ORIGINAL ARTICLE

Psychometric Properties of the Network Relationship Inventory-Social Provision Version in Chinese Youth

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Abstract Given the lack of psychometric research on friendship measures in non-Western countries, this study examined the psychometric properties of the Chinese version of the network relationship inventory-social provision version (NRI-SPV-C) in a sample of 200 young adolescents living in China (91 boys; M age = 13.21 years). Results from confirmatory factor analysis demonstrated that a hierarchical structure model with two second-order factors (Social Support, Negative Interactions) and nine first-order factors (Companionship, Intimacy, Instrumental Aid, Nurturance, Affection, Admiration, Reliable Alliance, Conflict, and Antagonism) was the best-fitting model. High internal consistency and high construct reliability were found for all factors. Girls reported higher levels of Social Support compared with boys, though no gender differences emerged for Negative Interactions. Social Support was positively associated with youth's friendship satisfaction (Satisfaction), whereas Negative Interactions was negatively associated with Satisfaction. Findings suggest the NRI-SPV-C may be a fruitful measure for assessing youth's friendship quality in China.

Keywords Adolescents · Friendship quality · Chinese adolescents · Psychometric · Factor structure · Network relationship inventory

Introduction

The significance of friendship is well acknowledged in developmental literature [1]; friendship plays a significant role in the lives of youth across development. *Friendship quality*, the combination of positive and negative features in a friendship [2], is particularly relevant to youth's adjustment. Research has shown that high-quality friendship protects youth from the consequences of negative family and peer experiences [1, 2]. Perceptions of high-quality friendship are also associated with indices of well-being like higher self-esteem and lower anxiety and depression [1–3].

Whereas high-quality friendships are characterized by socially supportive features like validation and intimacy, low-quality friendships are characterized by relationship-straining features like conflict and antagonism [1, 2]. Consistent with these views, researchers typically measure friendship quality during development by asking youth about the prevalence of positive and negative features in their friendships [1, 4, 5].

The network relationships inventory-social provision version (NRI-SPV) [5]—one of the most utilized measures of relationship quality across development and cultures [6]—asks youth to rate the extent to which their relationships with different social network members (e.g., parents, best friends) are characterized by positive, socially supportive features (Affection, Reliable Alliance, Enhancement of Worth, Intimacy, Instrumental Help, Companionship, and Nurturance) and negative, relationship-straining features (Conflict and Antagonism). Evidence of reliability and validity for the NRI-SPV has been demonstrated in Western countries. Using a sample of North American youth, Furman and Buhrmester [5] found that all nine features of friendship (Affection, Reliable Alliance, Enhancement of Worth, Intimacy, Instrumental Help, Companionship, Nurturance, Conflict, and Antagonism) were internally consistent and reliable (average α = .80), and that these factors further loaded onto two distinct higher-order or second-order

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factors: (a) Social Support, which comprises Affection, Reliable Alliance, Enhancement of Worth, Intimacy, Instrumental Help, Companionship, and Nurturance, and (b) Negative Interactions, which comprises Conflict and Antagonism. Other studies with North American youth have found similar support for this hierarchical structure model [6–8].

Although the NRI-SPV appears adequate for assessing friendship quality in North American youth, little is known about its psychometric properties in youth living in non-Western countries. Indeed, the only published psychometric research on the NRI-SPV to date was conducted with North American adolescents over a decade ago [6]. Accordingly, despite being used by over 900 developmental researchers from across the world [4, 9], little is known about whether the NRI-SPV is indeed suitable for assessing youth's friendship quality in non-Western countries. Given the majority of the world's youth do not live in Westernized countries and because friendship plays a significant role in youth's socioemotional and psychological adjustment across cultures [1–3], this lack of research remains to be addressed.

To address this gap in research, this study examined the psychometric properties of the NRI-SPV in young adolescents living in China. More specifically, this study examined: (a) the factor structure, (b) internal consistency and reliability, and (c) variable intercorrelations of the Chinese version of the NRI-SPV (NRI-SPV-C). Additionally, this study examined how the NRI-SPV-C factors of Social Support and Negative Interactions relate to Chinese youth's satisfaction with their friendships (Satisfaction).

Given that social relationships are conceptualized and regulated by the norms and values of culture [10], examining the NRI-SPV in China provides an ideal opportunity to examine how cultural differences in norms and values might influence the mechanisms of friendship in youth. In particular, whereas Western cultures like the U.S. are biased toward individualistic values like self-expression and independence, Eastern cultures like China are more characterized by collectivistic values like group-harmony and interdependence [10]. Indeed, China appears to be one of the most collectivistic and least individualistic countries [11]. These differences in cultural norms and values may affect the manifestation of friendships as well as how certain phenomena (e.g., intimacy) are expected and displayed within these relationships across different cultures. Understanding the mechanisms of friendship in China, then, may help elucidate critically important distinctions between culture-specific and culture-general forms of social relationships and help contribute to a more global understanding of friendship and its implications for youth's adjustment across development.

Method

Participants

200 Chinese young adolescents (91 boys; M age = 13.21 years; SD = .72) attending a public middle school in Beijing, China, participated in this study (consent rate = 100 %). 100 % of the participants were Han Chinese, the predominant ethnic group in China. All participants were developmentally normal and attended regular classrooms. The percentage of youth from two-parent families was 85 %. Available demographic information classified the majority of the participants as middle to upper-middle class.

Procedure

Data were collected during the Spring school semester (April–June). Participants were first contacted by telephone; if both parents and adolescents expressed interest, IRB-approved parental consent and adolescent assent forms were mailed to the home with pre-addressed and stamped return envelopes, along with NRI-SPV-C.

Chinese Version of the NRI-SPV (NRI-SPV-C)

The original NRI-SPV [5] assesses the quality of youth's relationship with their mothers, fathers, and friends. Youth's friendship quality was of interest in this study. Participants rated their relationships with their best friends based on 27 items, using a scale ranging from 1 ("none/not at all") to 5 ("very much/almost always"). The items form nine conceptually distinct first-order factors that further load onto two higher-order or second-order factors: (a) Social Support (Affection, Reliable Alliance, Enhancement of Worth, Intimacy, Instrumental Help, Companionship, and Nurturance) and (b) Negative Interactions (Conflict and Antagonism).

In addition to assessing youth's friendship quality, the NRI-SPV [5] also assesses youth's satisfaction with these relationships (Satisfaction). Participants rated their satisfaction with their best friends based on three items (e.g., "How satisfied are you with your relationship with this person?"), using a scale ranging from 1 ("none/not at all") to 5 ("very much/almost always").

Several members of the research team who were fluent in both English and Mandarin translated the original NRI-SPV using the standard forward and backward methods [12]. A variety of formal and informal strategies (e.g., interviews with youth, psychometric analysis) were also used to maximize the reliability and validity of the NRI-SPV-C.

Results

Preliminary Analyses and Descriptive Information

Table 1 contains the means and standard deviations of the NRI-SPV-C scale scores. Skewness and kurtosis values were within the acceptable range of univariate normality (e.g., skewness <2; kurtosis <7) for all scales [13]. Results from independent samples t tests demonstrated several gender differences between the scales. Compared to boys, girls scored significantly higher on Intimacy, Affection, Nurturance, and Social Support. No other gender differences were found. These results are consistent with past research with North American youth that demonstrated higher friendship quality among girls relative to boys [1–3, 6].

Internal Consistency and Reliability

To examine the internal consistency of the NRI-SPV-C, Cronbach's alpha coefficients were calculated for all factors. Table 2 demonstrates strong internal consistency for the two second-order factors (Social Support: $\alpha = .90$, Negative Interactions: $\alpha = .85$), and acceptable internal consistency for all nine first-order factors ($\alpha = .70$–.85). These results are similar to those obtained from past studies with North American youth [5, 6, 9].

To further examine the construct reliability of the NRI-SPV-C, coefficient H [14], a reliability index for latent

factors, was calculated across all factors. Table 2 shows high H coefficients ($H = .73$–.97) across all factors.

Factor Structure

To examine the factor structure of the NRI-SPV-C, several confirmatory factor analysis (CFA) models were constructed within Mplus 7 [15] based on established guidelines [13].

First, a hierarchical structure model was examined with the entire sample (Fig. 1). In this hierarchical structure model, the NRI-SPV-C scale items loaded onto nine first-order factors (Affection, Admiration, Intimacy, Companionship, Reliable Alliance, Instrumental Aid, Nurturance, Conflict, and Antagonism), and these nine first-order factors further loaded onto two second-order factors (Social Support, Negative Interactions). Results demonstrated good model-fit for this model ($\chi^2 = 463.09$, $df = 314$; RMSEA $= .05$; SRMR $= .06$; CFI $= .94$). Table 3 demonstrates that all items loaded highly (average $= .65$–.77) onto their appropriate first-order factors, and that all first-order factors loaded highly (.80–.97) onto their appropriate second-order factors. Goodness of model-fit for this hierarchical structure model was also verified by the absence of large modification indices and standardized residuals, indicating no focal areas of ill fit in the solution [13].

Next, to further test the structural validity of the hierarchical structure model, this model was compared with several other competing models: (a) a model in which there were no first-order factors, and items loaded directly onto the two second-order factors (Second-order only model;

Table 1 Means and standard deviations for the NRI-SPV-C by sex

	Mean		SD	
	Boys	Girls	Boys	Girls
First-order factors				
Affection	3.47*	3.91*	.88	.78
Admiration	3.54	3.61	.86	.78
Intimacy	3.51*	3.83*	.93	.88
Companionship	3.80	4.03	.87	.70
Reliable alliance	4.00	4.20	.88	.79
Instrumental aid	3.57	3.61	.84	.70
Nurturance	3.47*	3.78*	.81	.67
Conflict	2.31	2.09	.86	.76
Antagonism	2.13	2.07	.86	.79
Second-order factors				
Social support	3.62*	3.85*	.72	.58
Negative interactions	2.22	2.08	.79	.73
Satisfaction	4.15	4.32	.77	.66

Note. $N = 91$ boys, 109 girls

NRI-SPV-C Chinese version of the network relationship inventory-social provision version

* Denotes significant gender differences at $p < .05$

Table 2 Internal consistency and reliability of the NRI-SPV-C

	Cronbach's α	H
First-order factors		
Affection	.81	.82
Admiration	.74	.75
Intimacy	.80	.81
Companionship	.73	.78
Reliable alliance	.80	.81
Instrumental aid	.71	.76
Nurturance	.70	.73
Conflict	.85	.96
Antagonism	.71	.74
Second-order factors		
Social support	.90	.97
Negative interactions	.85	.96
Satisfaction	.83	.86

Note: $N = 91$ boys, 109 girls

NRI-SPV-C Chinese version of the network relationship inventory-social provision version

Fig. 1 Hierarchical structure
model. $N = 91$ boys, 109 girls.
Item indicators for first-order
factors: Intimacy (I1–I3).
Affection (A1–A3), Admiration
(AD1–AD3); Companisionship
(C1–C3); Reliable Alliance
(R1–R3); Instrumental aid
(IA1–IA3); Nuturance (N1–
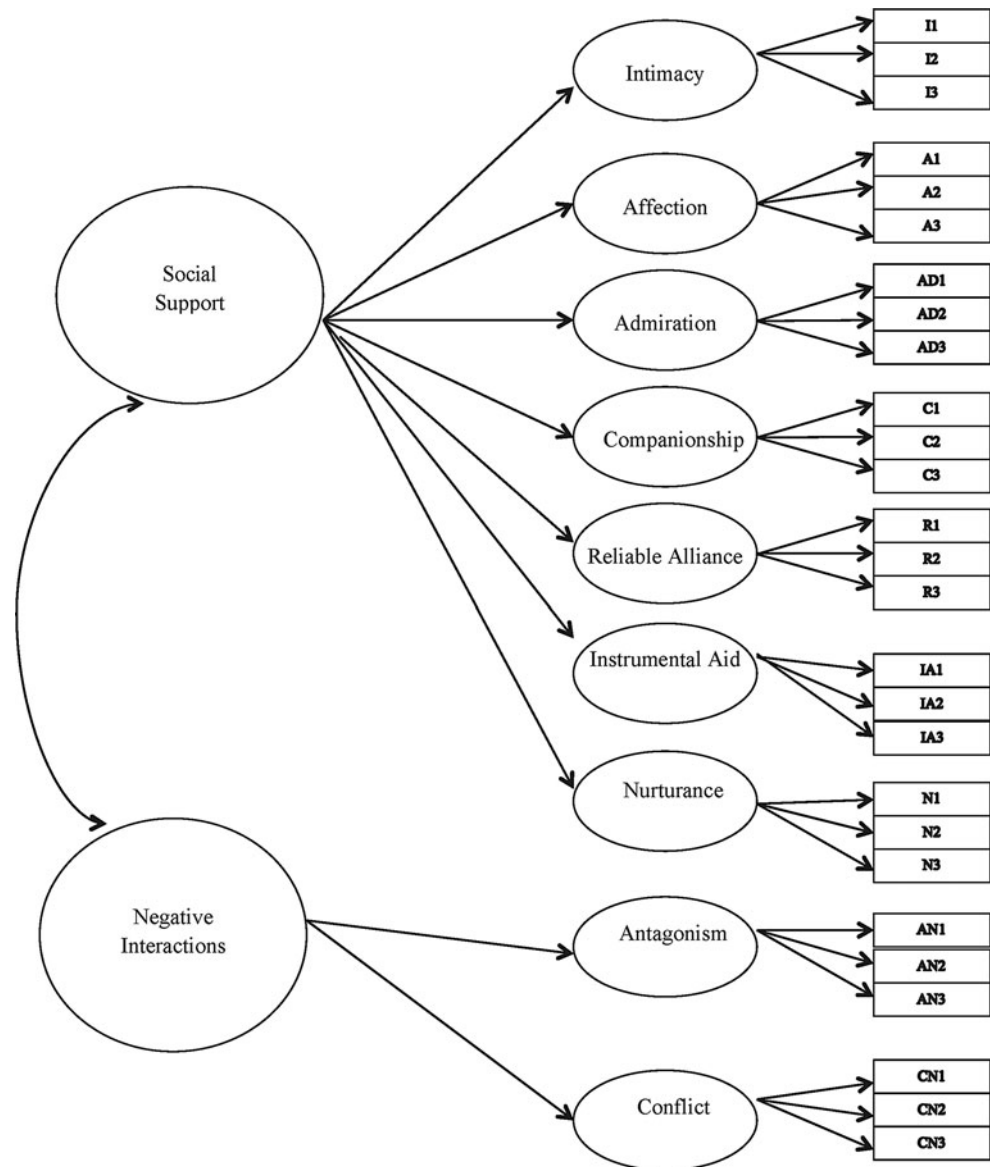N3); Antagonism (AN1–AN3);
and Conflict (CN1–CN3)

Fig. 2), and (b) a model in which there were no second-order factors and items loaded directly onto the nine first-order factors (First-order only model; Fig. 3). Compared with the hierarchical structure model, results demonstrated a significant decrease in model-fit in both the Second-order only model ($\Delta\chi^2(9) = 156.76$, $p < .01$) and the First-order only model ($\Delta\chi^2(10) = 928.89$, $p < .0001$). These model comparisons (Table 4) provided further evidence that the hierarchical structure model was the best-fitting model for the NRI-SPV-C.

Finally, to test whether the hierarchical structure model was invariant across gender, several multiple-group CFA's were conducted following established guidelines on group comparisons [16]. First, the hierarchical structure model was tested separately within each gender. Results showed good model-fit in both girls (RMSEA = .05, SRMR = .05; CFI = .95) and

boys (RMSEA = .06; SRMR = .07; CFI = .93), demonstrating evidence of configural invariance between the two genders. Next, a freely estimated model in which all paths were allowed to vary between girls and boys was compared to a model in which all paths were constrained to be equal between the two sexes. Results demonstrated no significant differences in model-fit between the free and the constrained models ($\Delta\chi^2(18) = 16.33$, $p > .05$); all loadings also exhibited the same pattern across both groups. These results provided evidence of metric invariance between the two genders. Then, a model in which all intercepts were allowed to vary between boys and girls was compared to a model in which all intercepts were constrained to be equal between the two sexes. Results showed no significant differences in model-fit between the free and the constrained models ($\Delta\chi^2(18) = 7.27$, $p > .05$), demonstrating evidence of scalar invariance between the two

Table 3 Factor loadings of the NRI-SPV-C

	Item loadings on scale		Factors	
	Mean	Range	Social support	Negative interactions
Affection	.77	.76–.78	.91	–
Admiration	.70	.66–.74	.87	–
Intimacy	.76	.68–.82	.82	–
Companionship	.70	.60–.81	.87	–
Reliable alliance	.76	.72–.81	.90	–
Instrumental aid	.69	.55–.81	.80	–
Nurturance	.65	.59–.78	.96	
Conflict	.76	.69–.81	–	.94
Antagonism	.68	.60–.77	–	.97

Note: $N = 91$ boys, 109 girls

NRI-SPV-C Chinese version of the network relationship inventory-social provision version

genders. Taken together, these findings provided evidence that the hierarchical structure model was invariant across gender.

Intercorrelations Among First-order factors

Given its hierarchical structure, the degree of intercorrelation between the nine NRI-SPV-C first-order factors should be higher *within* than across their respective second-order factors. Results supported this assumption. As seen in Table 5, the seven first-order factors that make up Social Support (Affection, Admiration, Intimacy, Companionship, Reliable Alliance, Instrumental Aid, Nurturance; $r = .43$–$.78$) were highly correlated with each other, as were the two first-order factors that make up Negative Interactions (Conflict, Antagonism; $r = .74$). By contrast, the degree of intercorrelation between the nine first-order factors was much lower ($r = -.02$ to $-.15$) among different second-order factors (Table 5). These results demonstrated that the intercorrelations between the first-order factors were much higher *within* than across their second-order factors.

Associations with Friendship Satisfaction

Past research of North American youth has demonstrated significant associations between features of friendship quality and perceptions of friendship satisfaction [1–3, 6]. To test whether similar relations also exist for youth in China, path analyses were conducted to examine the associations between Social Support, Negative Interaction, and Satisfaction. Results demonstrated that, consistent with past research [1–3, 6], Social Support was positively associated with Satisfaction ($\beta = .72$, $p < .001$), whereas Negative Interaction was negatively associated with Satisfaction ($\beta = -.31$, $p < .001$); these results were comparable across gender. Thus, whereas

higher Social Support was significantly associated with higher Satisfaction, higher Negative Interaction was significantly associated with lower Satisfaction.

Discussion

The goal of this study was to examine the psychometric properties of the network relationship inventory-social provision version (NRI-SPV) in Chinese youth. The original version of the NRI-SPV [5] for friendship was translated into Chinese (NRI-SPV-C) and administered to young adolescents in China. Findings from this study suggest the NRI-SPV-C may be suitable for assessing youth's friendship quality in China, and that the manifestations and functions of friendship quality may be similar to those found in Western cultures [1, 6].

Adequate coefficient alphas and *H* indices were found across all factors, including the nine first-order factors (Affection, Admiration, Intimacy, Companionship, Reliable Alliance, Instrumental Aid, Nurturance, Conflict, and Antagonism) as well as the two second-order factors (Social Support and Negative Interactions). As hypothesized, and similar to prior research in Western cultures [6, 9], a hierarchical structure model emerged as the most appropriate model in this study.

The intercorrelations between the nine first-order factors were much higher *within* than across their respective second-order factors: Affection, Admiration, Intimacy, Companionship, Reliable Alliance, Instrumental Aid, and Nurturance were more strongly correlated with one another than with Conflict or Antagonism, and Conflict and Antagonism were more strongly correlated with each other than with any of the other first-order factors of Social Support. These results provided evidence that the NRI-SPV-C is internally consistent and reliable among Chinese young adolescents.

Several gender differences as well as similarities were found. Compared with boys, girls reported higher scores on Intimacy, Affection, and Nurturance; they also scored higher on Social Support. By contrast, no gender differences in Negative Interactions were found—girls and boys reported similar levels of Negative Interactions in their friendships. In other words, whereas girls reported their friendships to be more socially supportive than boys, the two genders did not differ in their reports of negativity in these friendships. These results are consistent with past research with North American youth [1–3]. Indeed, although girls typically report higher levels of support in their friendships (e.g., greater affection, closeness, intimacy, and enhancement of self-worth), they do not tend to differ from boys in perceptions of negativity in these friendships. Results from this study further add to these

Fig. 2 Second-order only model. Note. $N = 91$ boys, 109 girls. Item indicators for second-order facotrs: Social Support (I1–I3, A1–A3, AD1–AD3, C1–C3, R1–R3, IA1–IA3, N1–N3) and Negatove interactions (AN1–AN3, CN1–CN3)
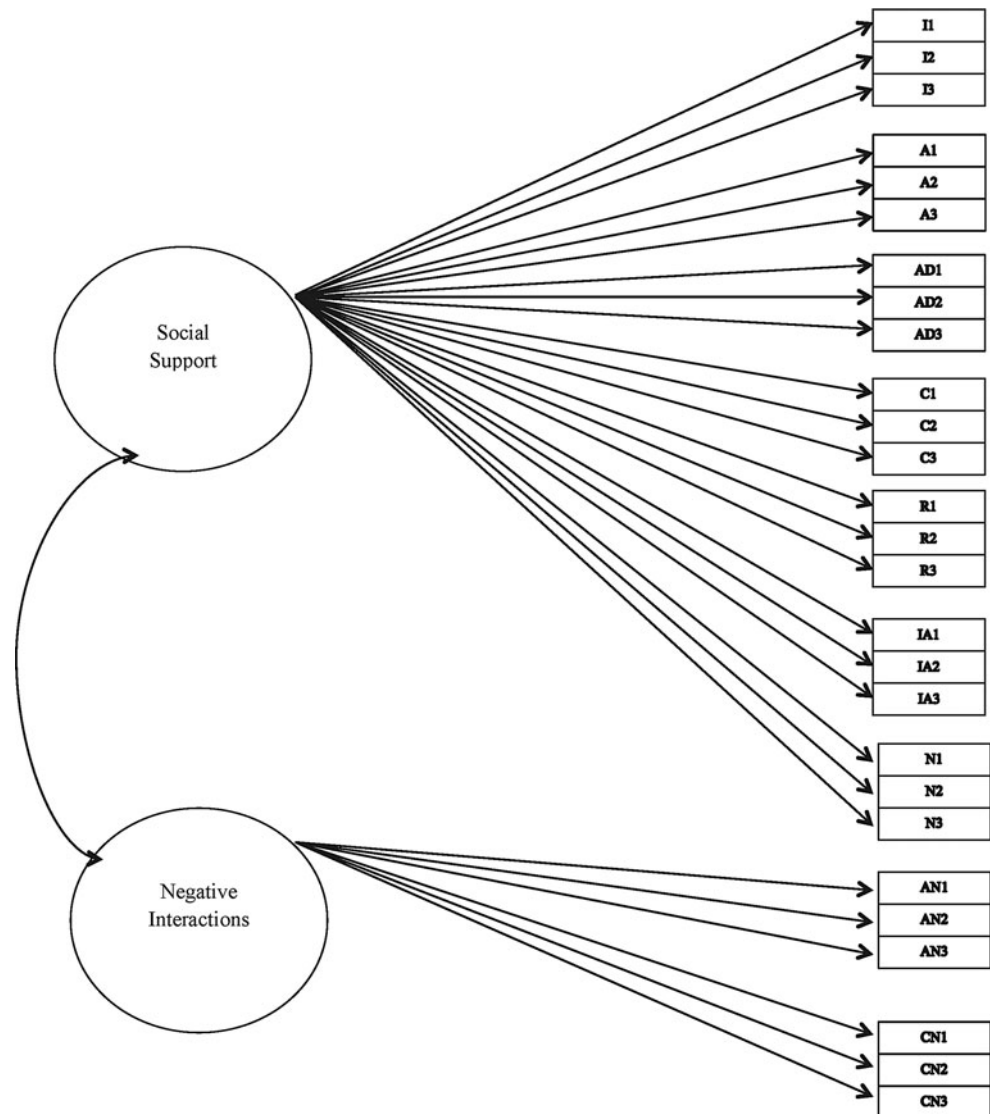
extant findings, suggesting that gender differences in friendship quality during early adolescence may be comparable across different cultures.

Also consistent with past research in Western cultures [1–3, 6], findings from this study demonstrated that whereas Social Support was associated with greater Satisfaction, Negative Interactions was associated with lower Satisfaction. Given the importance of friendship across development [1–4], these findings are not surprising. Whereas highly supportive friendships contribute to youth's sense of self-worth and emotional security, highly negative friendships put youth at risk for psychopathology and emotional distress [1, 2]. Because peers become particularly salient and influential during early adolescence [2], these implications may be particularly true for young adolescents. Regardless of cultural differences, youth's satisfaction with their friendships may be contingent on

their perceptions of social support and negativity in these relationships.

Taken together, findings from this study highlight the universal importance of friendship in youth's development across different cultures. Although China has been found to be more collectivistic and less individualistic compared with Western cultures like the U.S. [10, 11], results from this study suggest that the underlying mechanisms of friendship quality may be comparable to those found in North American and European countries. Despite the potential differences in cultural norms and values, findings suggest youth in different cultures may ascribe similar meanings to the concept of friendship. Consistent with empirical findings that suggest peer relationships may contribute similarly to youth's adjustment across different cultures [17], findings from this study provide further evidence that friendship is a universal phenomenon during development.
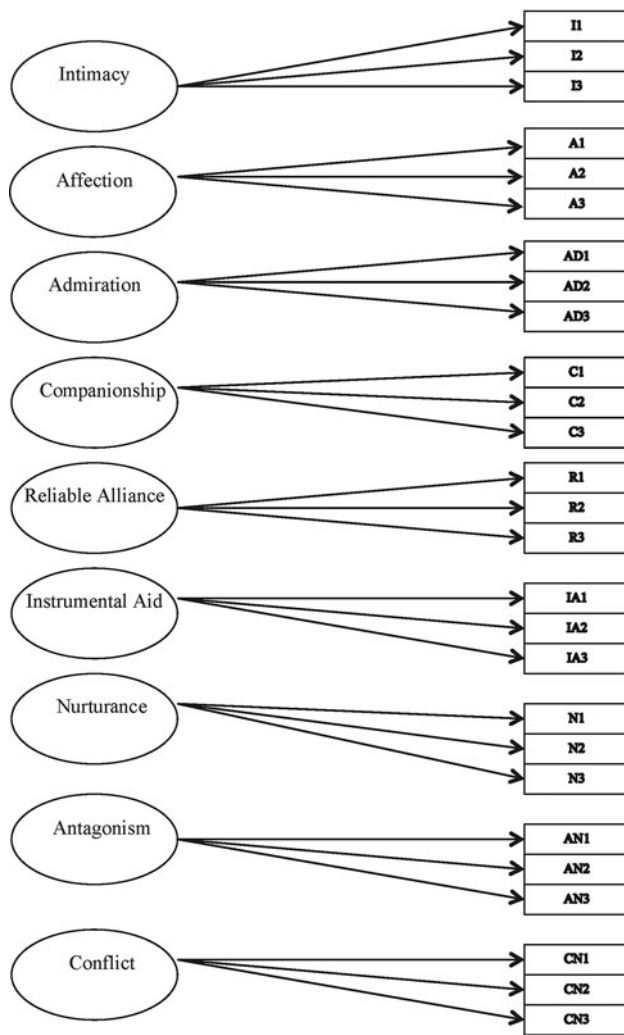
Fig. 3 First order only model. Note. N = 91 boys, 109 girls. Item indicators for first-order factors: Intimacy (I1–I3). Affection (A1–A3), Admiration (AD1–AD3); Companisionship (C1–C3); Reliable Alliance (R1–R3); Instrumental aid (IA1–IA3); Nuturance (N1–N3); Antagonism (AN1–AN3); and Conflict (CN1–CN3)

Table 4 Summary of model comparisons

Model	χ^2	df	CFI	RMSEA	SRMR
Hierarchical structure model	463.09	314	.95	.05	.06
Second-order only model	619.85	323	.88	.08	.07
First-order only model	1,391.98	324	.56	.13	.30

Note: N = 91 boys, 109 girls

CFI comparative fit index, *RMSEA* root-mean-square error of approximation, *SRMR* standardized-root-mean-square

Although this study helps address the lack of psychometric research on friendship measures and helps contribute to a more global understanding of youth's friendship quality, several limitations are worth noting. In particular,

Table 5 Estimated intercorrelations among the NRI-SPV-C first-order factors

	1	2	3	4	5	6	7	8	9
1. Affection		.65	.64	.59	.64	.51	.64	−.10	−.08
2. Admiration			.48	.53	.59	.53	.61	−.25	−.20
3. Intimacy				.71	.54	.43	.58	−.10	−.07
4. Companionship					.78	.48	.60	−.02	−.03
5. Reliable Alliance						.72	.61	−.20	−.15
6. Instrumental Aid							.77	−.12	−.06
7. Nurturance								−.14	−.12
8. Conflict									.74
9. Antagonism									

Note: N = 91 boys, 109 girls

NRI-SPV-C Chinese version of the network relationship inventory-social provision version

due to the cross-sectional nature of this study, future cross-cultural research on the NRI-SPV should employ longitudinal designs to examine its test–retest reliability. Additionally, because this study only examined the *friendship* dimension of the NRI-SPV, future research would do well to examine whether other dimensions, such as parent or romantic dimensions [8], also appear valid for assessing the quality of these relationships across different cultures. Furthermore, although the NRI-SPV-C was significantly associated with youth's friendship satisfaction in this study, future research on the NRI-SPV warrants the inclusion of other socioemotional outcomes (e.g., peer status, social competence), particularly from different informants (e.g., peers, teachers).

Summary

As the first study to examine the psychometric properties of the NRI-SPV in a non-Western country, findings demonstrated that NRI-SPV-C was a reliable measure for assessing youth's friendship quality in China. Similar to past studies with North American youth [6–9], the best-fitting model was a hierarchical structure model with two second-order factors (Social Support, Negative Interactions) and nine first-order factors (Companionship, Intimacy, Instrumental Aid, Nurturance, Affection, Admiration, Reliable Alliance, Conflict, and Antagonism); all factors were reliable and internally consistent. Consistent with past findings of gender differences in friendships [1–3], girls reported higher levels of Social Support compared with boys, though no gender differences emerged for Negative Interactions. Also consistent with past research [1–3], Social Support was positively associated with Satisfaction, whereas Negative Interactions was negatively associated with Satisfaction.

Taken together, findings from this study suggest that the NRI-SPV-C may be a fruitful measure for assessing youth's friendship quality in China, and highlight friendship as a universal phenomenon during development. Given psychometric research is critical for the advancement of psychological research and theories, findings from this study help contribute to a more global understanding of friendship and its significance for youth's development across different cultures.

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