

# Social Networks and Subjective Well-Being: A Comparison of Australia, Britain, and China

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**Abstract** This paper is a comparative study of formal and informal social networks and their effects on subjective well-being in Australia, Britain, and China. Formal social networks are measured by group affiliations, and informal social networks are measured by personal connections with kin, friends, and acquaintances. An analysis of the national representative sample surveys from the three countries shows that the formal networks are of notable importance in increasing people's subjective well-being in Britain and urban China, but the informal networks have much greater impacts in all three countries, particularly in rural China. We propose a cultural–structural interaction framework to explain the observed differences in the network influence on subjective well-being in the three countries.

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## 1 Introduction

Society is networked, and the well-connected are happier than others in Australia (Huang and Western 2015), Britain (Li 2007), China (Bian et al. 2014), and many other parts of the world (Helliwell and Putnam 2004; Song 2011). There are basically two explanations of the positive network influence on happiness or subjective well-being (SWB). First, well-connected persons obtain a good deal of emotional resources from others who generously give them the time and attention, share their feelings with due considerations, give advice with care, help resolve issues with actions and, more generally, provide them with needed social support which maintains one's SWB at a reasonably high level (House 2008). Second, well-connected persons also enjoy opportunities of access to instrumental resources, in forms of information, power, wealth, status and influence of significant others (Lin et al. 1981), and these "social resources" improve one's SWB both directly and indirectly (Lin 1982, 2001).

Of chief interest in this paper is the issue of how emotional and instrumental resources are made available from formal and informal channels of social networks and become effective for SWB. The formal channels refer to social groups, voluntary associations, and other nongovernment organizations (NGOs) whose membership ties are resourceful for emotional and instrumental purposes (Coleman 1990; Putnam 2000). The informal channels, on the other hand, are the personal ties that people develop with relatives, friends, and acquaintances (Granovetter 1973), and these ties are also resourceful for the same functions. To recognize their multifaceted relational roots and externalities, social network analysts have termed these two kinds of channels as "formal" and "informal" networks (Li et al. 2005; Bian and Hao 2013; Huang and Western 2015).

We argue that the relative importance of formal and informal networks in a given society is reflective of how that society is structured, and that the differences in the effects of formal and informal networks on SWB are a window into the structural constraints and opportunities people face in different societies. To what extent do formal and informal networks increase people's SWB in Australia, Britain, and China? What are the similarities and differences in formal and informal networks among the three countries? And how do formal and informal social networks exert their impacts on people's SWB across the three countries? Before presenting statistical results in relation to these questions, we provide a theoretical discussion to guide our empirical analysis.

## 2 Formal and Informal Social Networks

### 2.1 Basic Ideas

Social networks, formal or informal, are the basis from which social capital is generated to affect people's behaviors and perceptions, including SWB. While economic capital is external to social actors and human capital is internalized in them, social capital is embedded in and can be mobilized from the networks of ongoing relationships between social actors (Bourdieu 1986; Coleman 1990; Portes 1998; Lin 2001). The main functions of social capital are to bridge people across structural boundaries as well as bind them together within the communities to which they belong (Putnam 2000).

While social actors are embedded in the networks of ongoing relationships (Granovetter 1985), formal and informal networks are qualitatively different from each other (Li et al. 2005). The formal networks are developed from individuals' membership ties with social groups, voluntary associations, and other NGOs. These are the ties through which individuals can engage in society at large (Putnam 2000). While such ties may transform one's personal worlds, the informal networks mostly develop from kin ties, pseudo-kin ties, friendships, and acquaintanceships (Granovetter 1973; Lin 1982, 2001; Bian 1997, 2010; Li et al. 2015a). Unlike membership ties in the formal networks, social ties in the informal networks are essentially personal.

The distinction between the formal and the informal networks has important implications for the kinds of social resources that are made available to individuals through them. The informal networks are full of dyads of private individuals who share personal emotions and particular feelings toward each other, and are enhanced and strengthened through the build-up of sentiments and obligations on the dyadic basis (Lin 2001; Bian 2001, 2010). The formal networks, on the other hand, tend to bind group members together through formal procedures, membership fees, or other kinds of rule-binding rituals, and operate through the exercise of rights and interest satisfactions on behalf of the members (Putnam 2000). Consequently, whereas informal networks are rich in emotional and practical resources in the form of understanding, caring, trust, and social and material support thus generating both instrumental and expressive kinds of support (Lin 2001), formal networks are a source of tangible (e.g., skills and assets) and intangible (e.g., information and status) institutionalized resources whose very nature is more instrumental than emotional (Li 2015). It is of course also the case that some of the ties established via formal civic engagement become personal ties and that personal ties thus constituted contribute to the further construction of formal memberships in civic organisations where the formal and the informal boundaries become blurred and mutually reinforcing (Putnam 2000).

## 2.2 Informal Networks in the East and the West

In the East, Confucianism, China's main philosophy that has spread to Japan, Korea, Singapore, and other parts of East Asia, emphasizes and recognizes personal relationships, or *guanxi* in Chinese expression, as the core of the society. *Guanxi* is referred to as "a dyadic, particular, and sentimental tie that has the potential of facilitating favor exchange between the parties connected by the tie" (Bian 2006: 312). *Guanxi* is originated in familial ties of sentiment and obligation within kinship networks (Liang 1986[1949]; Fei 1992[1949]), but it goes beyond kinship boundaries to dictate social interactions in society at large through the norms of grace (or "*face*" in eastern culture, an expression which has also been gaining acceptance in western culture), favor, and reciprocity (Fried 1969[1953]; King 1985; Hwang 1987). Persons connected by a non-kin tie can develop *guanxi* between them if they repeatedly develop and strengthen family-like sentiments and, at the same time, build up obligations to each other, making the tie a pseudo-kin tie (Lin 2001; Bian 2001, 2010). The degree of particularism in both kin and pseudo-kin ties is fortified by the build-up of personalized obligations (*renqing*), face (*mianzi*), and emotional attachment (*ganqing*), which jointly impose relational constraints by exerting social-psychological pressure on favor granter and favor recipient alike (King 1985, 1991; Zhai 2009).

The significance of *guanxi* in Maoist China (1949–1976) was manifested in the socialist economy in which most people were faced with poverty and personal relationships were mobilized to break free bureaucratic controls over an array of economic resources, daily necessities, consumer goods, and public services (Whyte and Parish 1984; Bian 1994;

Yang 1994; Yan 1996; Kipnis 1997). In Maoist system of party clientelism and organized dependence, “instrumental-particular ties” with authorities were essential for day-to-day survival and politicized opportunities (Walder 1986). In post-Mao, reform-era, China, personal relationships have retained their significance for meandering through institutional uncertainties with heightened competitions and unleashed influences of political power in creating greater “social networking spaces” in economic, social, and political domains (Bian and Zhang 2014). The prevalence and the increasing significance of *guanxi* in China’s transitional economy are widely observed and well documented (Bian and Huang 2015; Bian et al. 2015; Bian in press).

In the West, Durkheim’s pioneering work on suicide presents a classical account of the importance of informal social networks for social cohesion and social integration (Durkheim 1951). But Durkheim also makes a theoretical distinction between “mechanic solidarity” for preindustrial society and “organic solidarity” for industrial society, pointing to the transformation from the traditional, homogenous, networks of similar persons to the modern interdependence of heterogeneous social roles and positions. Strong ties embedded within informal networks in advanced western countries continue to be important within communities (Gans 1982[1962]; Coleman 1990), but weak ties of infrequent interaction and low emotional attachment (Granovetter 1973) and strategic positions of “structural holes” (Burt 1992) allow non-redundant information and resources to flow across persons and groups that are otherwise disconnected from one another.

The afore-mentioned features of informal networks between the East and the West have led us to recognize a well-documented finding from comparative social network analysis, namely, that the concentration of weak ties in informal networks for westerners stands in some sharp contrast to that of strong ties for the Chinese (Bian 1997; Bian and Ang 1997; Huang and Western 2011; Chua 2011; Li 2013). A recent study shows that while two thirds of Chinese entrepreneurs rely on strong ties to conduct businesses, especially at the founding and immediately subsequent years, only one in ten of American and European entrepreneurs do so (Burt and Burzynska 2017). This particular finding has been discussed with attention to the comparative significance of *guanxi* across the globe (Bian 2017).

### 2.3 Formal Networks in the West and the East

Formal networks as composed of individuals’ membership ties with various social groups and NGOs are a strong source of social capital in advanced Western societies (Putnam 1995, 2000; Hall 1999; Li et al. 2003, 2005). Labour unions and religious institutions are two of the many examples. The truck drivers’ association in the United States, for example, protects its members through contract negotiations and its strong influence on hiring and firing decisions (Lindbeck and Snower 1986; Dickens and Lang 1988). Church members, on the other hand, develop strong identities and norms of sharing and mutual support (Pollner 1989; Emmons et al. 1998; Haslam et al. 2009). While association-based social capital may have been on the decline in the United States and Britain (Putnam 2000; Li et al. 2003), a recent study shows that the formal, membership-based networks still serve as stable structures which can cultivate personal ties and friendships (Lim and Putman 2010). In Britain and Australia, while the impact of social class on social capital is an issue for scholarly debate (Hall 1999; Li et al. 2003), it is nevertheless the case that participation in formal civic life is helpful to people in a range of social life domains such as developing bridging ties (Muttarak 2014), enhancing health status and increasing one’s SWB (Baum et al. 2000; Bjørnsvov 2003; Berry and Welsh 2010; Huang and Western 2011, 2015; Li 2007, 2016).

Formal networks exist in China but with Chinese characteristics. Maoist collectivism and bureaucratic control over resources and opportunities of access were operated through rural communes and urban work units (*danwei*) as distributive mechanisms, making work colleagues the most frequent source of “discussion networks” among the Chinese people in the 1980s (Ruan et al. 1987). While some of workplace-based relations transform into social ties on personal levels (Sun 1996; Zhang 2008) and generate instrumental social capital, post-Mao China has witnessed a growth of NGOs which are, in most instances, affiliated with and operative under the jurisdiction of government offices (Jin 2010). The appearance of autonomous, self-organizing NGOs in China is only a fairly recent phenomenon (Ji 2013).

The foregoing discussions suggest two main features about formal networks. First, Australia and Britain have stronger third-sector organizations, otherwise known in the literature as non-profit and non-governmental organizations, than in China, and consequently formal networks may be more consequential for people’s well-being in Australia and Britain than in China. Second, while both formal and informal social networks can generate emotional and instrumental resources, it is in the informal networks that one can more often find emotional resources than in the formal networks. When formal networks provide emotional resources, these resources are by and large generated from the informal networks of friendships that have grown from inside the formal networks and via co-participation in civic engagements.

### 3 The Influence of Social Networks on SWB: Hypotheses

#### 3.1 Factors Influencing SWB

SWB is people’s cognitive and affective evaluation of their lives. One of the authorities on the topic, Diener (2000) provides both a comprehensive review and a multi-perspective framework for studying SWB. Following Diener, we consider SWB as a function of three sets of factors. The first set refers to personal characteristics, such as an individual’s gender, age, health status, and behavioral habits (George and Landerman 1984; Dolan et al. 2008; Anderson 2014). The second set concerns economic factors, including an individual’s income as well as wealth and consumption as captured by one’s social class position (Easterlin 1974; Diener and Diener 1995; Goldthorpe and McKnight 2006). The third set emphasizes social factors, including an individual’s formal and informal networks (Baumeister and Leary 1995; Myers 2000; Bian et al. 2015). In this paper, we pay special attention to the third set of factors and analyze the effects of formal and informal networks on SWB among the three countries under study.

#### 3.2 Effects of Formal and Informal Networks

Previous research shows that occupational status, group affiliation, marital status, and personal attachments have significant influences on people’s SWB (Baumeister and Leary 1995; Myers 2000; Putnam 2000; Thoits 2011; Richards 2016). Generally speaking, socially integrated individuals are happier than isolated ones simply because people feel their lives fulfilled when they are recognized, accepted, valued, and honored by the significant others surrounding them (Bian and Xiao 2014; Bian et al. 2015).

Those who are deeply embedded in formal and informal social networks, or “machers” and “schmoozers” as Putnam (2000) vividly calls them, tend to benefit from both the instrumental and the emotional sides of social resources. Such resources are engendered through interpersonal interactions in the activities. However, formal engagement is typically conducted in more or less institutionalized settings which, while fostering bridging ties, tend to lack the personal, particular, and emotional touch (Baumeister and Leary 1995). In contrast, interactions through informal social milieus are frequently personal and intimate, where expressions of sympathy, understanding, encouragement, appreciation, and other kinds of emotional support are conveyed, which are very important for reducing anxiety, ensuring peace of mind, and enhancing happiness (Jamieson 1998; Myers 2000; Diener 2000; Pahl 2000).

In sum, social networks will tend to have a positive impact on people’s SWB independent of their demographic attributes or socio-economic positions. Based on the theoretical discussions and existing empirical findings, we now formulate the first hypothesis as follows:

**Hypothesis 1** While both formal and informal networks are expected to have positive effects on SWB, the effect of the informal is stronger than that of the formal in Australia, Britain, and China.

### 3.3 A Cultural–Structural Interactive Model and the Derived Hypotheses

The extent to which social networks affect people’s SWB potentially varies across the social and cultural contexts of Australia, Britain, and China. Theoretically, we argue that two contextual dimensions enhance or suppress network effects: the degree of relationalism in a culture, and the rigidity of social closure that shapes social interactions in a society.

Relationalism refers to the legitimacy of the emotional and instrumental values of social relationships. China exemplifies a strong and persistent relational culture in which social relationships are widely valued (Bian and Huang 2015), and collectivism and interdependence are emphasized over individualism and independence (Gold et al. 2002; DiTomaso and Bian 2016). Australia and Britain, on the other hand, represent strong rationality-oriented cultures in which individuals’ interests and values assume greater primacy. Rational culture normalizes what is called low context communication (Hall 1959), where it is assumed that understanding comes only by saying explicitly what one wants the other person to know. In contrast, communication within relational culture is high context, in which there is a great deal of understanding without the use of words because people know a lot about others by knowing the context of their relationships (Kipnis 1997). Consequently, strong and widespread relational understandings contribute to shared expectations that linked actors will behave in a predictable and normative way. Therefore, we expect the informal social networks to exert greater impacts on SWB in China than in Australia or Britain. In the case of China, we would also wish to differentiate between rural and urban sectors. In rural China, strong ties among kin, relatives and neighbors may prevail owing to the relative lack of socioeconomic development, whereas in urban China greater weak ties with colleagues, acquaintances, and school friends as well as ties obtained from civic activities may assume a greater role in affecting people’s socioeconomic lives.

The rigidity of social closure refers to the extent to which boundaries to social interaction remain fluid or closed. While there is an ongoing debate as to whether British society is getting more rigid (Blanden et al. 2005) or more open (Li and Devine

2011, 2014; Devine and Li 2013; Li and Heath 2016) or has witnessed no significant change in social fluidity over the last few decades (Goldthorpe and Mills 2008), there is some consensus that class rigidity is related to civic engagement (Li et al. 2005; Li and Marsh 2008). Furthermore, research also shows that Australia is more open than Britain in having higher levels of (absolute) social mobility (Erikson and Goldthorpe 1992: 331; Western 1994) and weaker barriers to the formation of friendship and marriage ties (Western 1991; Li 2002). Both countries were founded by the same ‘charter population’ as Heath and Cheung (2007: 1) termed it and have basically similar socioeconomic institutions and civic organizations. However, differences in social rigidity may have different impacts on formal and informal social engagement which may, in turn, have different effects on people’s SWB in the two countries. Our analysis will thus shed light on cultural–structural influences of social networks on SWB both between the two capitalist countries and between them and China, a state socialist country. Weak social boundaries are associated with more heterogeneous social relationships (Blau and Schwartz 1984), providing access to more diverse resources in social networks. We would thus expect network effects on SWB to be enhanced in less rigid societies such as Australia as compared with Britain or China.

These considerations suggest a four-way ideal–typical conceptual model. The first ideal type has a weak relational culture and a low social closure as would be exemplified by Australia. The second ideal type has a weak relational culture and a stronger social closure as represented by Britain. The third ideal type has a strong relational culture and a high social closure as prevalent in rural China. And finally, the fourth ideal type has a strong relational culture and a low social closure as is taking shape in urban China which is undergoing rapid economic and social changes.

This model has guided China–Britain comparisons (Bian and Hao 2013; Bian and Xiao 2014; Li et al. 2015b). It has been found that informal networks have a much stronger effect on SWB in China than in Britain (Bian and Xiao 2014), although Britain has much stronger formal networks than does China (Bian and Hao 2013). Based on these earlier findings, we propose two more hypotheses as follows:

**Hypothesis 2** The influence of informal networks on SWB is stronger in rural and urban China than in Australia and Britain.

**Hypothesis 3** The influence of formal networks on SWB is stronger in Britain and Australia than in urban and rural China.

## 4 Research Design

### 4.1 Data

While comparable data are hard to come by for cross-national analysis, we find a suitable dataset from each of the three countries under study. For Australia, we use the Australian Survey of Social Attitudes (AuSSA2007), which is a nationally representative sample with 2310 respondents aged 18–69, an age range we then impose for all three countries. The British data come from the 2008–2009 Taking Part Survey (TPS2008-09) with a valid sample size of 11,531 respondents residing in England. For China, the 2005 Chinese General Social Survey (CGSS) is used, with a valid sample size of 9696 which is

**Table 1** Distributions of SWB for original and adjusted values by country

Original value	Percent distribution				Adjusted values			
	AUS	BRI	UCN	RCN	AUS	BRI	UCN	RCN
1	1.1	0.5	1.3	1.5	1.0	0.4	0.8	0.8
2	9.4	0.6	6.8	8.9	2.0	0.8	1.6	1.6
3	58.6	1.4	44.6	45.8	3.0	1.2	2.4	2.4
4	31.0	2.0	40.4	39.9	4.0	1.6	3.2	3.2
5		7.4	6.9	4.0		2.0	4.0	4.0
6		7.3				2.4		
7		18.3				2.8		
8		28.9				3.2		
9		16.7				3.6		
10		16.9				4.0		
					Mean(SD)			
					3.2 (0.6)	3.1 (0.7)	2.8 (0.6)	2.7 (0.6)
N	2238	11,493	5330	4366	<i>t</i> test values for country difference			
					AUS	6.7***	27.3***	30.8***
					BRI		31.4***	35.9***
					UCN			5.5***

AUS, Australia; BRI, Britain; UCN, urban China, RCN: rural China (the same in all tables)

Two-tailed significance: \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

divided into rural (4366) and urban (5330) subsamples. These samples allow us to analyse “four societies”: Australia, Britain, urban China, and rural China.

## 4.2 Variables

### 4.2.1 Subjective Well-Being (SWB)

In Table 1, we show the country-specific distributions of SWB (left panel). Each country measures SWB with a different scale and a somewhat different wording. Australia uses a 4-point scale (from “not at all happy” to “very happy”), Britain a 10-point scale (from “extremely unhappy” to “extremely happy”), and China a 5-point scale (from “very unhappy” to “very happy”).<sup>1</sup> Using the proportional-adjustment method (Colman et al. 1997) to standardize the scales, we adjusted the original values in the British ( $Y_{adj.} = Y_{ori.} \times 4/10$ ) and the Chinese ( $Y_{adj.} = Y_{ori.} \times 4/5$ ) data by the values in the Australian data. The distributions of adjusted values and their means and standard deviations are

<sup>1</sup> The different number of categories between Australia and Britain may, at first sight, suggest some serious difficulties for the analysis, with the former having four and the latter ten categories. However, on closer scrutiny, the problem is not particularly severe. If we were to re-code the British data into a four-category variable, then the responses in the current 5th category would go up and those in the 6th category would go down, resulting in 1.1, 10.8, 54.5 and 33.6% respectively, a pattern very similar to that found for Australia. Given this and our standardization procedure, we would believe that the approach we have taken is a reasonable one in the absence of strictly comparable data. We thank the Associated Editor and one of the Reviewers for alerting the issue to us.



presented in the right panel of Table 1. The country differences in SWB are statistically significant from each other, as shown in pairwise *t* tests presented in the lower section of the right panel. On average, Australians are the happiest, with the British being happier than Chinese urbanites, and rural Chinese people having the lowest SWB scores.

#### 4.2.2 Informal Networks

One measure that is available from the three datasets we use in this study is the frequency of contact with relatives and friends, as shown in Panel A of Table 2. This measurement device meets our analytic purpose because, as shown by Marsden and Campbell (1984), the higher the frequency of contact with relative and friends, the more emotional resources there are from the informal networks.<sup>2</sup>

#### 4.2.3 Formal Networks

These measures are based on group memberships and activities. In the original dataset, Australia uses a list of five group memberships, Britain twelve, and China seven. While these group memberships vary in types across the three countries, we use Australia's five groups as the basis and choose the same or similar groups (and drop the other groups) for Britain and China, as shown in Panel B of Table 2. A note of clarification is needed here on two groups. First, the group for "sports" includes various kinds of group sport activities, and in Chinese cities these include the highly popular and low-cost group activities such as martial arts, table tennis, group dance, and pushing-kicking exercises in public spaces such as parks, streets, and neighbourhoods, generating a high rate of participation in urban China. Second, the group for "political/voluntary" is a combination of two separate groups: "political" organisations in Australia and Britain, and "voluntary" organisations for China. Political participation in Australia and Britain are highly voluntary, a reason why we put voluntary group activities in this same category. China's original dataset does not have a "political" category for group activities. Nonetheless, Table 2 shows that the three countries vary a great deal in terms of participation in group activities, with Australia being the highest and rural China the lowest.

Given the categorical nature of the variables on formal and informal social networks, we follow Li et al. (2005) in using the two-parameter item response theory (IRT) models to obtain estimates of the underlying propensities of network social capital. In the IRT modeling, indicator variables are assumed as being randomly chosen from the 'universe' of all such variables as representing the potentially distinctive facets of network social capital.<sup>3</sup>

<sup>2</sup> Australian and British datasets separate relatives from friends but the Chinese dataset combines the two. To make them comparable with each other, we combine relatives and friends in the Australian and British datasets.

<sup>3</sup> In our case, the set of variables for formal social networks meets the criteria better than does that for informal networks but for consistency, we use the IRT modeling in both formal and informal domains. Under the IRT, a single continuous factor is posited to underlie responses to items within a set but this factor is 'measured' subject to error by each item. A continuous score thus underlies each item, the sum of a true score contribution and an error. The distribution of this score is divided up by a set of ordered thresholds, with each section of the distribution being associated with observing one of the possible ordered categorical responses. A respondent's categorical score is therefore determined by their continuous score falling within a particular range of values defined by an adjacent pair of thresholds. Since the continuous score is not directly observable, it is commonly considered to be a latent variable.

#### 4.2.4 Variables of Individual Attributes

People's SWB is affected by a number of socio-demographic attributes (Easterlin 1974; George and Landerman 1984; Diener 2000; Dolan et al. 2008; Anderson 2014; Li 2016; Zhao et al. 2017), and these personal attributes must be controlled for in statistical models to assess the net effects of formal and informal networks on SWB. In our analysis, we include gender, age, health status, marital status, education, occupation, and income.<sup>4</sup> Descriptive statistics of these variables are presented in Panel C of Table 2.

### 4.3 Analytic Strategy

We test our hypotheses in two steps. First, we use the average marginal effects (AME) models to assess the effects of formal and informal social networks on SWB for each society separately, and the statistical results are presented in Table 3.<sup>5</sup> As the AME coefficients represent percentage-point differences, the levels of SWB and the effect sizes of its determinants can be directly compared across the four societies, allowing us to test the hypotheses in a meaningful and yet intuitive way. Second, we pool the four samples together and run the AME models with society–network interactions. The estimates of these interaction terms, presented in Table 4, allow for a direct test of cross-society differences with regard to the effects of social networks on SWB. In both Tables 3 and 4, the standardized EAP scores are used for measuring informal and formal networks in order to compare the magnitudes of their effects.

Footnote 3 continued

As different items may have different characteristics, they are allowed to differ in two ways. Firstly, items may have different threshold parameters. This allows, for example, fewer people to have memberships in political organizations than in sports clubs in Britain or Australia. Secondly, items may have different loading parameters. This allows items to be strongly or weakly related to the underlying factor, or correspondingly to vary in the extent to which they measure the underlying factor rather than something else. Choosing a proportional odds ordinal logistic parameterization allows the model to be specified by

$$\ln\left(\frac{\text{pr}(Y_{ij} \leq k)}{\text{pr}(Y_{ij} > k)}\right) = \alpha_{iK} + \lambda_i \eta_j$$

where  $Y_{ij}$  is the response to item  $i$  from individual  $j$ ,  $\eta_j$  is the score of individual  $j$  on the latent factor,  $\lambda_i$  is the factor loading for item  $i$ ,  $\alpha_{iK}$  is the threshold for a response of  $K$  or above. For an item with  $K$  categories, 1 to  $K$ ,  $\alpha_{iK} = \infty$ . It is also usual to make some parametric assumption about the distribution of the latent variable in the population. We have assumed this to be normally distributed. The models were estimated by maximum likelihood in STATA using Generalized Linear Latent and Mixed Models (gllamm) (Rabe-Hesketh and Skrondal 2012). The details of IRT loadings are available on request and we show the minimum and maximum scores obtained via the *Expected A Posteriori* (EAP) method (Zheng and Rabe-Hesketh 2007) in Table 2.

<sup>4</sup> There are sizeable missing data on education in the British sample: 18% were excluded from the analysis as they had not completed full-time education yet and 3.4% had 'unknown' levels of education. The missing cases in Australia and urban and rural China are minimal, all within 1.0%. There are also missing cases on class in the range of 3.0–9.3% for the four societies. Following Greenland and Finkle (1995), we omitted the missing cases in the analysis. Including the missing as dummy variables does not have any substantial change on the effects of formal and informal social networks on subjective well-being in the four societies. We also conducted a separate analysis using ordinal logit (ologit) regressions and the pattern is essentially the same as shown in Table 3, with informal social networks having significant and positive effects for all four societies and formal networks being positively and significantly associated with SWB for only Britain and urban China (full details of ologit models are available upon request).

<sup>5</sup> The AME models are based on OLS regressions. We used the *eydx* option on the margins command in STATA to turn the coefficients into elasticities. The elasticities represent proportional changes in the dependent variable for unit changes in independent variables.

**Table 2** Distributions of networks and socio-demographic attributes

Variables	AUS N = 2233	BRI N = 8550	UCN N = 5330	RCN N = 4366
<i>A. Informal networks: contact frequency with relatives and friends</i>				
1. Never	2.8	2.4	0.8	0.7
2. Seldom	34.6	12.9	3.8	4.0
3. Sometimes	44.7	18.5	38.4	29.0
4. Often	16.1	42.0	47.2	53.6
5. Very often	1.9	24.2	9.8	12.7
EAP minimum	- 1.1	- 0.4	- 0.5	- 0.5
EAP maximum	1.1	0.2	0.3	0.3
<i>B. Formal networks: group memberships and participation</i>				
1. Sports	42.4	22.1	39.2	5.7
2. Cultural/entertainment	29.1	13.7	30.6	5.7
3. Religious	34.3	6.3	6.7	4.3
4. Community/social	39.6	6.0	32.0	6.2
5. Political/voluntary	7.7	0.8	37.9	9.7
EAP minimum	- 0.1	- 0.4	- 0.6	- 0.4
EAP maximum	0.4	3.4	2.0	4.2
<i>C. Personal attributes</i>				
% Males	44.0	44.9	46.9	46.8
Age (mean)	46.0	44.4	42.7	42.6
Health status (mean)	3.4	4.0	4.0	3.9
% Married	70.5	58.8	81.4	90.1
% High school educated	24.3	27.6	35.1	10.0
% College educated	54.1	45.1	18.2	0.4
Annual income (mean)	44,036.1	18,753.6	12,341.0	4608.9
% Routine manual	7.5	12.6	9.3	79.3
% Skilled-manual	5.2	16.4	29.5	7.3
% Supervisor-technician	12.5	19.7	28.1	10.4
% Routine non-manual	38.1	17.1	15.7	1.1
% Salaried	36.7	34.2	17.4	1.9

EAP is the standardized score on people's formal and informal networks. Annual income takes the mid-point of income bands in Australia and Britain

## 5 Results

### 5.1 Results from Country-Specific Models

Table 3 shows that informal networks have stronger effects than do formal networks in all four societies. In each of the four societies, informal social networks are significantly associated with SWB, net of the effects of all other covariates controlled for in the models. The formal networks, however, are significant in only Britain and urban China. Holding constant all other factors in the models, informal social networks' effects on SWB are most salient in rural China. An increase of one standard deviation in informal social networks is associated with an increase in happiness by 4.6 (a coefficient of 0.046) percentage points

**Table 3** Average marginal effects of country-specific social networks on SWB

	AUS	BRI	UCN	RCN
Social networks				
Informal networks	0.031***	0.019***	0.042***	0.046***
Formal networks	0.004	0.008**	0.010**	0.004
Control variables				
Male	- 0.032***	- 0.019**	- 0.015*	- 0.018**
Age/10	- 0.022	- 0.098***	- 0.172***	- 0.010***
(Age/10) <sup>2</sup>	0.004	0.012***	0.019***	0.012***
Health status	0.077***	0.067***	0.046***	0.043***
Married	0.065***	0.097***	0.133***	0.110***
Higher secondary	- 0.002	0.017*	0.014*	0.007
College	- 0.009	- 0.001	0.032***	- 0.010
Income (sample Z-score)	0.007	0.018***	0.015***	0.041***
Skilled-manual	- 0.024	- 0.020	0.013	0.022
Supervisor-technician	- 0.030	- 0.021	0.011	0.007
Routine non-manual	- 0.041*	- 0.014	0.040**	- 0.039
Salariat	- 0.020	- 0.021	0.046***	0.048*
R <sup>2</sup>	0.213	0.154	0.182	0.140
N	1757	5308	4645	4142

Reference groups in the control variables are female, lower secondary education or below, non-married, and routine manual workers

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

for rural Chinese people, and the corresponding increase for Britons is only 1.9 (a coefficient of 0.019) percentage points. Further tests also show that the effects of informal social networks are significantly larger than those of formal ones in each of the four societies (at the 0.01 level or higher). These results lend strong support for Hypothesis 1.

The effects of personal attributes are worth noting. In keeping with previous studies, women are happier than men; the curvilinear shape of age effects suggests that younger and older persons are happier than middle-aged persons, who are “sandwiched” by the dual obligations to take care of young children and ageing parents; and healthier people and the married are also happier. All these features are consistently observed across the four societies.

The effects of education, income, and occupation vary across the four societies. With the other factors controlled for in the models, higher levels of education are positively related with SWB in Britain and urban China, but not in Australia or rural China. Income does not have significant net effects on SWB in Australia, although it makes a positive impact on SWB in the other three societies. The class effects in Australia and Britain are very weak, suggesting a close association between education, class, and income in the two countries. The stronger demographic and weaker socioeconomic effects in Australia than in Britain suggest that the former is a more fluid society than the latter. Our previous discussion has indicated this from the perspective of social mobility research and we here find evidence on SWB. As a developing country, China has a much smaller professional–managerial salariat than Britain (Li et al. 2015b) and even for people with the same

**Table 4** Average marginal effects of cross-society social networks on SWB

	Base model	Main interaction model	Full interaction model
Society (base = rural China)			
Australia	0.172***	0.173***	- 0.036
Britain	0.145***	0.145***	0.062
Urban China	0.023***	0.023***	0.123*
Informal networks * society	0.038***	0.050***	0.043***
× Australia		- 0.019**	- 0.009
× Britain		- 0.033***	- 0.022***
× Urban China		- 0.001	- 0.003
Formal networks * society	0.015***	0.010**	0.004
× Australia		0.002	0.001
× Britain		0.008*	0.005
× Urban China		0.011**	0.005
R <sup>2</sup>	0.126	0.130	0.243
N	15,852	15,852	15,852

The coefficients for the control variables (as used in Table 3) are not presented but are available upon request

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$

amounts of income, those situated in salariat positions tend to feel more fulfilled than their counterparts who nevertheless occupy lower social positions.

## 5.2 Results from Society-Interactive Models

We have, in the above, shown that informal social networks have significantly stronger net effects than do formal networks on people's SWB in all four societies. This leaves the question of whether informal, or formal, networks' effects are stronger in one country than in another. For this purpose, we conducted a cross-society analysis based on the pooled data of the four society-samples, with rural China as the reference category.

Table 4 shows the results of the cross-country analysis with three models. Model 1 is the base-line model, which estimates the independent effects of society as well as formal and informal social networks on SWB. Model 2 is the main interaction model, with both formal and informal networks interacting with societies. Model 3 is the full model where socio-demographic attributes are added as control variables; for ease of presentation and exposition, the coefficients of the control variables are not presented (but available upon request).

A closer scrutiny of Table 4 reveals four patterns. Firstly, as seen under Model 1, the general level of SWB varies among the four societies, in the order of Australia, Britain, urban China, and rural China (the reference society). These coefficients are statistically significant and confirm the findings from Table 1. Specifically, holding constant the effects of formal and informal social networks, Australians, Britons, and urban Chinese are happier than the rural Chinese by significant margins of 17.2, 14.5, and 2.3 percentage points, respectively.

Secondly, and still referring to Model 1 and net of society-specific differences, we find that both informal networks and formal networks exert significant effects on people's SWB, with the effects of informal social networks being over twice the size as those for the formal networks (a standard-deviation change in the two networks is associated with an increase in SWB by 3.8 and 1.5 percentage points, respectively). Further analysis again shows that this represents a statistically significant difference at the 0.001 level (the  $\chi^2$  is 76.57 with 1 degree of freedom). The findings here again render strong support for Hypothesis 1.

Thirdly, moving to Model 2 with regard to between-society effects of formal and informal networks on SWB, we find some differences in the expected directions. Looking firstly at the results for informal social networks, we find that, while Australians and Britons are happier than rural Chinese people at the overall level as shown in the main effects, informal networks make a significantly smaller contribution to their SWB than in the case of the rural Chinese, by 1.9 and 3.3 percentage points whereas there is little difference between urban and rural residents within China. This provides clear support to Hypothesis 2. Turning next to results on formal networks, we find that formal networks make a significant, albeit small, contribution to SWB (by 0.8 and 1.1 percentage points relative to the rural Chinese). These findings render partial support for Hypothesis 3.

There are marked differences in socioeconomic conditions across the four societies, with rural Chinese having much lower levels of education, occupation, and income. The question that ensues from this is how the society-specific social network effects would manifest themselves once the variations in socioeconomic factors are taken into account. This is shown in the full interaction effects model. Thus, our final important finding from Table 4 is that, other things being equal, people in Australia and Britain are no different from rural Chinese people in terms of SWB and that there is no difference in the impacts of formal social networks on SWB among any of the four societies covered in our analysis. Yet, importantly, we find that informal social networks still retain their net significance but they make a significantly smaller contribution to British people's SWB than to the rural Chinese by 2.2 percentage points, a finding that may well reflect the highly entwined social networks among the rural Chinese. As a highly developed society, high levels of social, and concomitant geographic, mobility in Britain would make it harder to foster such thick networks. Piecing these findings together, our analysis suggests that the impacts of formal social networks are driven primarily by differences in socioeconomic conditions while those of informal social networks are much less affected by such differences.

## 6 Conclusion and Limitations

### 6.1 Conclusion

Previous studies have shown that well-connected individuals are happier than the less-connected. In this paper, we differentiated between formal networks established from people's memberships of and participation in formal civic organizations, and informal networks developed from personal ties with relatives, friends, and acquaintances. This differentiation combined with other innovations in our analysis has enabled us to analyze the formal and the informal social networks' effects on subjective well-being among Australia, Britain, and urban and rural China, enhancing our understanding about the

positive effects of social networks on people's SWB. Our analysis leads to the following four conclusions.

First, our analysis has for the first time in comparative empirical research demonstrated that Australians are happier than Britons, who are in turn happier than Chinese urbanites, leaving the rural Chinese as the least happy on a comparable scale of happiness. This holds true even after their social network characteristics are held constant. Although this finding is open to more nuanced interpretations, it is important to establish this pattern of empirical evidence before further research effort is made to explore the causes of these four-fold differences in happiness.

Second, individual-level variations among the societies are an important source of theoretical explanation for the cross-societal differences in happiness. Our analysis shows that Australians and Britons are happier than the Chinese urbanites and peasants largely because they either have happiness-inducing factors, such as higher occupational positions and higher incomes, or higher happiness generators such as enhanced health status. Whether or not these individual-level variations do indeed produce the above-described patterns about the cross-country differences in SWB awaits further scrutiny. In this regard, we need to note that different levels of socioeconomic development could also make a significant contribution to differences in SWB. Australia and Britain are highly developed societies with well-developed welfare policies such as unemployment protection and pension schemes and pro-health infrastructures mitigating the negative consequences of poor health and other repercussions of socio-economic life whereas in China, particular in the rural sector, welfare schemes and health-care facilities are much poorer.

Third, with a theoretical innovation to differentiate between formal and informal social networks, we were able to establish an understanding that both types of these social networks increase people's SWB in Australia, Britain, urban China, and rural China, despite the fact that these societies are structurally and culturally different from each other. Because emotional resources are of greater importance to people's SWB than are instrumental resources, and since the informal social networks are a stronger and more durable supplier of emotional resources, we have hypothesized that informal social networks maintain and increase people's SWB with a stronger effectiveness than do formal social networks, and this should be true in all societies. This hypothesis has been consistently supported by our analysis on the four societies. Therefore, of fundamental importance for one's happiness is to live or work in a social milieu where one could frequently and intimately socialize with kin, friends, neighbors and colleagues.

Fourth, the society-interactive models have allowed us to produce findings on the differential effects of formal and informal social networks across the four societies. Here the findings do not fully support our hypotheses. One hypothesis is that a stronger relational culture generates greater effects of informal networks on people's SWB in rural and urban China than in Australia and Britain, and this hypothesis has been fully supported. Another hypothesis is that a stronger relational culture generates greater effects of formal networks on people's SWB in Australia and Britain than in rural and urban China, but this hypothesis is not supported. The findings are that there is greater effect of formal networks on people's SWB in Britain and urban China than in Australia and rural China. These effects are subject to the variations in the population characteristics at the individual levels in the respective countries.

## 6.2 Limitations

Some of these conclusions await further investigation in future research. Our measurement devices of both SWB and two types of social networks are confined to the available data in the surveys at our disposal which are not specifically designed for cross-national analyses. On SWB scales, for example, Australia has a 4-point scale without a middle, neutral, category for “neither happy nor unhappy”, China’s 5-point scale includes a middle category of “so-so” with nearly half of the respondents choosing it (45% in the urban sample and 46% in the rural sample), and Britain has a more elaborated 10-point scale from “extremely unhappy to extremely happy” with the two middle categories chosen by around 15% of the respondents. Formal and informal networks, on the other hand, have different kinds of contents in the measurement devices across the three countries. Though we use the standardized scores of these variables, with theoretically-guided and rigorously-conducted models, it would be preferable to have instruments designed in the same way for cross-societal analysis. To be sure, this study sets up an initial point of comparison for future researchers.

At the theoretical level, our explanation is somewhat speculative. We gave a good deal of effort to describe contextual variations in social structure and relational culture among Australia, Britain, and China, but more effort is needed if we are to produce a more rigorous test of the derived hypotheses. How exactly is the rigidity of class closure to be measured? How is relational culture to be operationalized? What are the behavioral mechanisms whereby the societal variations affect the extent to which formal and informal social networks matter for people’s SWB? These questions need to be addressed by a more effective study design. In such a design, there is also an analytical task to be performed about how individual-society interactions alter the effects of informal and, especially, formal social networks on people’s SWB and how macro-level factors (such as welfare schemes and health-care policies) are combined with meso-level (such as community cohesion) and micro-level characteristics to jointly affect people’s SWB both in a given society and across societies. Such an analysis would not only enhance our understanding of SWB but also disclose important features on the similarities and the differences about the social structures in different societies.

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