the mediating effect

As a unified multi-ethnic country, China is home to diverse ethnic cultures with distinct characteristics due to differences in geographical ecological environments and production methods [34]. Each ethnic group has its own traditional concentrated settlement areas; for example, the Tibetan people mainly reside in the Tibet Autonomous Region while the Bai people are primarily distributed in Yunnan Province. Several populous ethnic groups, such as the Mongolian, Tibetan, Uighur, Nakhi, and Zhuang peoples, have their own scripts and exhibit even greater variations in spoken languages. Physical differences also exist among different ethnicities; for instance, Tibetan, Mongolian, and Uighur people possess unique facial features. Psychological studies have demonstrated that there are cognitive, emotional, and behavioral differences between various ethnic groups. For instance, Uighur individuals show better cognitive reappraisal effects for negative emotions compared to Han Chinese individuals [35], Han Chinese university students tend to use cognitive reappraisal strategies more than Tibetan students when regulating negative emotions [36], minority groups demonstrate higher cross-cultural sensitivity compared to Han Chinese individuals [37], and Va individuals exhibit significantly lower delay discounting rates in intertemporal decision-making related to health and environment and significantly smaller time perception than Han Chinese individuals [38]. In comparison to the Han ethnic group, the kinship concept structures of the Nakhi and Mosuo peoples emphasize generational hierarchy [39]. Notably, while Yi men's kinship terms evoke the notion of "heaviness," women's kinship terms among the Mosuo people conversely highlight "lightness" [40]. Drawing upon disparities between majority and minority ethnic groups, this study posits that there may be divergent mechanisms for kin recognition among these groups. Hypothesis 5 postulates significant variations in chain mediation effects pertaining to similarity (including attitude and cultural similarity), which influence psychological integration within major and minority ethnic groups.

Based on kin selection theory, we examined the relationship between attitude and cultural similarity with psychological kinship, intergroup contact, and ethnic psychological compatibility, as well as the possible differences in kin recognition between the ethnic majority and minorities. We hope that our findings will provide new perspectives for promoting ethnic psychological compatibility.

## 2. Materials and methods

### 2.1. Participants

In this study, questionnaires were administered in five schools in China, including a higher vocational and technical school that included some minors. Prior to the experiment, we asked classroom teachers to obtain consent from students' parents through a WeChat parent group. Only students whose parents agreed to participate and passed the attention check questions were included in the data analysis. Moreover, each subject read the informed consent form before filling out the questionnaire.

We distributed questionnaires via an online survey website, and a total of 1628 questionnaires were recovered. We removed samples that did not pass the two attention check questions ("Please select "Somewhat Agree") and had excessively short or long responses, which resulted in 1523 valid samples. There were 465 male and 1058 female respondents, ranging from 16 to 29 years ($M = 20.68$, $SD = 1.61$). A total of 1303 participants were from 25 ethnic groups, including the Han (the majority ethnic group in China); meanwhile, 220 participants were from 24 ethnic minority groups, such as the Yi, Bai, and Hui. All participants took part in this survey voluntarily, and those who returned valid questionnaires received RMB 6 as remuneration.

### 2.2. Measures

Attitude was measured using one item, which referenced the perceived deep-level similarity questionnaire developed by Ng et al. [41]. In this study, the target was modified to the Nakhi people: "In terms of attitude, to what extent do you think you are similar to the

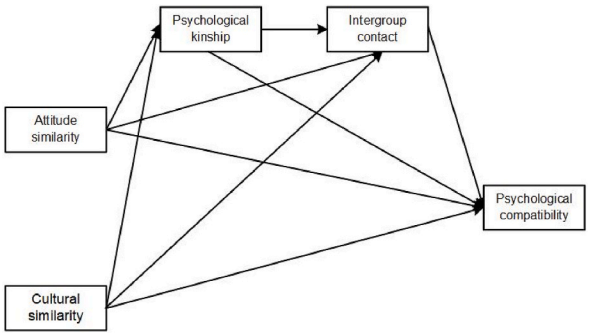


**Fig. 1.** Research hypothesis framework.

Nakhi people?" The item was rated using a 7-point Likert scale ranging from 1 ("completely dissimilar") to 7 ("completely similar"), with higher scores implying stronger perceived similarities in attitude.

Cultural similarity was measured using one item proposed by Gao et al. [42] to measure the perceived similarity between the participants' ethnic culture and the Han culture. The item was included and presented in pictorial form (see Fig. 2). The target was modified to the Nakhi people, and the participants were asked the following question: "In your opinion, which picture best represents how different or similar your ethnic culture is to the Nakhi culture?" Participants who perceived the two as completely different selected the two circles with no overlap; those who perceived the two to be particularly close selected the two circles with the greatest overlap. The item was rated on a five-point scale ranging from 1 (least overlap) to 5 (most overlap), with greater overlap indicating stronger perceived cultural similarities.

We adopted the Psychological Kinship Scale developed by Buhrmester et al. [31], which consisted of three items. The scale was subjected to forward and backward translation in this study. The target was modified to the Nakhi people, and the following is a typical item: "The Nakhi people are like family to me." The items were rated on a 7-point scale ranging from 1 (completely disagree) to 7 (completely agree), with higher average scores indicating a stronger psychological kinship. The Cronbach's α coefficient in this study was 0.917.

Intergroup contact was measured using two items, which were taken from the measurement of multicultural experiences by Li [43]. The two items include: (1) "What proportion of your friends are from other ethnic groups?" rated on a 7-point scale ranging from 1 (few) to 7 (many); (2) "How much contact do you think you have with other ethnic groups?" rated on an 11-point scale ranging from 0 (almost no contact) to 10 (a lot of contact). The average score was calculated with higher average scores indicating more intergroup contact with other ethnic groups. The Cronbach's α coefficient in this study was 0.799.

Ethnic psychological compatibility was measured using eight items, which were adopted from the Social Distance Scale of Bao et al. [8]. A typical item is "I am willing to be in the same school as Nakhi people." All items were rated on a 5-point scale ranging from 1 (extremely unwilling) to 5 (extremely willing), with higher average scores indicating a closer social distance and higher psychological compatibility. The Cronbach's α coefficient in this study was 0.928.

### 2.3. Statistical analysis

We employed SPSS 25.0 to perform a common method bias (CMB) test, correlation analysis, and regression analysis. We used the PROCESS macro for SPSS developed by Hayes [44] to perform mediation analysis and Amos 24.0 to compare the ethnic differences in mediation effects between different groups.

## 3. Results

### 3.1. Common method bias test

We separated the measurements in time because the questionnaire survey method is susceptible to CMB. Further, we ensured the participants' anonymity [45]. We also performed Harman's single-factor test to assess the presence of CMB [46]. The results showed that a total of four factors had eigenvalues greater than one, and 43.43 % of the variance was explained by the first factor, which contributed less than 50 % [47,48]. Thus, CMB was not severe in this study.

### 3.2. Descriptive Statistics and correlation analysis

We performed a Pearson correlation analysis to understand the relationships among the main variables. The results are shown in Table 1, which demonstrates that there were significant positive correlations between all pairs of variables. Attitude and cultural similarity were significantly positively correlated with psychological compatibility, which implies that higher levels of attitude and cultural similarity were associated with higher levels of psychological compatibility. Attitude and cultural similarity were significantly positively correlated with psychological kinship, which implies that higher levels of similarities were more likely to evoke psychological kinship. Attitude and cultural similarity were significantly positively correlated with intergroup contact, which implies that

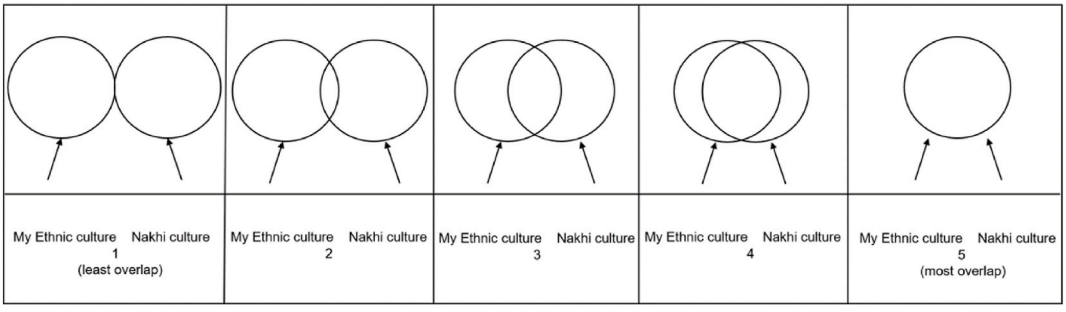


**Fig. 2.** Measurement of perceived cultural similarity.

**Table 1**
Correlation matrix of main research variables.

| Variable | *M* | *SD* | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| 1. Attitude similarity | 4.02 | 1.60 | – | | | | |
| 2. Cultural similarity | 2.93 | 1.00 | 0.56*** | – | | | |
| 3. Psychological kinship | 4.76 | 1.50 | 0.51*** | 0.44*** | – | | |
| 4. Intergroup contact | 4.44 | 2.14 | 0.28*** | 0.26*** | 0.32*** | – | |
| 5. Psychological compatibility | 4.17 | 0.69 | 0.32*** | 0.28*** | 0.47*** | 0.26*** | – |

**Notes:** $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$, same below.

higher levels of perceived attitude and cultural similarity were associated with greater intergroup contact. Psychological kinship was significantly positively correlated with intergroup contact, which implies that a stronger sense of psychological kinship was associated with more frequent intergroup contact.

### *3.3. Relationship between similarity and psychological compatibility: serial mediation analysis*

We verified serial mediation effects using the bootstrap method, a sample size of 5000, a 95 % confidence interval (CI), and Model 6 of the SPSS PROCESS plug-in Ref. [49].

First, attitude and cultural similarities were set as the independent variables, psychological compatibility as the dependent variable, and psychological kinship and intergroup contact as the serial mediators. The results are shown in Table 2. The overall regression equation was significant when attitude similarity was set as the independent variable $R^2 = 0.24$, $F(3,1519) = 160.00$, $p < 0.001$, and also when cultural similarity was set as the independent variable $R^2 = 0.24$, $F(3,1519) = 157.88$, $p < 0.001$.

Next, we tested the significance of the direct and mediation effects of similarity and ethnic psychological compatibility. The 95 % CI of all paths did not contain zero. The results are shown in Table 3, as follows: (1) With similarity as the independent variable, the effect on psychological compatibility was significant. More specifically, the effect of attitude similarity on psychological compatibility was $B = 0.139$, $SE = 0.011$, 95 % CI [0.119, 0.160]. The effect of cultural similarity on psychological compatibility was $B = 0.191$, $SE = 0.017$, 95 % CI [0.158, 0.225]. Thus, the results support Hypothesis 1. (2) The results are consistent with Hypothesis 2 in that similarity exerted a positive effect on psychological compatibility via psychological kinship. More specifically, attitude similarity had a significant indirect effect on psychological compatibility via psychological kinship $B = 0.085$, $SE = 0.008$, 95 % CI [0.070, 0.100]; while cultural similarity also had a significant indirect effect $B = 0.122$, $SE = 0.011$, 95 % CI [0.101, 0.145]. (3) Similarity had a significant indirect effect on psychological compatibility via intergroup contact. More specifically, the indirect effect of attitude similarity on psychological compatibility via intergroup contact was $B = 0.008$, $SE = 0.002$, 95 % CI [0.004, 0.013]. Cultural similarity was $B = 0.012$, $SE = 0.004$, 95 % CI [0.006, 0.019]. Thus, the results support Hypothesis 3. (4) Similarity was a positive predictor of psychological compatibility via psychological kinship and intergroup contact. The serial mediation effect was significant when attitude similarity was set as the independent variable, $B = 0.007$, $SE = 0.002$, 95 % CI [0.003, 0.009], and when cultural similarity was set as the independent variable, $B = 0.009$, $SE = 0.002$, 95 % CI [0.005, 0.014]. Thus, the results support Hypothesis 4 (see Table 3).

Fig. 3 shows the results of each path coefficient in the serial mediation model. When attitude similarity was set as the independent variable, psychological kinship and intergroup contact as the mediators, and psychological compatibility as the dependent variable, attitude similarity had a significant positive effect on psychological kinship, $B = 0.48$, $p < 0.001$; psychological kinship had a significant positive effect on intergroup contact, $B = 0.33$, $p < 0.001$; intergroup contact had a positive effect on psychological compatibility, $B = 0.04$, $p < 0.001$; and attitude similarity also had a direct positive effect on psychological compatibility, $B = 0.04$, $p < 0.001$ (see Fig. 3a). When cultural similarity was set as the independent variable, cultural similarity was a positive predictor of psychological kinship, $B = 0.66$, $p < 0.001$; psychological kinship had a significant positive effect on intergroup contact, $B = 0.36$, $p < 0.001$; intergroup contact remained a positive predictor of psychological compatibility, $B = 0.04$, $p < 0.001$; and cultural similarity was also a direct positive predictor of psychological compatibility, $B = 0.05$, $p < 0.001$ (see Fig. 3b).

**Table 2**
Regression analysis of similarity with psychological compatibility.

| | Psychological compatibility | | |
|---|---|---|---|
| | *B* | *SE* | *p* |
| Attitude similarity | 0.041 | 0.011 | <0.001 |
| Psychological kinship | 0.178 | 0.012 | <0.001 |
| Intergroup contact | 0.037 | 0.008 | <0.001 |
| $R^2$ | 0.240 | | |
| *F* | 160.004 | | |
| Cultural similarity | 0.048 | 0.017 | <0.01 |
| Psychological kinship | 0.185 | 0.012 | <0.001 |
| Intergroup contact | 0.038 | 0.008 | <0.001 |
| $R^2$ | 0.238 | | |
| *F* | 157.881 | | |

**Table 3**
Path analysis of the mediation model.

| Mediation path | Psychological compatibility | | |
|---|---|---|---|
| | Effect size | *SE* | 95 % CI |
| Ind1: Attitude similarity→ Psychological kinship→ Psychological compatibility | 0.085 | 0.008 | [0.070, 0.100] |
| Ind2: Attitude similarity→ Intergroup contact→ Psychological compatibility | 0.008 | 0.002 | [0.004, 0.013] |
| Ind3: Attitude similarity→ Psychological kinship→ Intergroup contact→ Psychological compatibility | 0.006 | 0.002 | [0.003, 0.009] |
| Total indirect effect | 0.099 | 0.009 | [0.082, 0.116] |
| Direct effect | 0.041 | 0.011 | [0.018, 0.063] |
| Total effect | 0.139 | 0.011 | [0.119, 0.160] |
| Ind1: Cultural similarity→ Psychological kinship→ Psychological compatibility | 0.122 | 0.011 | [0.101, 0.145] |
| Ind2: Cultural similarity→ Intergroup contact→ Psychological compatibility | 0.012 | 0.004 | [0.006, 0.019] |
| Ind3: Cultural similarity→ Psychological kinship→ Intergroup contact→ Psychological compatibility | 0.009 | 0.002 | [0.005, 0.014] |
| Total indirect effect | 0.143 | 0.012 | [0.121, 0.168] |
| Direct effect | 0.048 | 0.017 | [0.014, 0.082] |
| Total effect | 0.191 | 0.017 | [0.158, 0.225] |

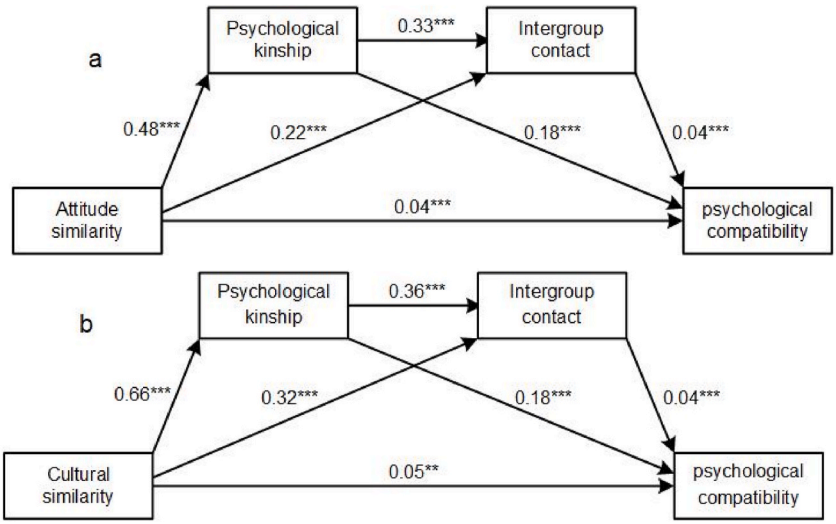


**Fig. 3.** Serial mediation path diagram of attitude similarity (a) and cultural similarity (b) on psychological compatibility.

### *3.4. Multigroup comparison of mediation model between the ethnic majority and minorities*

Multigroup models were created using AMOS 24.0, and the Stats Tools Package (http://statwiki.kolobkreations.com) was employed to test the ethnic differences in the serial mediation models. The results are presented in Table 4. The three paths of attitude and cultural similarities via psychological kinship, intergroup contact, and psychological kinship—intergroup contact did not show

**Table 4**
Comparison of path coefficient differences between the ethnic majority and minorities in the mediation model of similarity.

| Mediation path | Ethnic majority | | Ethnic minorities | | z-score |
|---|---|---|---|---|---|
| | B | P | B | P | |
| Attitude similarity → Psychological kinship | 0.476 | 0.000 | 0.536 | 0.000 | 1.118 |
| Psychological kinship → Intergroup contact | 0.329 | 0.000 | 0.344 | 0.001 | 0.155 |
| Attitude similarity → Intergroup contact | 0.222 | 0.000 | 0.190 | 0.007 | −0.322 |
| Intergroup contact → Psychological compatibility | 0.036 | 0.000 | 0.015 | 0.447 | −1.147 |
| Attitude similarity → Psychological compatibility | 0.040 | 0.000 | 0.033 | 0.291 | −0.243 |
| Psychological kinship → Psychological compatibility | 0.177 | 0.000 | 0.215 | 0.000 | 1.302 |
| Cultural similarity → Psychological kinship | 0.646 | 0.000 | 0.742 | 0.000 | 0.909 |
| Psychological kinship → Intergroup contact | 0.360 | 0.000 | 0.325 | 0.001 | −0.329 |
| Cultural similarity → Intergroup contact | 0.298 | 0.000 | 0.439 | 0.007 | 0.815 |
| Intergroup contact → Psychological compatibility | 0.042 | 0.000 | 0.012 | 0.447 | −1.368 |
| Cultural similarity → Psychological compatibility | 0.044 | 0.018 | 0.078 | 0.291 | 0.653 |
| Psychological kinship → Psychological compatibility | 0.179 | 0.000 | 0.212 | 0.000 | 1.040 |

significant differences between the ethnic majority and minorities. This indicates that the effects of the three paths by which attitude and cultural similarities positively predict ethnic psychological compatibility did not differ significantly between the ethnic majority and minorities.

In addition, we used a feelings thermometer to measure the dependent variable (psychological compatibility) and conducted the same serial mediation and multigroup comparison analyses. The results were consistent with the research findings above. However, due to space limitations, the results for this section are described in the S1 Supplementary Materials (S1 Results).

## 4. Discussion

This study examined the relationship between similarity and psychological compatibility, as well as the role of psychological kinship and intergroup contact. Our findings revealed that for both attitude and cultural similarity, higher levels of perceived similarity were associated with greater psychological kinship and more frequent intergroup contact, resulting in higher levels of psychological compatibility, with no significant differences between the Han ethnicity and other ethnic minorities in this relationship model.

The ability of attitude and cultural similarities to promote ethnic psychological compatibility may be attributed to shared value orientations. Attitude is closely associated with values. As a type of deep-level similarity, attitude similarity can promote attraction between different ethnic groups [41] and reduce psychological distance, thereby enhancing their psychological compatibility with an ethnic outgroup. Cultural symbols are an important carrier of group culture [50] and a representation of the group, causing individuals to exhibit a preference for outgroups that are similar to their own ethnic culture [18]. Moreover, cultural symbols can convey the value orientation of a given cultural group. Hence, cultural similarity can also signify value similarity. The values conveyed by attitude and culture are closely linked to intergroup relations. Higher levels of perceived similarity in values can enhance the emotional attachment and willingness to cooperate with outgroups [51] while also improving the social trust in groups with similar values [52].

In the long process of development, all ethnic groups in China influence and integrate with each other while still preserving their own unique cultures. We may observe patterns in the distribution of ethnic groups with large mixed populations, small settlements, and interspersed dwellings. Notably, this pattern of plurality and unity has laid the foundation for the formation of similar cultures and values across different ethnic groups. For instance, in Dali, Yunnan Province, the Bai live in the same area as the Han and Yi. While the Bai language belongs to the Yi subfamily, it has also evolved by borrowing from the Han language, giving rise to similar vocabularies and pronunciations across the languages of the three ethnic groups. Notably, these three ethnic groups have lived in harmony and intermarried. The similarities and interconnections between the ethnic groups have brought about a sense of intimacy—"you have me, and I have you"—which has facilitated ethnic compatibility [53,54]. "Cultural borrowing" between ethnic groups also gives rise to similarities across the cultures of different ethnic groups, such as the Buyi, Miao, and Yao groups in southern Guizhou, which demonstrate similar traditional ethnic singing festivals and wedding customs [17]. In addition, similarities between different ethnic groups may also support their psychological compatibility; in particular, this may be especially true for groups with the same origins, such as the Daur ethnic group in northern China and the Han ethnic group, which have the same place of origin—indeed, these groups both affirm collectivism and respect for older adults [55]. Ultimately, similar attitudes and cultural characteristics between different ethnic groups can reinforce their intergroup relations and psychological compatibility.

Similarity serves to activate psychological kinship and promote the interactions and exchanges between ethnic groups, thereby improving ethnic psychological compatibility. Kin selection theory posits that perceived similarity indicates the possibility of kinship between two parties [56]. Attitude similarity can serve as a cue for kin recognition to evoke a sense of psychological kinship between non-kin [15]. Kin recognition induced by cultural similarity may also imply the presence of shared memories and experiences between the two parties [57], resulting in the perception of the other party as "one of their own." Perceived similarity can promote intergroup contact [58], as individuals are more willing to interact with groups that are similar to their own, which will, in turn, increase the level of psychological compatibility [27]. According to the evolutionary and close-relationship model of helping [33], higher psychological kinship can contribute to greater intergroup contact. Our findings revealed that perceived attitudes and cultural similarity between different ethnic groups can evoke "false-positive" kin recognition, producing psychological kinship. As psychological kinship is accompanied by the projection of positive emotions onto others, as well as deep-level attachment and support [59], it can reduce the anxiety that may exist in intergroup contact, increasing the interactions and exchanges between ethnic groups. More frequent interactions and exchanges between ethnic groups can objectively contribute to enriching the experiences of intergroup contact, enhance the psychological closeness with other ethnic groups, reduce the psychological distance between in-group and outgroup members [60], and improve the level of acceptance towards outgroups [61], thereby promoting ethnic psychological compatibility. Furthermore, the impact of kinship is cross-cultural [62], and it is important to consider social and cultural factors when examining the study's proposed model. Perceived similarity plays a significant role in various aspects of human life and serves as a cue for social categorization. Social categorization satisfies the need to be a "cognitive miser" [63]. Perceived attitudes and cultural similarities can act as cues for comprehending the external world and engaging in social categorization, potentially leading to favoritism towards one's own group and derogation towards out-groups, thereby facilitating the development of psychological kinship. Additionally, from the perspective of cultural adaptation, the wide range of pro-social behaviors observed among unrelated individuals may be attributed to cultural adaptations that have evolved over time; this is because humans possess an inherent ability to learn from others, which enables cumulative cultural evolution [64], with groups with more cooperators or pro-social individuals prevailing over those with fewer [65]. In Chinese culture, the pursuit of strong family cohesion is evident in intergenerational dynamics [66], with families continuously interacting across the boundaries between "us" and "them," forming interethnic interclan kinships and cross-ethnic kinships at individual and regional levels [67].

Our findings demonstrate that there were no ethnic differences in the relationship models among perceived similarity,

psychological kinship, intergroup contact, and ethnic psychological compatibility. Differences have been found between the psychological models of majority and minority groups. For example, the self-construct of the Mosuo people includes mothers and aunts as significant others, whereas that of the Han people only includes mothers [68]. In the context of two-way bias, the self-categorization of Han individuals tended towards outgroup categorization, while that of Jingpo and Dai individuals tended towards in-group categorization [7]. Significant differences were also reported regarding emotional experiences and regulation [69,70], mental health [71], wellbeing [72], and other aspects. Ethnic minorities were more susceptible than Han people to the effect of cross-ethnic friendships on enhancing the willingness to engage in intergroup contact [73]. These differences did not affect the relational paths by which attitude and cultural similarity affected psychological compatibility via psychological kinship and intergroup contact. This implies that the different ethnic groups in China have forged a sense of national community through the process of interaction and exchange, which have diluted ethnic boundaries and highlighted their common goals [74]. For more than 2000 years since the Qin and Han dynasties, the 56 ethnic groups in China have shared in their fortunes and misfortunes, successes and failures, and glory and disgrace. Hence, the attitude and cultural similarity derived from this commonality will have the same effect on the psychological and behavioral models of all ethnic groups, providing a psychological foundation to consolidate a sense of community for the Chinese nation.

This study has expanded upon kin selection theory, extended the scope of kin recognition cues from attitude to cultural similarity, and introduced new paths of kin recognition. Additionally, we found that kin recognition mechanisms apply to different ethnic groups, thereby expanding the applicability of kin recognition.

This study has several limitations: 1) Kin recognition cues encompass different types of similarities—attitude, cultural, and facial. Our study was confined to examining attitude and cultural similarities and we found that both can promote psychological compatibility. Future studies can further explore the relationship of psychological compatibility with more types of similarities and the applicability of kin selection theory. 2) A total of 24 Chinese ethnic minorities were selected for this study, all of whom have co-habited with the Han people for an extended period, exhibiting a high degree of mutual familiarity. However, familiarity is also a part of the kin recognition mechanism [3]. Therefore, future studies should distinguish between familiarity and similarity, clarify the relationships among similarity, familiarity, and psychological compatibility (e.g., by choosing two ethnic minorities that are mutually unfamiliar), and further demonstrate the relationship between similarity and psychological kinship with ethnic psychological compatibility. This will provide more robust evidence for establishing a strong sense of community in the Chinese nation.

## 5. Conclusion

Attitude and cultural similarity are significant positive predictors of psychological compatibility. Psychological kinship and intergroup contact serve as mediators in the relationship of attitude and cultural similarities with ethnic psychological compatibility, and this mediating effect consists of three paths: independent mediation of psychological kinship, independent mediation of intergroup contact, and serial mediation of psychological kinship and intergroup contact. No significant differences were found in the mediation effects between the ethnic majority and minorities.

## Ethical approval statement

The project was supervised and approved by Institutional Review Board of the Faculty of Psychology, Southwest University (IRB approval no. H23120). All participants volunteered to participate in this study and read the informed consent form before filling out the questionnaire. The informed consent form informed the participants that the study would be completed anonymously and for scientific purposes only.

## Notes

1. The demographic variables in this study also included the racial composition of the subjects' parents and grandparents, the racial composition of their place of residence, and educational attainment. A total of 1326 participants had parents and grandparents of a single ethnicity and 197 of two or more ethnicities; 1045 participants lived in areas that were ethnically homogenous and 478 lived in areas that were multi-ethnic; 1343 participants were undergraduate and graduate students, and 180 participants were junior college students.
2. We tested for differences between majority and minority ethnic groups for the above demographic variables. The results indicate that there are no significant differences in the ethnic composition of parents and grandparents ($t = 0{,}968$, $p = 0{,}333$), nor in the ethnic composition of the place of residence ($t = -0.306$, $p = 0.759$). However, notable disparities exist in terms of educational qualifications ($t = 2.034$, $p < 0.05$) between the majority and minority ethnic groups.

## Data availability statement

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

## CRediT authorship contribution statement

**Jiani He:** Writing – original draft, Investigation, Conceptualization. **Yufang Zhao:** Writing – review & editing, Supervision, Conceptualization. **Bing Chen:** Validation, Data curation. **Yan Bao:** Investigation. **Zilun Xiao:** Writing – original draft.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix ASupplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e36262.

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