



Citation for published version:

Deng, J, Shou, Y, Wang, M-C, Allen, J, Gao, Y & Hawes, DJ 2024, 'Core features of Callous-Unemotional Traits: A Cross-Cultural Comparison of Youth in Four Countries' *European Child & Adolescent Psychiatry*, vol. 33, pp. 2681-2693. <https://doi.org/10.1007/s00787-023-02357-8>

DOI:

[10.1007/s00787-023-02357-8](https://doi.org/10.1007/s00787-023-02357-8)

Publication date:

2024

Document Version

Peer reviewed version

[Link to publication](#)

This version of the article has been accepted for publication, after peer review and is subject to Springer Nature's AM terms of use, but is not the Version of Record and does not reflect post-acceptance improvements, or any corrections. The Version of Record is available online at: <http://dx.doi.org/10.1007/s00787-023-02357-8>

University of Bath

Alternative formats

If you require this document in an alternative format, please contact:
openaccess@bath.ac.uk

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

**Core features of Callous-Unemotional Traits: A Cross-Cultural Comparison of Youth in
Four Countries**

Jiaxin Deng¹ Yiyun Shou^{2,3,4} Meng-Cheng Wang¹ Jennifer L. Allen⁵ Yu Gao⁶ David
J Hawes⁷

¹Department of Psychology, Guangzhou University, Guangzhou, China

²Research School of Psychology, The Australian National University, Canberra, Australia

³Saw Swee Hock School of Public Health, National University of Singapore, Singapore

⁴Lloyd's Register Foundation Institute for the Public Understanding of Risk, National
University of Singapore, Singapore

⁵Department of Psychology, University of Bath, Bath, UK

⁶Department of Psychology, Brooklyn College and the Graduate Center of the City
University of New York, NY, USA

⁷School of Psychology, University of Sydney, Australia

Accepted in *European Child and Adolescent Psychiatry*, 11th December, 2023

Author Note

Jiaxin Deng: kammy-tang@hotmail.com

Yiyun Shou: yiyun.shou@anu.edu.au

Meng-Cheng Wang: wmcheng2006@126.com

Jennifer L. Allen: ja980@bath.ac.uk

Yu Gao: yugao@brooklyn.cuny.edu

David J Hawes: david.hawes@sydney.edu.au

Correspondence concerning this article should be addressed to Meng-Cheng Wang, Department of Psychology, Guangzhou University, 230 Wai Huan Xi Road, Guangzhou Higher Education Mega Center Guangzhou, P. R. China 510006, Phone: 86-20-39366750, FAX: 86-20-39366750, E-mail: wmcheng2006@126.com

Conflict of Interest: The authors declare that they have no conflict of interest.

Data availability: Data included in this study are secondary data and the analysis code is available from the corresponding author on reasonable request.

Acknowledgements: We would like to thank all participants in data collection.

Core features of Callous-Unemotional Traits: A Cross-Cultural Comparison of Youth in Four Countries

Objective: With considerable debate concerning the impact of culture on the expression of callous-unemotional (CU) traits, it is unclear whether the core features of CU traits generalize to youth across cultures. This study aimed to examine whether cultural differences are reflected in the core features of CU traits and the associations among these features.

Method: Network analysis was employed to identify the core features and to examine the network structure of CU traits operationalized by the Inventory of Callous-Unemotional Traits (ICU) in four community youth samples from different nations (Australia, $N = 190$; the United Kingdom, $N = 437$; the United States, $N = 330$; China, $N = 503$).

Results: The item “Apologizes to people” was identified as a cross-cultural core feature in the ICU network with a greater centrality of this item compared to others in all four samples. In addition, some items were identified as culture-specific core features in the network, differing in their centrality across samples. The network structures of the youth self-report ICU items were moderately similar across samples, while the structures of parent-report items showed substantial differences. These findings have important implications for cross-cultural research on CU traits as well as practical implications for screening and treatment.

Conclusion: The core features of ICU appear to be generalizable in youth across cultures, although cultural-specific manifestations should be noted.

Key words: Callous-Unemotional traits, Network analysis, Cross-cultural, The Inventory of Callous-Unemotional Traits

Introduction

Callous-unemotional (CU) traits have been included as the specifier —“with Limited Prosocial Emotions”— for the diagnosis of conduct disorder in the fifth edition of the Diagnostic and Statistical Manual [1] and for conduct disorder and oppositional defiant disorder in the International Classification of Diseases 11th edition (ICD-11) [2]. CU traits refer to a temperament dimension with characteristics comprising a lack of remorse and empathy, uncaring about work or school performance, and shallow affect [3]. Youth with these features and behavioral problems are considered to indicate a subgroup with more serious and violent patterns of antisocial and aggressive behavior [4]. Therefore, accurately and reliably identifying these features early in development is crucial for our understanding of the etiology of antisocial behavior. Although measurement research on CU traits has grown rapidly in recent years, this work has rarely included a cross-cultural perspective.

The Inventory of Callous Unemotional traits (ICU) [3] is a comprehensive scale that assesses CU traits in youth with multiple informant ratings. Most research on CU traits has been conducted in Euro-American regions including North America [5–7], Europe [8–10], and Australia [11]. There has been increasing interest and rapid development in CU traits research in East Asian countries in recent years [12–15] (see [13] for review). The findings of those studies have demonstrated that the ICU is a reliable scale to assess CU traits in East Asian countries.

However, differences in the structure and external validity of the ICU between East Asian and Western samples have been reported [8, 16–19]. For example, the item “not

showing emotions to others” has poor discriminability in assessing CU traits in Chinese college students [20], schoolchildren [14], and detained adolescents [19], while it shows moderate discriminability in Western samples [21]. This may suggest that some items, such as “not showing emotions”, may not be a typical feature of CU traits in Chinese samples. This may be due to the social norm that the expression of individual emotions is generally not encouraged in collectivist cultures, in which collective harmony and group needs are prioritized. In addition, from the perspective of Confucian culture, individuals are expected to control their emotions and maintain gravity in their facial expressions.

Another example is that the item “does not care about doing things well” has been reported to have different item properties for children from the United Kingdom (UK) and China [8]. Chinese students were more likely to have higher scores on this item than UK students. Chinese students have a stronger tendency than students in the USA to believe that their school performance may not meet the higher expectations, and greater pressure from peers, parents and teachers to succeed academically [22]. Furthermore, “the feelings of others are unimportant to me” item seemed to be more strongly predicted by callousness among Chinese students than UK students [8], suggesting that disregarding others’ feelings could be a more typical expression of callousness among Chinese students. This may be due to a greater tendency to value considering others’ perspectives and a willingness to give up one’s own desires for the benefit of others in China [23]. Furthermore, UK youth were more likely to score higher compared to Chinese youth on the item, “I apologize (“say I am sorry”) to persons I hurt”, but less likely to score higher than Chinese students on the item “I do not feel

remorseful when I have done something wrong”. The overall social value and expectation that individuals explicitly apologize for transgressions could be higher in the UK than China, explaining its greater use in UK students even if the apology is not ‘felt’ [8].

While the previous studies that used a structural equation modelling (SEM) framework have demonstrated the differential functioning of items (how items relate to latent traits) assessing some features of CU traits in Western and East Asian samples, it remains unclear how the inter-relationships among different features of CU traits may be similar or different for different cultural groups.

Network analysis has become an increasingly popular approach to identifying the core features and relationships among features of mental disorders in psychopathology and personality trait profiles in personality research. Rather than interpreting features as indicators of a latent factor, network analysis conceptualizes disorders or personality traits as the result of interconnections between symptoms or traits [24]. This approach can indicate the most influential characteristics in understanding disorders or personality traits rather than assuming that each feature holds the same importance as being a common outcome of a latent construct, as is the case in latent variables modeling. Features with strong connections with other features which hold central positions in a network are considered to be the central or most important features of a construct. Therefore when a network analysis framework is applied to CU traits, the co-occurrence of features of CU traits are viewed as the result of the interplay between these features.

Network analysis has been used to further our understanding of theoretical frameworks

of CU traits from different cultural contexts by examining the relationships among features of CU traits as measured by the ICU (e.g., lacking remorse or empathy, uncaring about others' feelings, and shallow affect). Bansal and colleagues (2020) performed an initial network analysis using the ICU in 104 preschool children in the United States and identified three features including “Does not care who he/she hurts to get what he/she wants” (Item 4), “Does not care about getting in trouble” (Item 9) and “Seems very cold and uncaring” (Item 12) as the core features of CU traits [25]. In network analysis studies of CU traits in Chinese samples, “Seems very cold and uncaring” was also found to be one of most central features in community samples of youth and juvenile offenders [16] and at various time points during youth aged 8 to 11 years old [26]. In addition, “Shows no remorse” was also found to be an important feature of CU traits in Chinese samples [16]. Findings also suggest that networks for CU traits may share some core features (coldness and lack of remorse) between the US and Chinese samples. For example, studies using confirmatory factor analysis (CFA) have highlighted the importance of callousness in both US and Chinese participants [20, 25].

It is unclear whether the CU traits network might be similar for self- and observer-report across cultures. Goulter and Moretti (2021) identified “Does not care who I/they hurt to get what I/they want” (Item 4) as the most central feature in both self- and parent-report network of CU traits and conduct disorder symptoms in a Western sample of youth and parents, and they also reported differences between youth self-report and parent ratings of networks [27]. “Apologizes to persons I/they have hurt” (Item 16) emerged as a central indicator in the self-report network, while “Concerned about the feelings of others” (Item 8) was a central

indicator in the parent-report network. Wang et al. (2019) reported that the factor loadings of items “The feelings of others are unimportant to me” (Item 21), “I try not to hurt others’ feelings” (Item 17) and “I seem very cold and uncaring to others” (Item 12) were consistently high across multiple informants (i.e., self-, parent- and teacher-report) for Chinese school children [14]. However, these items had low to moderate factor loadings for US youth, with the factor loading of Item 17 .44 for self-report and .66 for parent-report [5]. One possible reason for this discrepancy is that these two cultures place different values on interpersonal relationships. The core values of collectivist culture in China concern interdependence and social harmony, which differs from the emphasis on individualism that is commonly adopted in the US. However, limited research has been conducted comparing self- and other-report of CU traits across cultures using network analysis.

The current study

The present study aimed to investigate the network structure of the ICU items in youth across nations and informants. The first aim was to replicate the ICU network findings in the four samples from different cultures. The second aim was to compare the similarities and differences in the network structure of the ICU items in the four samples from Western and East Asian cultures. The third aim was to investigate the agreement between the self- and parent-report measures of ICU items in the network structure.

In this study, we focused on the short form of the ICU that has shown good cross-cultural validity in prior work [8, 19]. Since prior studies have demonstrated that there are similarities and differences across cultures [8, 14, 19], we expected that items that assessed callousness

as core features of CU traits (e.g., “Shows no remorse”, “Seems very cold and uncaring”) and these features would be generalizable across the four samples. We also expected that two clusters featuring callousness and uncaring items would be observed and that similar associations within clusters would be found in the network structure across cultures. In addition, specific features concerning interpersonal harmony (e.g., “the feelings of others are unimportant to me”) were expected to be more likely to be core features in the Chinese sample than in the Western samples. “Apologizes to persons” was expected to be a more central feature in the UK sample compared with other samples.

Method

Participants and Procedure

This study included youth samples from four different nations: Australia, the UK, the US, and China (see Table 1 for a comparison of demographic information). The samples of Australia and the UK included youth as participants. The Australian sample consisted of 190 participants (75% male), aged from 10 to 15 years old ($M = 11.66$, $SD = 1.29$). One subsample comprised a community sample of 91 boys aged 10-13 years. Study information and questionnaires were distributed to parents of children enrolled in three independent schools and one public school. Another subgroup consisted of a community sample of 99 children (52% boys) aged 10-15 years ($M = 12.01$, $SD = 1.47$). More than half of the parents had a bachelor’s degree as their highest education level (53.9% for mothers, 67.4% for fathers). Questionnaires were distributed to parents of children attending private schools. More details of the samples and procedures can be found in Hawes et al. (2013) [11] and

Hawes et al. (2019) [28].

The UK sample comprised 437 children aged 11-14 years (51% girls; $M = 12.50$ years, $SD = 0.96$). Around three quarters of the sample had English as their first language (77%). Most children were White (85%) and had parents who completed more than 16 years of education (69%). More details about the characteristics of the UK sample can be found in Allen et al. (2021) [8] and Bird et al. (2019) [29].

The samples of the US and China, described below, included youth and their parents as participants. The US sample included a community sample of 330 children aged 8- to 10-years old ($M_{age} = 9.06$, $SD = 0.60$) in New York, the United States. Participants and their main caregivers were invited to complete the questionnaires in a research laboratory following receipt of informed written consent. More details of the characteristics and procedure can be found in Gao and Zhang (2016) [5].

The Chinese sample included 503 children aged 8-13 years (52% boys; $M = 10.77$ years, $SD = 1.06$) from an elementary school in Guangdong Province, China. Most participants were from nuclear families (94%). Over half of the children came from families with only one child (74%). Children and their mothers were invited to participate in the study. The parent consent form and questionnaire were sealed in an envelope to be taken home by students to obtain their parents' consent and completion of questionnaire within two days. Questionnaires and student consent forms were distributed to the students during a class unit, and then students completed the questionnaire during a 45-minute class session under the guidance of their teachers. All the completed parent and student consent forms and

questionnaires were returned to the authors. Parents and children who completed the questionnaires received a gift voucher in exchange for their participation in the study. More details are available in Deng et al. (2020) [16].

All studies received Institutional Review Board (IRB) approval from their respective institutions.

Measure

The Inventory of Callous-Unemotional Traits (ICU) [3] was used to assess CU traits in all samples. The present study reports on the short form of the ICU (11 items of the 24-item version)¹ because the ICU-11 has stronger evidence for its psychometric properties and cross-cultural measurement invariance (ICU-11) [8, 14, 19, 30]. The Chinese version of the ICU [14] was used in the Chinese sample, while the English version was used in the other three samples. Youth from four samples were assessed using the self-report version of the ICU-11 and parents of US and Chinese youth completed the parent-report version. In this study, Cronbach's alpha coefficients and average inter-item correlations (AIC) for the callousness and uncaring scales in the four samples are shown in Table 2.

Analytic Strategy: Network analysis

In this study, four steps of analysis were carried out using the *R* program (*v4.2.1*) [31], and details are described in the following sections.

¹ As the short form of the ICU with 12 items (ICU-12) has been supported in Western countries [21], this study also conducted the analyses using the ICU-12, and the results showed that Item 6 “does not show emotions” was placed at the peripheral location with consistently low centrality in the four samples. More details are presented in the Supplementary Materials).

Network Estimation. The Gaussian Graphical Model (GGM) [32] was applied to estimate the networks for the four samples. The GGM is based on partial correlations and uses graphical lasso regularization to suppress spurious edges [33]. The GGM with polychromic correlations is appropriate for ordinal and continuous data given that the items are rated on a four-point ordinal scale.

We first estimated a joint GMM for the samples using the Fused Graphical Lasso (FGL) [34–35] via the R package *EstimateGroupNetwork* (v0.3.1) [36]. The FGL is an extension of the graphical lasso that enables jointly estimating multiple GGMs, enabling greater accuracy in identifying the similarities and differences among networks of different samples compared to independent network estimation [34–35]. The datasets of self- and parent-report in the joint estimate were separated, including four self-report datasets from four samples and two parent-report datasets from the Chinese and US samples. The networks were visualized using the *qgraph* package (v1.9.2) [37].

Centrality indices. Centrality indices including strength, closeness and expected influence were used to quantify the importance of each node in the network [38]. Strength index is the sum of the weights of all edges directly connected to that node [39]. A node with a higher level of strength has stronger direct connections with many nodes. Closeness reflects the inverse weight sum of the shortest path distance of a node to all other connected nodes. A node with stronger closeness may influence all the other nodes faster (i.e., influencer role). Expected influence was also used to assess the influence of nodes, especially for those nodes with negative edges. Expected influence is identical to strength except it retains the positive

or negative value of the edge weight. These three indices² were reported as standardized values (i.e., z-scores) with higher values indicating the greater centrality of a node in the network using the *qgraph* package.

Network comparison. In addition to visual inspection of the networks across samples, we performed the network comparison test to examine the similarities and differences among the four samples' networks via *NetworkComparisonTest* package (v2.2.1) [42]. The network comparison test is a permutation-based hypothesis test. This test estimates the differences between two networks based on several invariance measures, including network structure, edge strength, and global strength. The network structure invariance test examines whether the structure is completely identical across two networks (i.e., if there are any differences in the structure as a whole). The edge strength invariance test examines the differences in the strength of all edges (or any of one specific edge). The global strength invariance test examines whether the overall connectivity is equal across networks. Six datasets of self- and parent-report from four samples were included in the network comparison test. The study focused on the comparison of self-report data from all samples for the cross-nation comparison, and the comparison of self- and parent-report data from the Chinese and US samples for the cross-informant comparison.

2 Some researchers may also use another centrality index called betweenness, which refers to the frequency that a node goes through on the shortest path between two other nodes. However, betweenness is argued to be less useful in psychology networks and has been found to be less stable in general [40–41]. Thus, this study focused on strength, closeness and expected influence for further comparison.

In addition, we also assessed the similarity of each network using the procedure detailed in two recent published studies [35, 43], including (a) analyzing the correlation of adjacent matrices of the networks for comparing the network structure, and (b) the correlations between the centrality estimates.

Network stability. To examine the stability of networks, the accuracy estimation of networks was conducted using the bootstrapping method with *bootnet* (v1.5) [44]. All the results for network stability are described in the Supplementary Materials.

Missing data. The UK sample had two cases with one item missing. For the US dataset, nine cases and 18 cases were removed due to the number of missing values over five in the parent- and self-report datasets, respectively. Missing data were imputed by the predictive mean matching approach using the MICE package (v3.14.0) [45] and were based on other ICU items that did not have missing values. The Australian and Chinese samples did not have missing data.

Results

Descriptive statistics

The mean and standard deviation of each item are presented in Table 2. Higher scores of items indicate a stronger tendency of the characteristics. There were significant differences in the average scores of items across samples. Participants from the UK and China had higher average scores for items than those from Australia and the US.

Network estimations

The visualization of jointly estimated networks in the four samples of self-report data

and two samples of parent-report data are presented in Figure 1. The items were clustered into two clusters with linked edges. The jointly estimated networks showed some consistent edges with strong connections especially edges between Item 16 (“Apologizes to persons”) and Item 17 (“Tries not to hurt others feelings”), and between Item 9 (“Does not care if gets in trouble”) and Item 11 (“Does not care about doing well”). Several other edges also showed stronger weights consistently across networks, including Item 16 - Item 24 (“Does things to make others feel good”), Item 4 (“Does not care who is hurt”) - Item 21 (“Feelings of others unimportant”), Item 5 (“Feels bad or guilty”) - Item 8 (“Concerned about feelings of others”), Item 8 - Item 24, and Item 17 - Item 24.

Some edges differed considerably across networks. The edge-weight between Item 9 and Item 17 was greater in the Australian network with a coefficient of 0.18 visualized as a thicker line, but not in other networks with lower coefficients ranging from .004 (UK) to .050 (Chinese). The edge-weight between Item 8 and Item 16 had a greater coefficient in the UK network (0.156) but not in other networks (less than 0.07). In addition, the edge between Item 8 and Item 21 had a greater weight in the Chinese network (0.240) than in the other three networks (less than 0.1). The edges between Item 12 and Item 8, and Item 18 and Item 24 were negative in the US sample only.

Network inference

Figure 2 displays the centrality indices of the networks. In the self-report networks, Item 16 (“Apologizes to persons”) had a consistently stronger centrality than other nodes across the four networks. Furthermore, Item 17 (“Tries not to hurt others’ feelings”) had a greater

centrality than other nodes for the Australian, US and UK networks. On the other hand, Item 21 (“Feelings of others are unimportant”) had the strongest centrality in the Chinese network, but only moderate centrality in the other three networks.

For the two parent-report networks, some items had similar centrality indices in both networks, such as Item 17 (“Tries not to hurt others’ feelings”) in strength centrality, Item 9 (“Does not care if in trouble”) in closeness centrality, items 4 (“Does not care who is hurt”) and 24 (“Does things to make others feel good”) in expected influence. In contrast, some items showed remarkable differences on the centrality indices, such as Item 21 (“Feelings of others are unimportant”), Item 18 (“Shows no remorse”) and Item 8 (“Concerned about feelings of others”). Item 21 had the strongest strength and expected influence in the Chinese network while it had the lowest value in the US network. Item 18 had a greater centrality in the Chinese network but weaker centrality in the US network. Item 8 had a stronger centrality in the US network, but a lower centrality in the Chinese network.

In terms of the comparison between the self- and parent-report networks, Item 4 had a lower centrality in the parent-report network than the self-report network in the US sample. Item 8 had a much lower centrality in the parent-report network than the self-report network in the Chinese sample.

Network comparison

Table 3 displays the results of the network comparison tests of all networks. The network structure invariance test indicated that there were no significant differences across samples in the self-report networks except for the comparison between the UK and US

samples ($p = .002$). The parent-report network in the US and Chinese samples had a significantly different network structure ($p = .042$). Self- and parent report networks differed significantly in the network structure for the US networks ($p = .010$), but not for the Chinese networks.

The values of global network strength were 3.68 (Australia), 4.27 (UK), 5.9 (US), 4.33 (Chinese) for the four self-report networks, and 6.75 (US) and 4.55 (Chinese) for the two parent-report networks. There were no significant differences among the four self-report networks except for the comparison between the US and UK samples, and between the US and Chinese samples. The global strength of the US and Chinese parent-report networks were significantly different ($p < .01$).

Next, we performed difference tests on all edges and strength centrality across networks. We found that 11% of the 55 edges on average (ranging from 5% for the Australian and Chinese samples to 18% for the US and Chinese samples) differed significantly across the four self-report networks. The correlations of adjacency (edge) matrices of the self-report networks were moderate with coefficients ranging from .340 (US vs. UK) to .561 (US vs. Chinese). The correlation of the adjacency matrices of the parent-report networks for the US and Chinese samples was .535.

We also performed difference tests on the strength centrality of the 11 nodes and found that there were no nodes that differed significantly between Australian and US samples, or between Australian and Chinese samples. Only one node differed between the UK and Australian samples, and between the UK and Chinese samples. Four nodes differed between

the US and UK samples, and between the US and Chinese samples.

The correlations of the strength centrality estimates of most networks were moderately positive. The correlations of self-reports between Australia, the US, and the UK networks were higher than those with the Chinese network, especially the correlation between the Chinese and Australian networks. However, the strength centrality estimates for the two parent-report networks had moderately negative associations ($r = -.49$). The correlation of centrality for the US parent-report and Chinese self-report networks was also negative ($r = -.46$).

Network stability

The stability analysis of the estimated networks indicated that the strength and closeness centrality of four self-report and two parent-report networks were not very stable given that the correlation-stability (CS) coefficients mostly did not reach the minimum coefficient of 0.25 (both zero for Australia and self-report US data, 0.129 for strength in parent-report US data). Compared with closeness, the CS coefficients of strength reached the recommended threshold for stable estimation [44] in the Chinese datasets (0.362, 0.284 for self- and parent-report) and were particularly stable for the UK dataset (0.517). Furthermore, there were few significant differences in centrality indexes, especially for the Australian and US networks. In terms of edge differences, there were less significant edges in the Australian network compared with other networks. More details are available in the Supplementary materials.

Discussion

This study investigated the network structure of the ICU-11 items across four nations

and two informants to identify the core features of CU traits in youth. Results indicated that Item 16 (“Apologizes to persons”) had a greater centrality consistently across the four samples for the self-report version, suggesting that this symptom could be a core feature of CU traits in youths across the four countries. This finding is consistent with previous findings showing higher factor loadings for this item compared to other items in the short form ICU (e.g., .82 in China [14]; .80 in the UK and Australia [8, 46]; .68 in the US [21]). Apologizing to others is a proactive behavior to show guilt and remorse, compared to other ICU items assessing inner feelings or hidden emotional expressions, such as individuals not caring if they hurt someone. This type of observable action may reflect a stronger self-recognition of a wrongful or hurtful act and indicate a higher level of sincere remorse, or greater affiliative motivation to repair a social relationship damaged by the individual’s behavior [47].

Interestingly, this item had remarkably greater centrality in the UK network than in the other networks. This may reflect the function and meaning of apology in the British culture. People in the UK use the term ‘sorry’ on many different occasions, for mild to major transgressions, and thus apologies may be considered to be a more basic way to show empathy and remorse [48]. Thus, if individuals fail to apologize this may be a stronger indicator of lack of empathy or remorse for youth from this nation.

This finding of apologizes to persons as a core feature across culture replicated the prior finding that “apologizes to persons I/they have hurt” was one of most central features of the self-report network in a Canadian study [27], but our findings were not entirely consistent with this previous study (e.g., the highlighting of “Does not care who is hurt” in the Canadian

sample) . These inconsistent findings may be due to sample characteristics. The samples from two prior studies were at-risk youth with serious mental health and behavioral problems [27] and preschoolers [25] while the current study included four samples of community youth. The failure to apologize to someone appears to be a more crucial indicator in detecting CU traits among youth within communities characterized by low levels of behavioral problems.

We also found sample-specific core features of CU traits. For example, “Feelings of others are unimportant” had the greatest centrality in the Chinese network, while it was peripheral in other networks. This may relate to the social norm of discouraging views that reflect self-entitlement and encouraging values that promote interpersonal harmony in East Asian culture [49]. Disregarding others’ feelings, as a sign of not conforming to social norms, may be an important feature of CU traits in the Chinese cultural context. Furthermore, we found that the association between “Do not care if get into trouble” and “Do not care about doing things well” in the Chinese network was weaker than it was in other networks. One possible explanation is that Chinese participants might interpret “things” differently compared to other participants. Chinese participants might perceive “things” to indicate homework or academic performance, where the outcomes of this behavior are more reward-related (e.g., praise and other social rewards). Their interpretation of “things” may not cover or overlap with “trouble”, where the outcomes would be interpreted to be punishment-related.

While the networks did not differ significantly between self- and parent-report versions of the ICU in Chinese or US samples, the two samples’ parent-report networks differed substantially. The ICU item 21 “The feelings of others are unimportant to me” was the most

important feature in the parent-report network rated by Chinese parents, while it was the least important feature in the US network. On the other hand, the ICU item 8 “I am concerned about the feelings of others” was the most important feature in the US network, while it was the least important in the Chinese network. Both items reflect the feature of respecting others’ feelings, with the main difference between the two items being how the action is expressed. Directly showing one’s concern is a more externalized and explicit way of respecting others’ feelings, while the perceived importance of others’ feelings is more implicit and sits at a cognitive level. The contrast in the importance of the two items in the two samples may reflect different norms in expressing attitudes and emotions [50]. Cognitive aspects of the attitude (e.g., acknowledging and reflecting on one’s wrongdoing) are of more concern to parents in the Chinese context, while affective and behavioral aspects of the attitude (e.g., expressing feelings and taking actions) may be of greater concern to US parents.

Strengths and Limitations

The present study addressed the gap in the cross-cultural understanding of the core features of CU traits using a network approach and provided insights into potential cultural differences in the expression of CU traits [23, 51]. The literature on cultural comparisons of CU traits or psychopathic traits has generally relied on latent variable modeling and focused on factor structures. The current study provided more insight into the importance of each item in understanding CU traits in different cultures. Furthermore, we covered multiple informants in the CU traits network. Informant discrepancies often exist among ratings in child psychopathology and influence the recognition, assessment, and treatment of mental

disorders, possibly due to differences in each informant's attributions and perspectives. For example, observers are more likely to access information about the negative aspects of the child's behavior from memory while the child is more likely to access contextual information relating to his/her behaviors [52]. The moderate agreement for self- and parent report has encouraged investigation of the potential mechanisms underlying these discrepancies, guided by theoretical models such as the Attribution Bias Context Model (the ABC Model) [52–53]. This model proposes that informant discrepancies (e.g., parent-youth) may be explained by the differences in their attributions of the causes of the child's behaviors, with both perspectives providing vital information about the child's behaviors.

Some limitations should be noted. First, this study only included community samples. It is unclear whether the current findings can be generalized to clinical samples. Future cross-cultural comparisons should be conducted in other types of samples, such as clinical, forensic, or adjudicated samples. Second, the only East Asian sample in this study is a Chinese sample. Although Chinese culture has an essential influence on East Asian culture, there is great diversity in social norms across different regions in East Asia. Therefore, it is unclear whether the findings from the Chinese sample can be generalized to other East Asian nations. Third, the network approach used a cross-sectional and correlational design, and thus it cannot provide evidence of causation. Fourth, the stability of network estimations may be affected by the sample size, which ranged from around 200 to 500, especially the small size of the Australian sample. Network statistics require larger sample sizes for better accuracy and stability, especially given that the network approach is a topic under ongoing debate, with

notable concerns regarding its replicability [54–57]. Future studies may need to increase the sample size to form more robust conclusions. Fourth, the comparisons of the ICU networks across four samples mainly rely on the self-report version, which could potentially be constrained by the limited insight, self-awareness, and comprehension of youth. Future studies could consider a more comprehensive comparison of datasets from multiple informants (e.g., self-, parent-, teacher-report) across different cultural contexts.

Conclusions

The current study demonstrated that the network structures of the youth self-report ICU items were moderately similar across the UK, US, Australian and Chinese samples, while the structures of the parent-report items showed substantial differences. Apologizing to others was identified as a core characteristic of self-reported CU traits among youth across cultures. Future research should expand investigation to wider range of cultural and geographical contexts, and further investigate the discrepancies between youth self-report and parent report CU traits.

Conflict of interest. The authors declare no potential conflicts of interest.

References

1. American Psychiatric Association (2013) Diagnostic and statistical manual of mental disorders, 5th ed. American Psychiatric Publishing, Washington
2. World Health Organization (2018) International classification of diseases for mortality and morbidity statistics (11th Revision).
<https://icd.who.int/browse11/lm/en>
3. Frick PJ (2004) The Inventory of Callous-Unemotional Traits. Unpublished rating scale, University of New Orleans
4. Frick PJ, Ray JV, Thornton LC, Kahn RE (2014) Can callous-unemotional traits enhance the understanding, diagnosis, and treatment of serious conduct problems in children and adolescents? A comprehensive review. *Psychol Bull* 140:1–57. <https://doi.org/10.1037/a0033076>
5. Gao Y, Zhang W (2015) Confirmatory factor analyses of self- and parent- report Inventory of Callous-Unemotional Traits in 8- to 10-year-olds. *J Psychopathol Behav Assess* 38:331–340. <https://doi.org/10.1007/s10862-015-9527-5>
6. Ray JV, Frick PJ, Thornton LC, et al (2016) Positive and negative item wording and its influence on the assessment of callous-unemotional traits. *Psychol Assess* 28:394–404. <https://doi.org/10.1037/pas0000183>
7. Waller R, Shaw DS, Neiderhiser JM, et al (2015) Toward an understanding of the role of the environment in the development of early callous behavior. *J Pers* 85:90–103. <https://doi.org/10.1111/jopy.12221>

8. Allen JL, Shou Y, Wang M-C, Bird E (2021) Assessing the measurement invariance of the Inventory of Callous-Unemotional Traits in School Students in China and the United Kingdom. *Child Psychiatry Hum Dev* 52:343–354. <https://doi.org/10.1007/s10578-020-01018-0>
9. Essau CA, Sasagawa S, Frick PJ (2006) Callous-unemotional traits in a community sample of adolescents. *Assessment* 13:454–469. <https://doi.org/10.1177/1073191106287354>
10. Roose A, Bijttebier P, Decoene S, et al (2009) Assessing the affective features of psychopathy in adolescence: A further validation of the Inventory of Callous and Unemotional Traits. *Assessment* 17:44–57. <https://doi.org/10.1177/1073191109344153>
11. Hawes DJ, Helyer R, Herlianto EC, Willing J (2012) Borderline personality features and implicit shame-prone self-concept in middle childhood and early adolescence. *J Clin Child Adolesc Psychol* 42:302–308. <https://doi.org/10.1080/15374416.2012.723264>
12. Hwang S, Waller R, Hawes DJ, Allen JL (2020) Callous-unemotional traits and antisocial behavior in South Korean children: Links with academic motivation, school engagement, and teachers' use of reward and discipline. *J Abnorm Child Psychol* 48:1183–1195. <https://doi.org/10.1007/s10802-020-00663-2>
13. Sng KI, Hawes DJ, Hwang S, et al (2020) Callous-unemotional traits among children and adolescents in Asian cultures: A Systematic Review. *J Cross Cult Psychol* 51:576–596. <https://doi.org/10.1177/0022022120944475>

14. Wang M-C, Shou Y, Liang J, et al (2019) Further validation of the Inventory of Callous–Unemotional Traits in Chinese children: Cross-informants invariance and longitudinal invariance. *Assessment* 27:1668–1680.
<https://doi.org/10.1177/1073191119845052>
15. Yoshida S, Adachi M, Takahashi M, et al (2019) The factor structure and construct validity of the parent-reported Inventory of Callous-Unemotional Traits among school-aged children and adolescents. *PLoS ONE* 14:e0221046.
<https://doi.org/10.1371/journal.pone.0221046>
16. Deng J, Wang M, Shou Y, Gao Y (2020) Core features of callous–unemotional traits: Network analysis of the inventory of callous–unemotional traits in offender and community samples. *J Clin Psychol* 77:1487–1498.
<https://doi.org/10.1002/jclp.23090>
17. Sng KI, Hawes DJ, Raine A, et al (2018) Callous-unemotional traits and the relationship between aggressive parenting practices and conduct problems in Singaporean families. *Child Abuse Negl* 81:225–234.
<https://doi.org/10.1016/j.chiabu.2018.04.026>
18. Wang M-C, Deng J, Shou Y, Sellbom M (2022) Cross-cultural examination of psychopathy network in Chinese and U.S. prisoners. *J Psychopathol Behav Assess* 44:620–635. <https://doi.org/10.1007/s10862-022-09960-0>
19. Zhang X, Shou Y, Wang M-C, et al (2019) Assessing callous-unemotional traits in Chinese detained boys: Factor structure and construct validity of the Inventory of Callous-Unemotional Traits. *Front Psychol* 10:1841–1849.

<https://doi.org/10.3389/fpsyg.2019.01841>

20. Wang M-C, Gao Y, Deng J, et al (2017) The factor structure and construct validity of the inventory of callous-unemotional traits in Chinese undergraduate students. *PLoS ONE* 12:e0189003. <https://doi.org/10.1371/journal.pone.0189003>
21. Hawes SW, Byrd AL, Henderson CE, et al (2014) Refining the parent-reported Inventory of Callous–Unemotional Traits in boys with conduct problems. *Psychol Assess* 26:256–266. <https://doi.org/10.1037/a0034718>
22. Chen H, Lan WY (1998) Adolescents’ perceptions of their parents’ academic expectations: Comparison of American, Chinese-American, and Chinese high school students. *Adolescence* 33:385–390
23. Shou Y, Lay SE, De Silva HS, et al (2021) Sociocultural influences on psychopathy traits: A cross-national investigation. *J Pers Disord* 35: 194–216. https://doi.org/10.1521/pedi_2019_33_428
24. Borsboom D, Cramer AOJ (2013) Network analysis: An integrative approach to the structure of psychopathology. *Annu Rev Clin Psychol* 9:91–121. <https://doi.org/10.1146/annurev-clinpsy-050212-185608>
25. Bansal PS, Goh PK, Lee CA, Martel MM (2020) Conceptualizing callous-unemotional traits in preschool through confirmatory factor and network analysis. *J Abnorm Child Psychol* 48:539–550. <https://doi.org/10.1007/s10802-019-00611-9>
26. Zhang X, Deng J, Shou Y, Wang M-C (2022) Longitudinal network structure of child psychopathy across development in Chinese community children. *Curr*

- Psychol. <https://doi.org/10.1007/s12144-022-03799-0>
27. Goulter N, Moretti MM (2021) Network structure of callous-unemotional traits and conduct disorder symptoms among at-risk youth: Multi-informant reports and gender differences. *Res Child Adolesc Psychopathol* 49:1179–1196. <https://doi.org/10.1007/s10802-021-00819-8>
 28. Hawes DJ, Straiton M, Howie P (2019) The social dynamics of boys with callous and unemotional traits: Uncooperative and proud of it. *J Res Pers* 79:79–82. <https://doi.org/10.1016/j.jrp.2019.02.005>
 29. Bird E, Chhoa CY, Midouhas E, Allen JL (2019) Callous-unemotional traits and academic performance in secondary school students: Examining the moderating effect of gender. *J Abnorm Child Psychol* 47:1639–1650. <https://doi.org/10.1007/s10802-019-00545-2>
 30. Colins OF, Andershed H, Hawes SW, et al (2015) Psychometric Properties of the Original and Short Form of the Inventory of Callous-Unemotional Traits in Detained Female Adolescents. *Child Psychiatry Hum Dev* 47:679–690. <https://doi.org/10.1007/s10578-015-0601-8>
 31. R Core Team (2022). R: A language and environment for statistical computing. R foundation for statistical computing. Vienna, Austria. <https://www.r-project.org/>
 32. Lauritzen SL (1996) Graphical models. Oxford University Press, Oxford
 33. Friedman J, Hastie T, Tibshirani R (2007) Sparse inverse covariance estimation with the graphical lasso. *Biostatistics* 9:432–441. <https://doi.org/10.1093/biostatistics/kxm045>

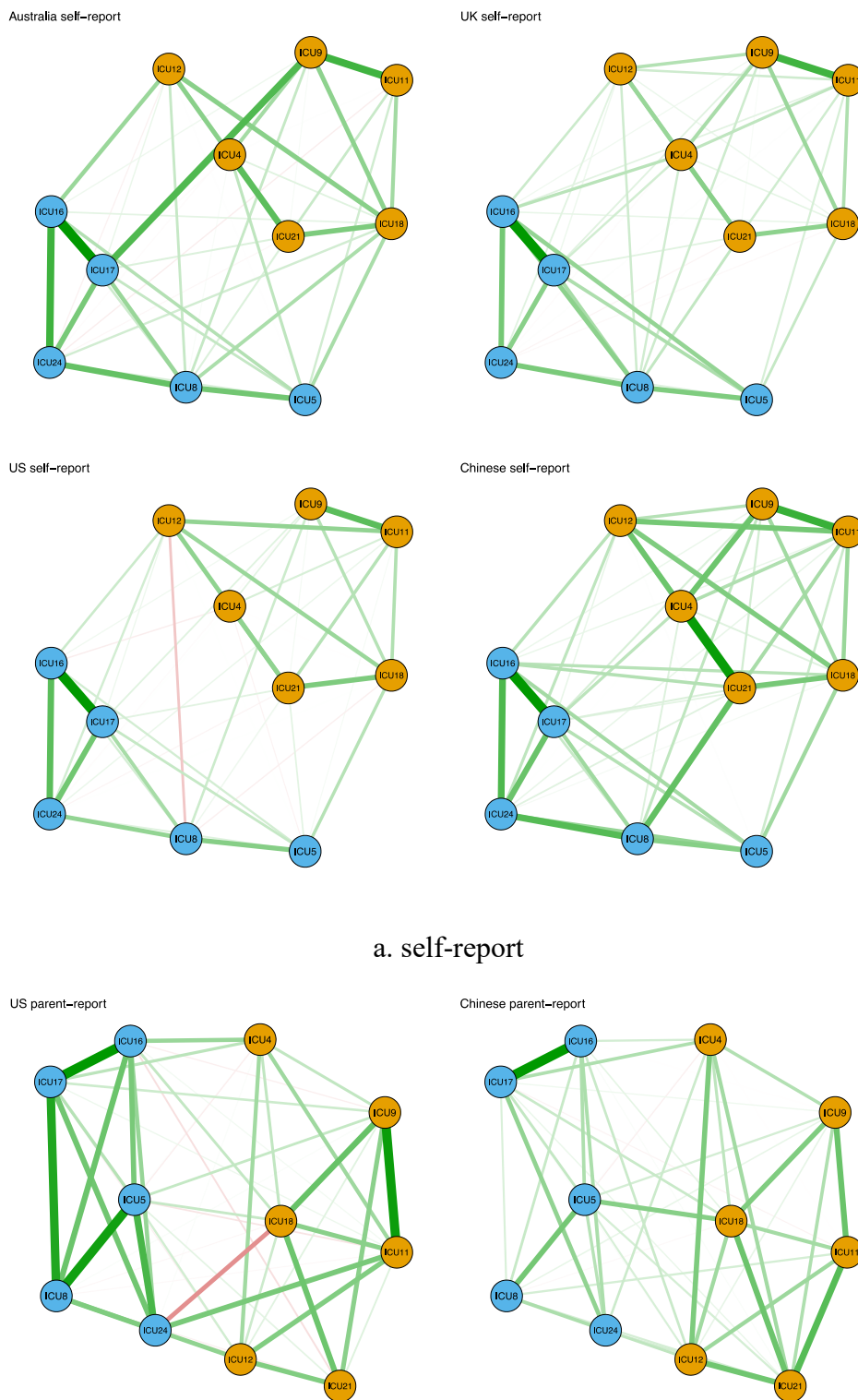
34. Costantini G, Perugini, M (2017) Network analysis for psychological situations. In Funder DC, Rauthmann JF, Sherman RA (Eds.), *The Oxford handbook of psychological situations*. Oxford University Press, Oxford. <https://doi.org/10.1093/oxfordhb/9780190263348.013.16>
35. Fried EI, Eidhof MB, Palic S, et al (2018) Replicability and Generalizability of Post-traumatic Stress Disorder (PTSD) networks: A cross-cultural multisite study of PTSD symptoms in four trauma patient samples. *Clin Psychol Sci* 6:335–351. <https://doi.org/10.1177/2167702617745092>
36. Costantini G, Epskamp S (2017) EstimateGroupNetwork: Perform the joint graphical lasso and selects tuning parameters. R package (Version 0.1.2) [Computer software]. <https://cran.r-project.org/web/packages/EstimateGroupNetwork/index.html>
37. Epskamp S, Cramer AOJ, Waldorp LJ, et al (2012) Qgraph: Network visualizations of relationships in psychometric data. *J Stat Softw* 48: 1–18. <https://doi.org/10.18637/jss.v048.i04>
38. Opsahl T, Agneessens F, Skvoretz J (2010) Node centrality in weighted networks: Generalizing degree and shortest paths. *Soc Netw* 32: 245–251. <https://doi.org/10.1016/j.socnet.2010.03.006>
39. Bringmann LF, Elmer T, Epskamp S, et al (2019) What do centrality measures measure in psychological networks? *J Abnorm Psychol* 128:892–903. <https://doi.org/10.1037/abn0000446>
40. McCuish E, Bouchard M, Beauregard E, Corrado R (2019) A network app

- roach to understanding the structure of core symptoms of psychopathic personality disturbance in adolescent offenders. *J Abnorm Child Psychol* 47:1467–1482. <https://doi.org/10.1007/s10802-019-00530-9>
41. Verschuere B, van Ghesel Grothe S, Waldorp L, et al (2018) What features of psychopathy might be central? A network analysis of the Psychopathy Checklist-Revised (PCL-R) in three large samples. *J Abnorm Psychol* 127:51–65. <https://doi.org/10.1037/abn0000315>
42. van Borkulo CD, van Bork R, Boschloo L, et al (2022) Comparing network structures on three aspects: A permutation test. *Psychol Methods*. <https://doi.org/10.1037/met0000476>
43. Santos HP, Kossakowski JJ, Schwartz TA, et al (2018) Longitudinal network structure of depression symptoms and self-efficacy in low-income mothers. *PLoS ONE* 13:e0191675. <https://doi.org/10.1371/journal.pone.0191675>
44. Epskamp S, Borsboom D, Fried EI (2018) Estimating psychological networks and their accuracy: A tutorial paper. *Behav Res Methods* 50:195–212. <https://doi.org/10.3758/s13428-017-0862-1>
45. Buuren S van, Groothuis-Oudshoorn K (2011) Mice: Multivariate imputation by chained equations in R. *J Stat Softw* 45:1–67. <https://doi.org/10.18637/jss.v045.i03>
46. Houghton S, Hunter SC, Crow J (2012) Assessing callous unemotional traits in children aged 7- to 12-years: A confirmatory factor analysis of the Inventory of Callous Unemotional Traits. *J Psychopathol Behav Assess* 35:215–222.

<https://doi.org/10.1007/s10862-012-9324-3>

47. Waller R, Wagner N (2019) The Sensitivity to Threat and Affiliative Reward (STAR) model and the development of callous-unemotional traits. *Neurosci Biobehav Rev* 107:656–671. <https://doi.org/10.1016/j.neubiorev.2019.10.005>
48. Jordan W (2015) *Oh, sorry: Do British people really apologise too much?* YouGov. <https://yougov.co.uk/topics/society/articles-reports/2015/07/01/oh-sorry-do-british-people-apologise-too-much>
49. Huang L-L (2016) Interpersonal harmony and conflict for Chinese people: A Yin–Yang perspective. *Front Psychol* 7: 847. <https://doi.org/10.3389/fpsyg.2016.00847>
50. Camras LA, Bakeman R, Chen Y, et al (2006) Culture, ethnicity, and children’s facial expressions: A study of European American, mainland Chinese, Chinese American, and adopted Chinese girls. *Emotion* 6:103–114. <https://doi.org/10.1037/1528-3542.6.1.103>
51. Wernke MR, Huss MT (2008) An alternative explanation for cross-cultural differences in the expression of psychopathy. *Aggress Violent Behav* 13:229–236. <https://doi.org/10.1016/j.avb.2008.04.004>
52. De Los Reyes A, Kazdin AE (2005) Informant discrepancies in the assessment of childhood psychopathology: a critical review, theoretical framework, and recommendations for further study. *Psychol Bull* 131:483–509. <https://doi.org/10.1037/0033-2909.131.4.483>
53. De Los Reyes A, Augenstein TM, Wang M, et al (2015) The validity of the multi-informant approach to assessing child and adolescent mental health. *Psychol Bull*

- 141:858–900. <https://doi.org/10.1037/a0038498>
54. Borsboom D, Fried EI, Epskamp S, et al (2017) False alarm? A comprehensive reanalysis of “Evidence that psychopathology symptom networks have limited replicability” by Forbes, Wright, Markon, and Krueger (2017).. *J Abnorm Psychol* 126:989–999. <https://doi.org/10.1037/abn0000306>
55. Fried EI, Cramer J (2017) Moving Forward: Challenges and Directions for Psychopathological Network Theory and Methodology. *Perspect Psychol Sci* 12:999–1020. <https://doi.org/10.1177/1745691617705892>
56. Forbes MK, Wright C, Markon KE, Krueger RF (2017) Evidence that psychopathology symptom networks have limited replicability. *J Abnorm Psychol* 126:969–988. <https://doi.org/10.1037/abn0000276>
57. Forbes MK, Wright AGC, Markon KE, Krueger RF (2017) Further evidence that psychopathology networks have limited replicability and utility: Response to Borsboom et al. (2017) and Steinley et al. (2017). *J Abnorm Psychol* 126:1011–1016. <https://doi.org/10.1037/abn0000313>

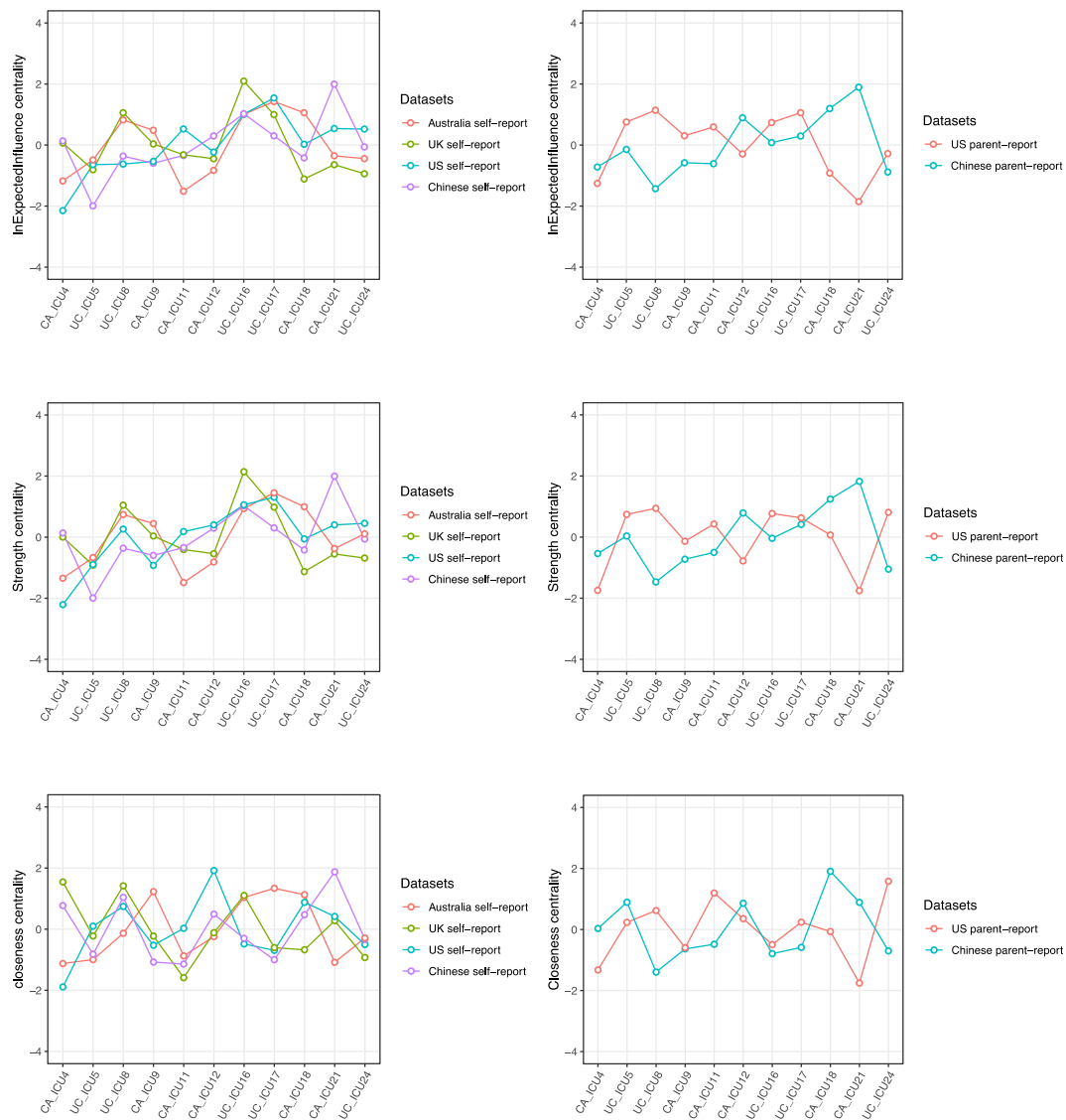


a. self-report

b. parent-report

Figure 1. Six jointly estimated networks using the ICU-11 from self- and parent-report separately

Notes. Orange nodes indicate callousness items. Blue nodes indicate uncaring items. Green lines indicate positive edges. Red lines indicate negative edges.



a. self-report

b. parent-report

Figure 2. Centrality indices of the ICU-11 networks from self- and parent-report separately

Table 1. Demographics of four community samples

	Australia	UK	US	Chinese
Sample size	190	437	330	503
Age [M (SD)]	11.66 (1.29)	12.50 (0.96)	9.06 (0.60)	10.77 (1.06)
Males (%)	75%	49%	48%	52%
Language preference	English	English	English	Chinese
School and location	A mixture of private schools, independent schools and public school in Sydney	A state secondary school in the east of England	Children who are living in Brooklyn, New York	A mainstream elementary school in Guangdong
Ethnicity	/	Most children from White, small percentage from Asian, Mixed White and Asian, Black or Mixed Black and White	11% Hispanic, 21% Caucasian, 52% African-American, 2% Asian, 14% mixed/other	Almost all from Han ethnicity
Family background	Over half of parents in one subgroup with a bachelor's degree as their highest education level (N = 54-68)	69% of parents who completed more than 16 years of education	/	Most parents with an educational qualification following high school; 94% from nuclear families, 74% from families with only one child

Table 2. Summary of descriptive analysis and the internal consistency in the four samples

	Item	AUS (N=190)	UK (N=437)	US (N=330)	Chinese (N=503)
ICU1	Expresses feelings openly	1.67(0.74)	1.86(0.81)	1.84(1)	1.42(0.8)
ICU2	Does not know right from wrong	0.92(0.73)	1.38(0.85)	0.98(0.95)	1.19(0.79)
ICU3	Concerned about school work	0.65(0.78)	0.67(0.83)	0.52(0.78)	0.79(0.78)
ICU4	Does not care who is hurt	0.15(0.54)	0.29(0.59)	0.09(0.41)	0.45(0.69)
ICU5	Feels bad or guilty	0.76(0.83)	1.1(1)	1.04(1.06)	0.67(0.71)
ICU6	Does not show emotions	1.05(0.83)	1.14(0.83)	0.92(1.01)	1.49(0.89)
ICU7	Does not care about being on time	0.52(0.8)	0.45(0.76)	0.45(0.91)	0.6(0.95)
ICU8	Concerned about feelings of others	0.73(0.79)	1.11(0.85)	1.11(1.01)	0.9(0.8)
ICU9	Does not care if gets in trouble	0.5(0.74)	0.51(0.78)	0.34(0.83)	0.59(0.79)
ICU10	Does not let feelings control	1.39(0.89)	1.2(0.87)	1.19(1.19)	1.98(0.73)
ICU11	Does not care about doing well	0.21(0.49)	0.38(0.67)	0.31(0.75)	0.78(0.81)
ICU12	Seems very cold and uncaring	0.21(0.55)	0.43(0.7)	0.19(0.55)	0.55(0.74)
ICU13	Easily admits to being wrong	1.62(0.84)	1.73(0.86)	1.78(1.13)	1.01(0.72)
ICU14	Easy to tell how I am feeling	1.73(0.83)	1.83(0.95)	1.85(1.03)	1.63(0.85)
ICU15	Always tries the best	0.62(0.73)	0.87(0.86)	0.36(0.66)	0.81(0.69)
ICU16	Apologizes to persons I hurt	0.55(0.73)	0.84(0.88)	0.47(0.74)	0.64(0.65)
ICU17	Tries not to hurt others feelings	0.58(0.76)	0.9(0.89)	0.5(0.85)	0.7(0.68)
ICU18	Shows no remorse	0.59(0.87)	0.75(0.88)	0.39(0.85)	0.57(0.81)
ICU19	Expressive and emotional	1.82(0.79)	1.89(0.92)	1.83(1.08)	1.33(0.86)
ICU20	Does not put the time into things	0.3(0.6)	0.62(0.8)	0.47(0.86)	0.8(0.76)
ICU21	Feelings of others unimportant	0.36(0.8)	0.52(0.81)	0.35(0.83)	0.53(0.7)
ICU22	Hides feelings from others	0.93(0.73)	1.26(0.93)	0.94(0.98)	1.4(0.91)
ICU23	Work hard on everything	0.73(0.79)	1.01(0.88)	0.5(0.82)	0.82(0.64)
ICU24	Does things to make others feel good	0.82(0.73)	1.11(0.84)	0.52(0.73)	0.75(0.63)
Average item scores comparison (p-value)	Australia	-			
	UK	.000	-		
	US	.000	.000	-	
	Chinese	.000	.000	.000	-

Alpha coefficients and AICs	Callousness ^a	0.52/0.15	0.58/0.19	0.52/0.15	0.70/0.28
	Uncaring ^b	0.62/0.25	0.71/0.33	0.58/0.22	0.61/0.24

Notes. The mean and standard deviation, Cronbach's alpha and average inter-item correlations (AIC) were based on self-report data.

^a The alpha coefficients and AICs for the US and Chinese parent-report data were .62 (AIC = .22) / .83 (AIC = .49), respectively.

^b The alpha coefficients and AICs for the US and Chinese parent-report data were .78 (AIC = .37) / .67 (AIC = .29), respectively.

Table 3. Results of the network comparison tests

Informant	Networks		Global Strength	Network Invariance
			(<i>p</i> -value)	(<i>p</i> -value)
Self-report	Australia	UK	.142	.930
	Australia	US	.114	.676
	Australia	Chinese	.064	.466
	UK	US	.004	.002
	UK	Chinese	.862	.238
	US	Chinese	.030	.266
Parent-report	US	Chinese	.002	.042
Self-report vs.	US PR	US SR	.352	.010
Parent-report	Chinese PR	Chinese SR	.306	.318

Notes. SR= self-report. PR= parent-report. The bold indicated the significant results.

Supplemental Materials

Core features of Callous-Unemotional Traits: A Cross-Cultural Comparison of Youth in Four Countries

Pages 2. Figure S1 Six jointly estimated networks using the ICU-11 combined self- and parent-report

Pages 3. Figure S2 Strength and closeness centrality of the ICU-11 networks combined self- and parent-report

Pages 4. Figure S3 Six jointly estimated networks using the ICU-12 from self- and parent-report separately

Pages 5-6. Figure S4 Centrality of the networks using the ICU-12 from self- and parent-report separately

Pages 7. Figure S5 Six jointly estimated networks using the ICU-12 combined self- and parent-report

Pages 8. Figure S6 Strength and closeness centrality of the ICU-12 networks combined self- and parent-report

Pages 9. Figure S7 Stability of the centrality indices of the ICU-11 items

Pages 10-15. Figure S8 Bootstrapped difference among the ICU-11 items

Pages 16-18. Figure S9 Bootstrapped difference among edges within ICU-11 networks

Pages 19-21. Figure S10 Edge-weight confidence intervals of the ICU-11 items

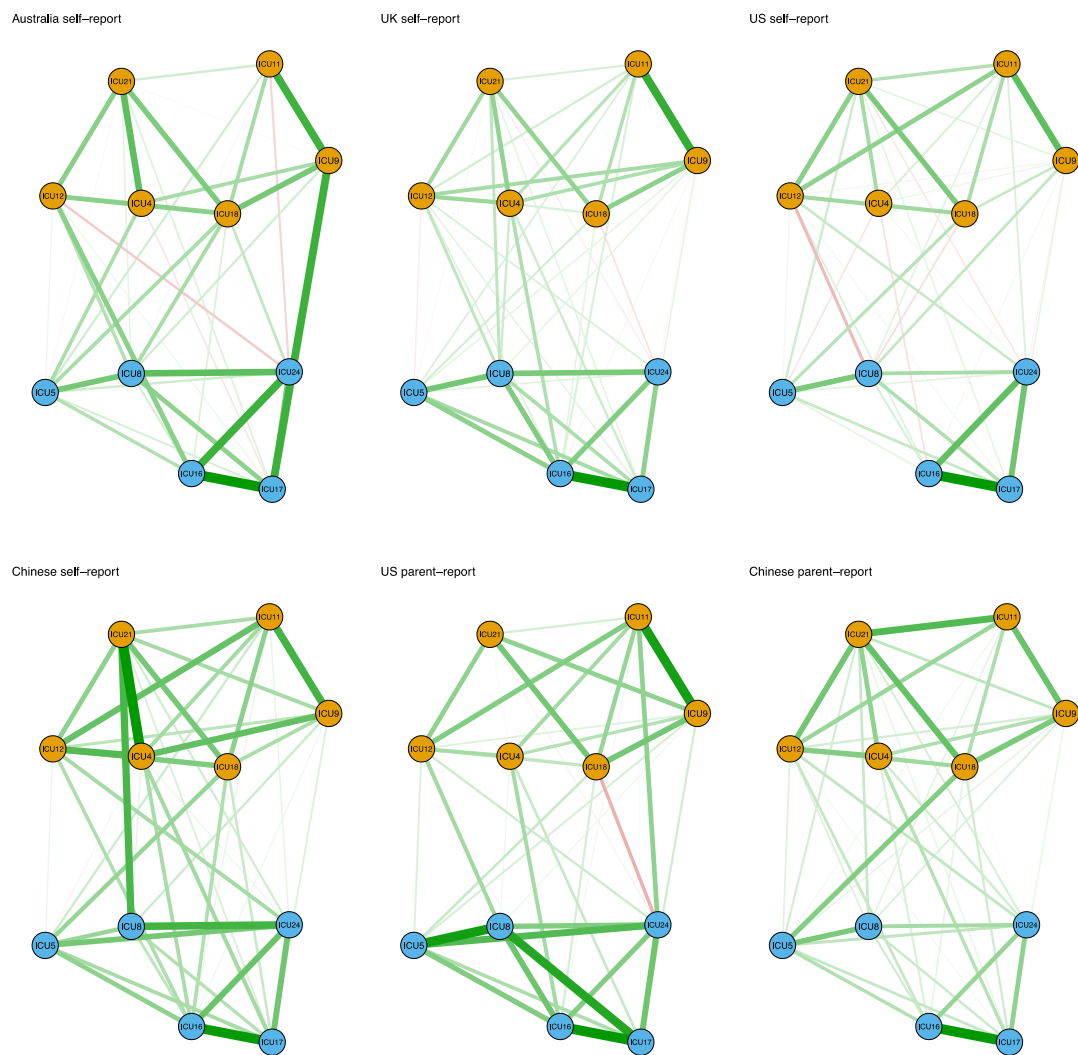


Figure S1 Six jointly estimated networks using the ICU-11 combined self- and parent-report

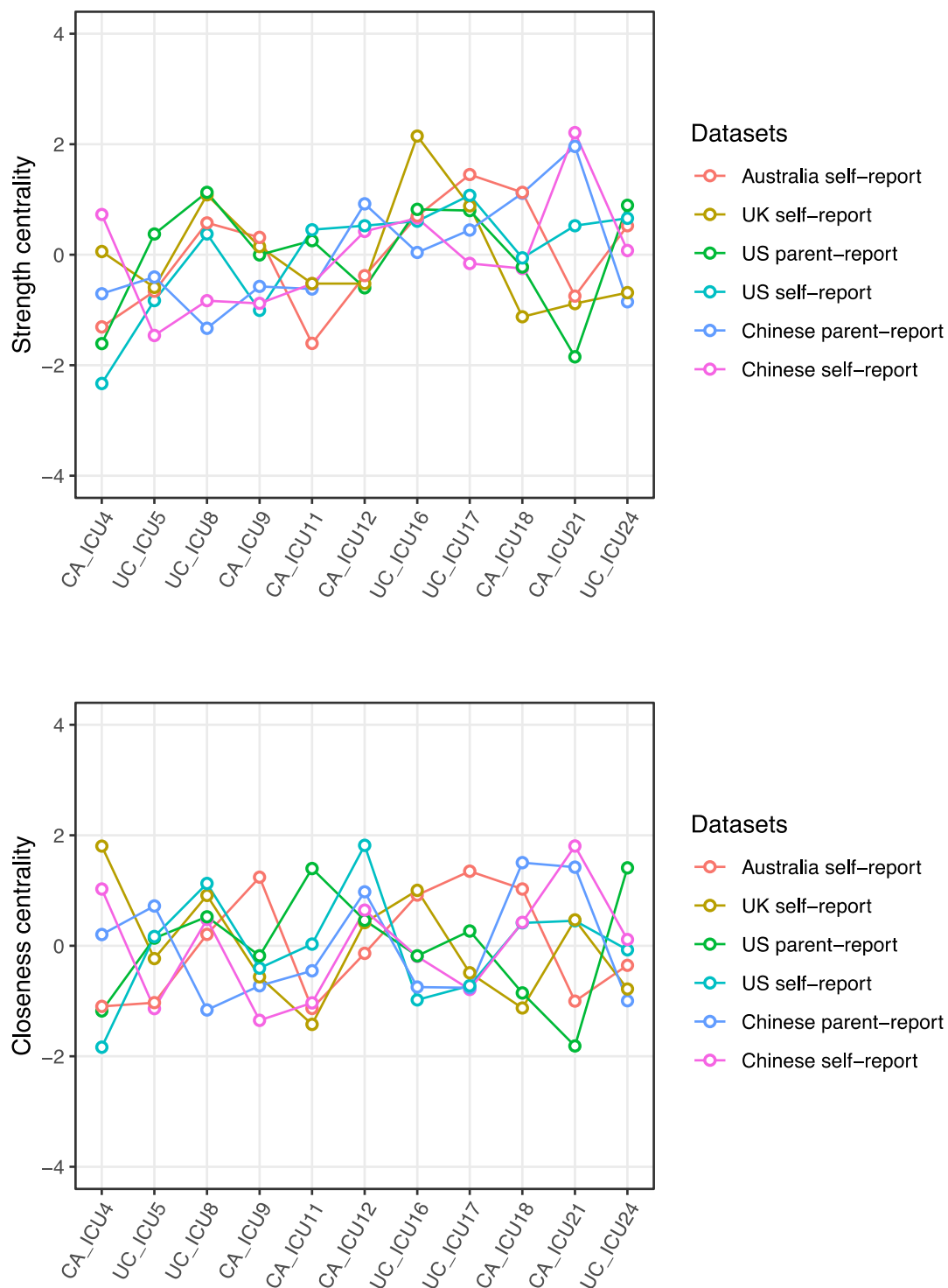
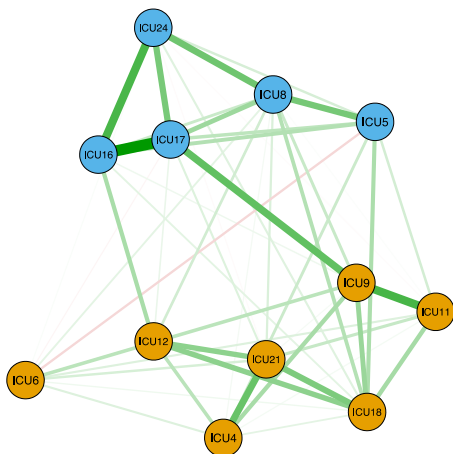
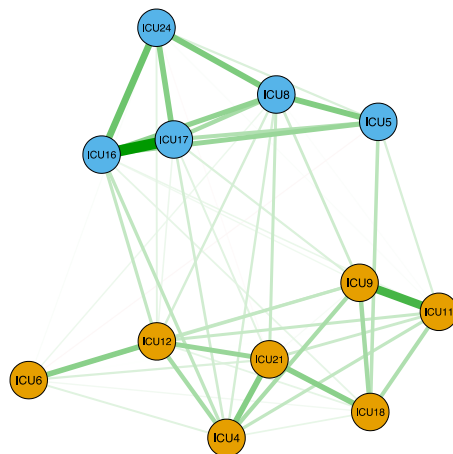


Figure S2 Strength and closeness centrality of the ICU-11 networks combined self- and parent-report

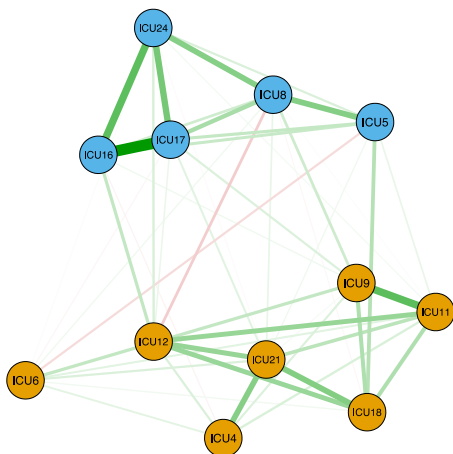
Australia self-report



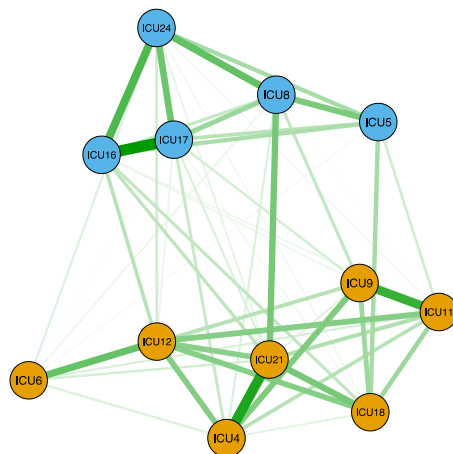
UK self-report



US self-report

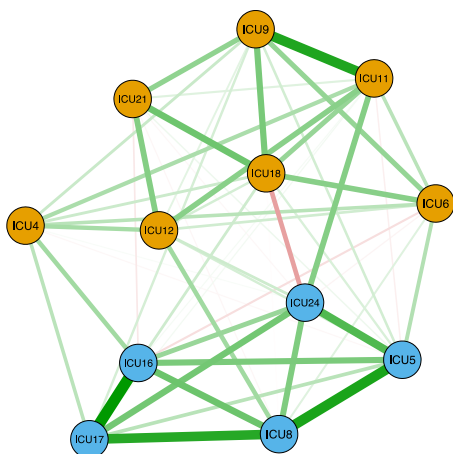


Chinese self-report

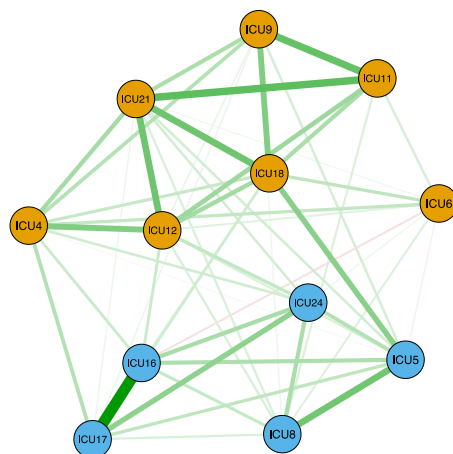


a. self-report network

US parent-report

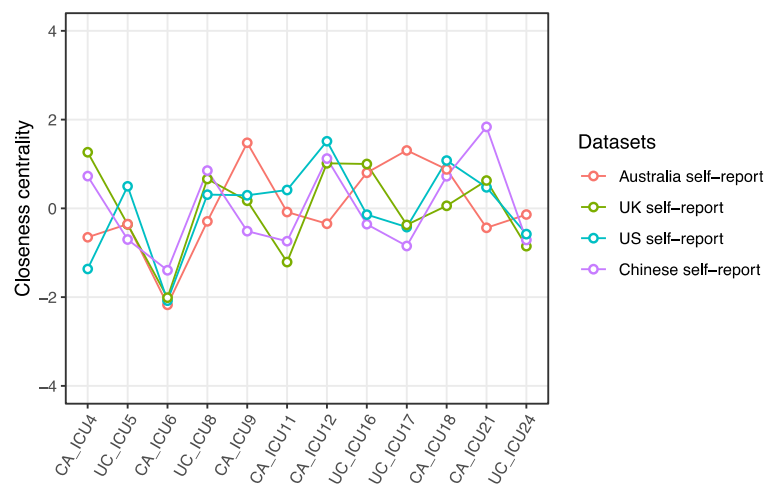
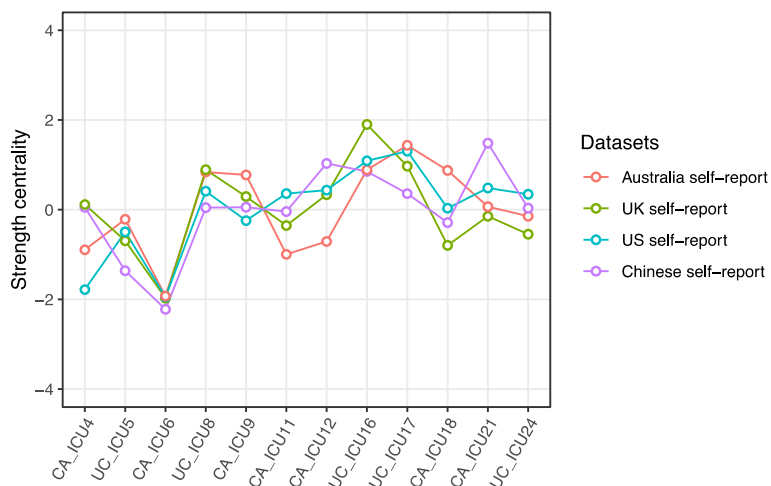
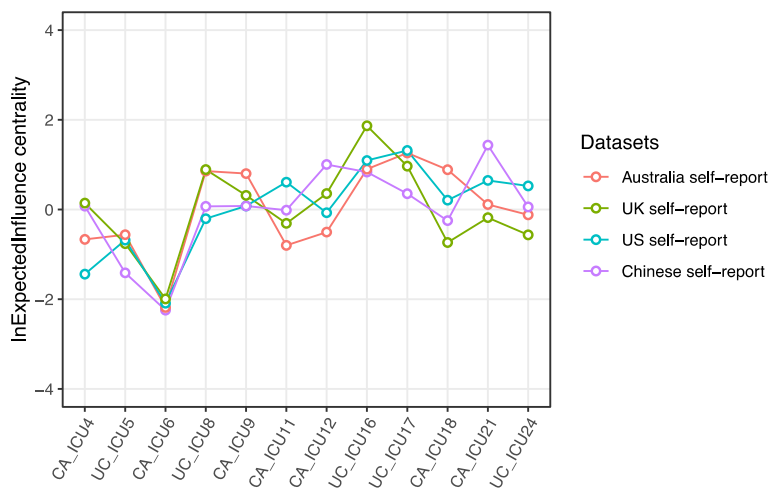


Chinese parent-report

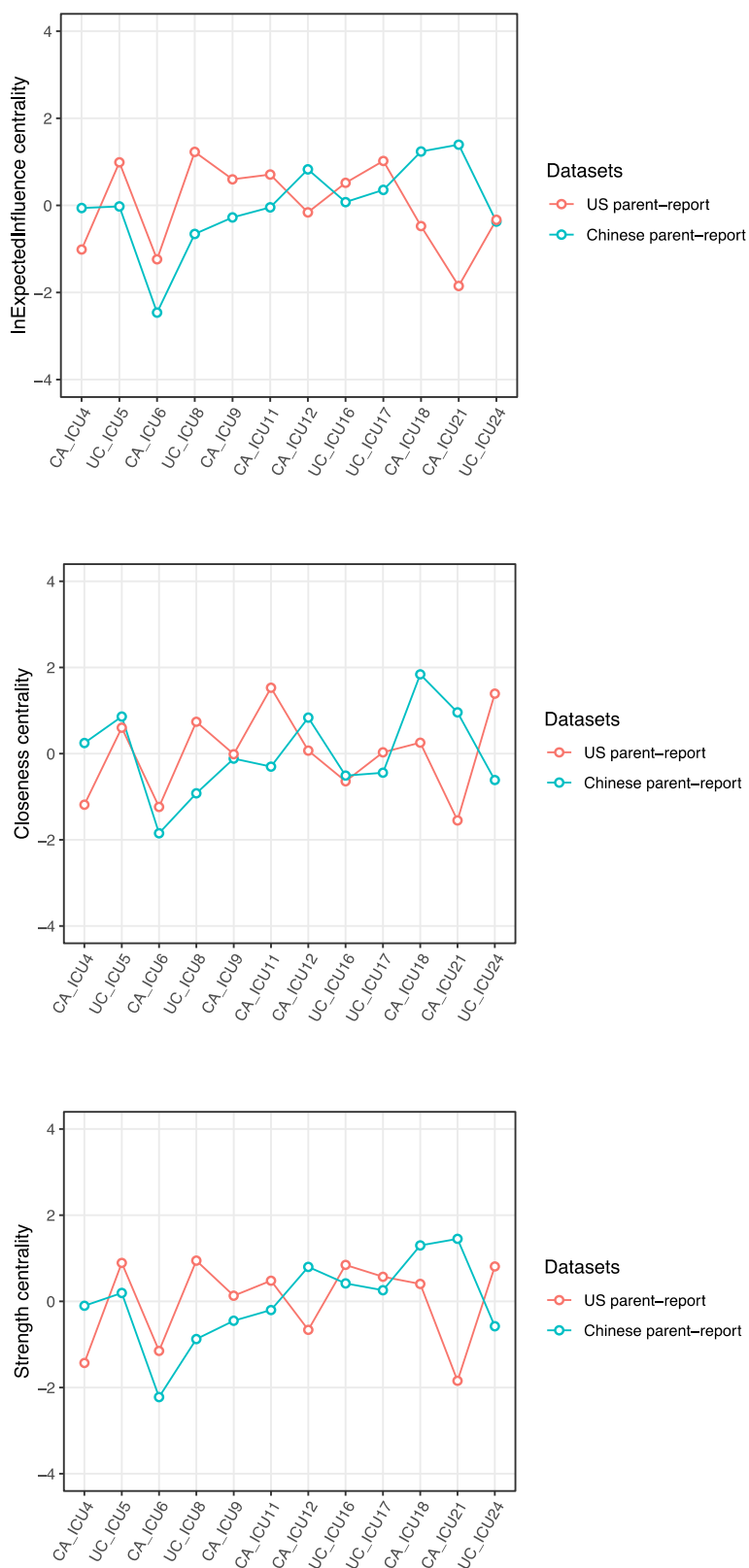


b. parent-report network

Figure S3 Six jointly estimated networks using the ICU-12 from self- and parent-report separately



a. self-report network



b. parent-report network

Figure S4 Centrality of the networks using the ICU-12 from self- and parent-report separately

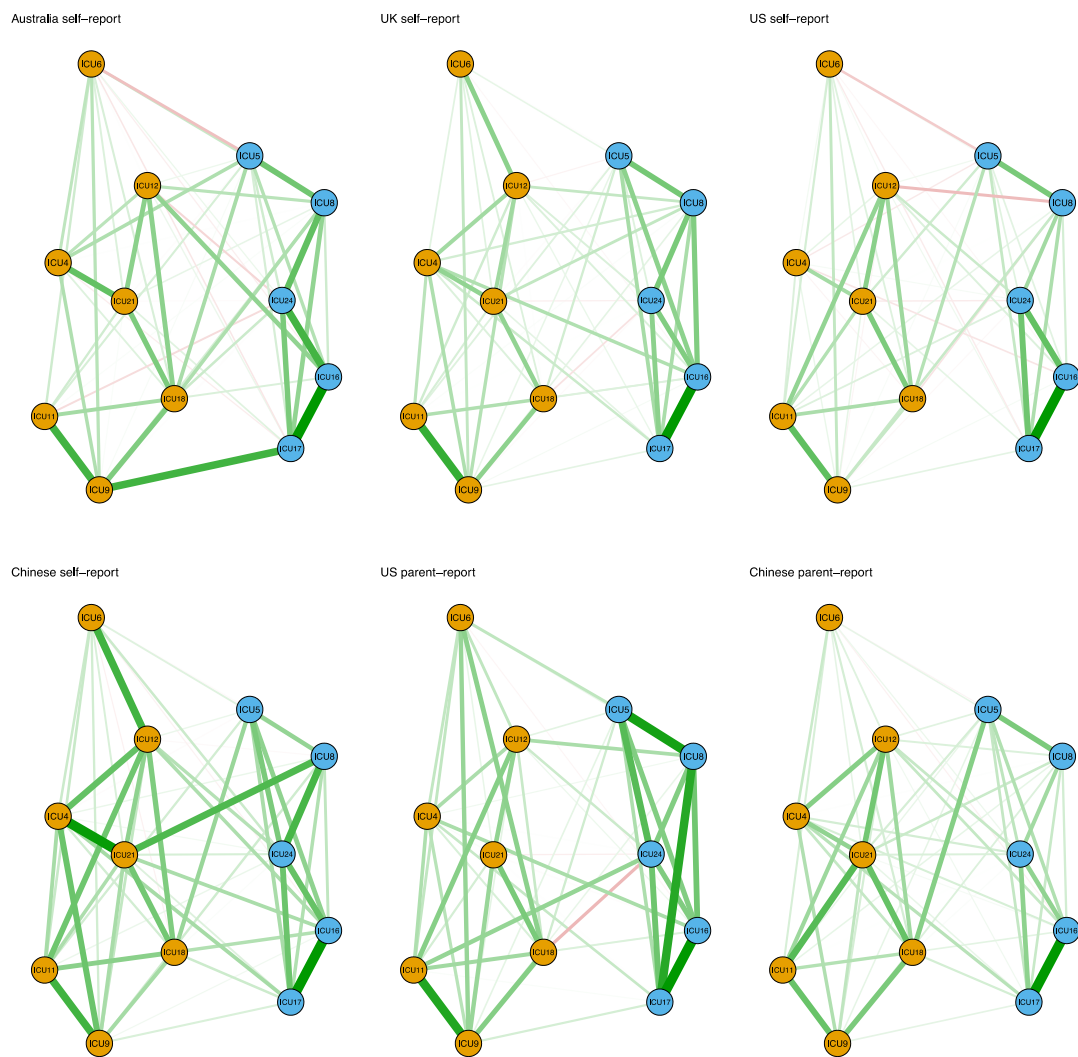


Figure S5 Six jointly estimated networks using the ICU-12 combined self- and parent-report

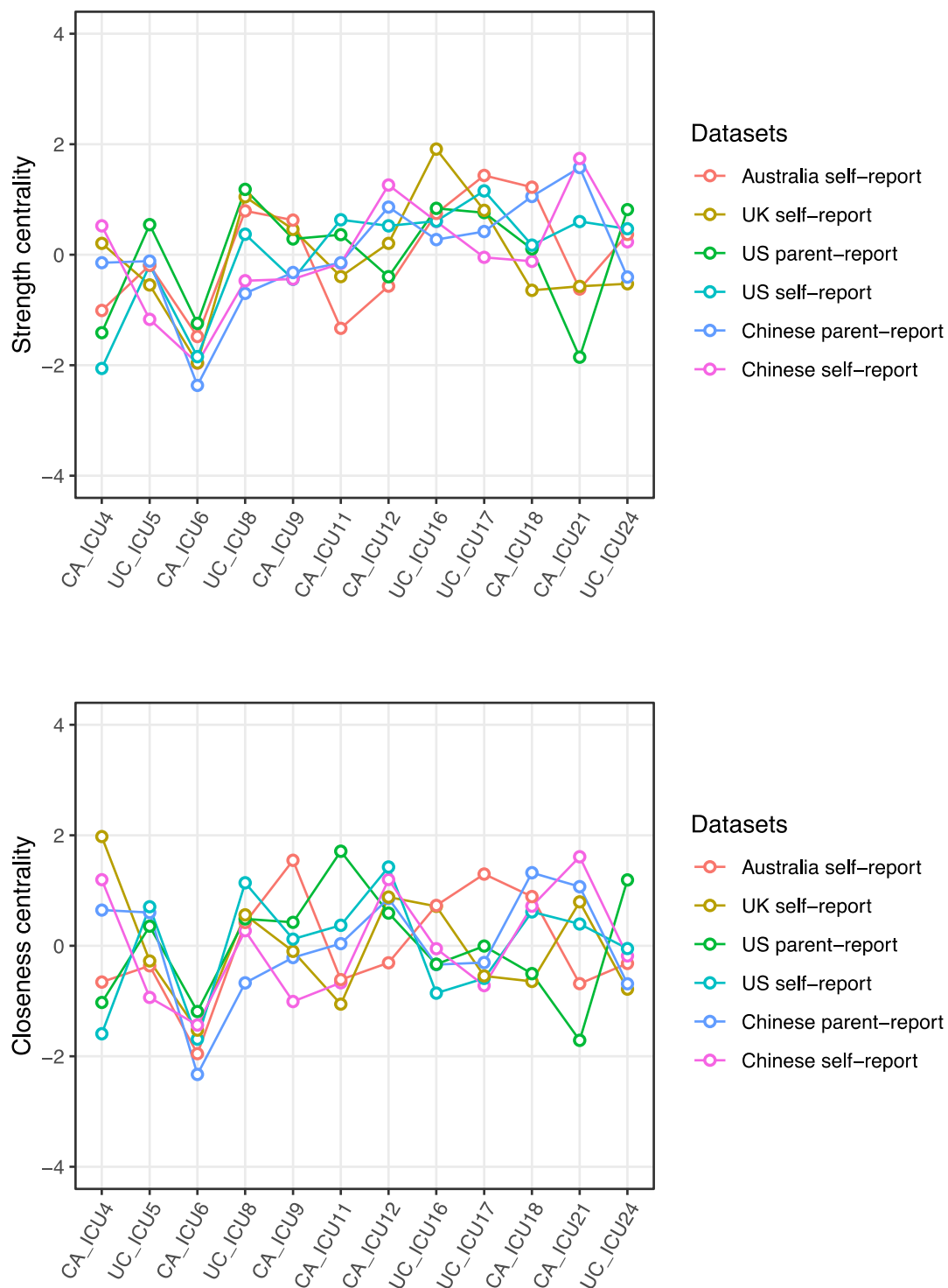


Figure S6 Strength and closeness centrality of the ICU networks using the ICU-12 combined self- and parent-report

The stability estimation of networks has been developed recently (Epskamp et al., 2017) and is not available for jointly estimated networks. Therefore, we investigated the stability of individual networks, including estimating the correlation coefficients of centrality indices with decreasing proportions of participant subsets, testing the differences on the edge-weight and centrality indexes, bootstrapping 95% confidence intervals of each weight. The results of the accuracy analysis are displayed in Figure S7 for the stability of centrality indices, Figure S8 for bootstrapped differences on the ICU items, Figure S9 for bootstrapped difference among edges, and Figure 10 for edge-weight confidence intervals.

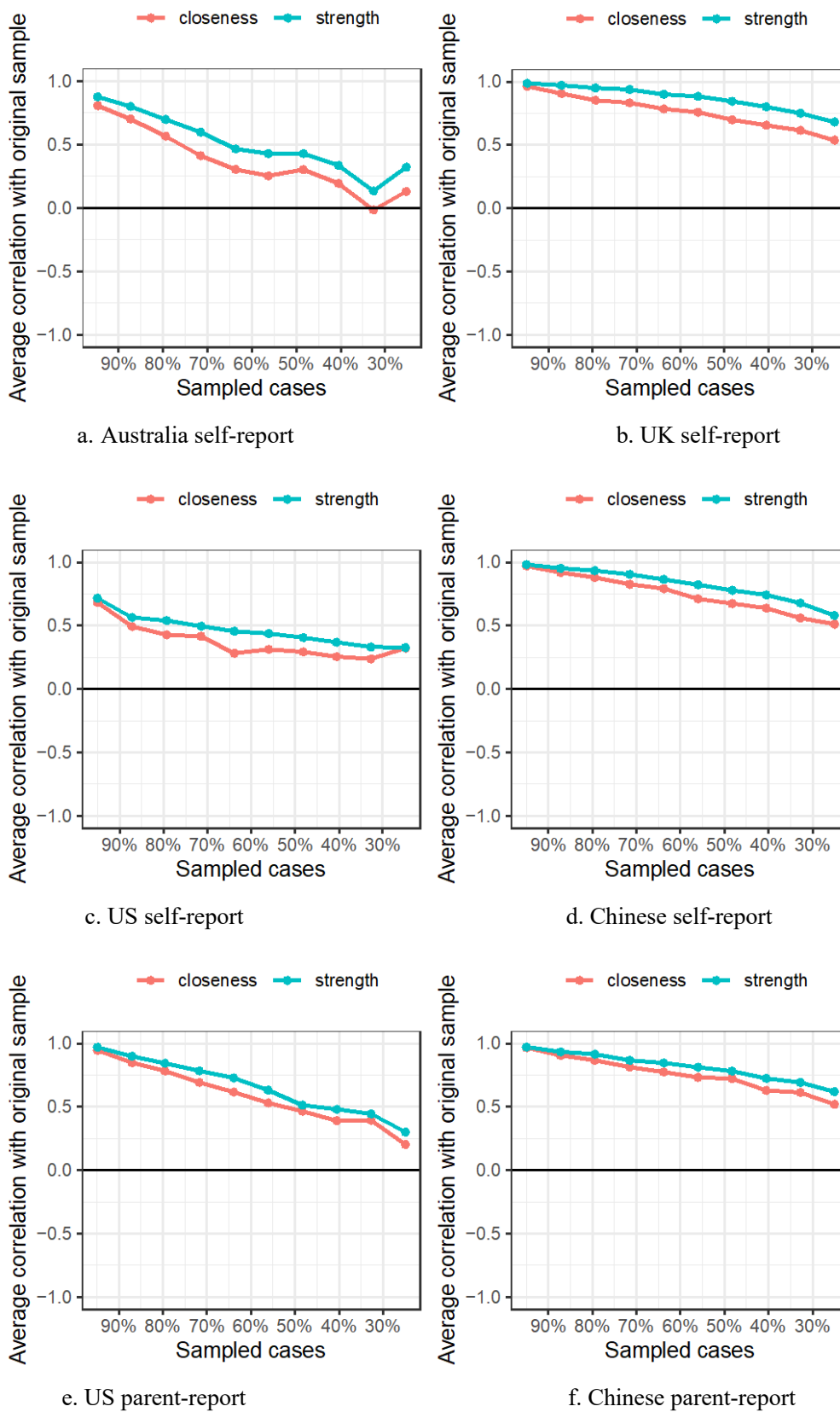
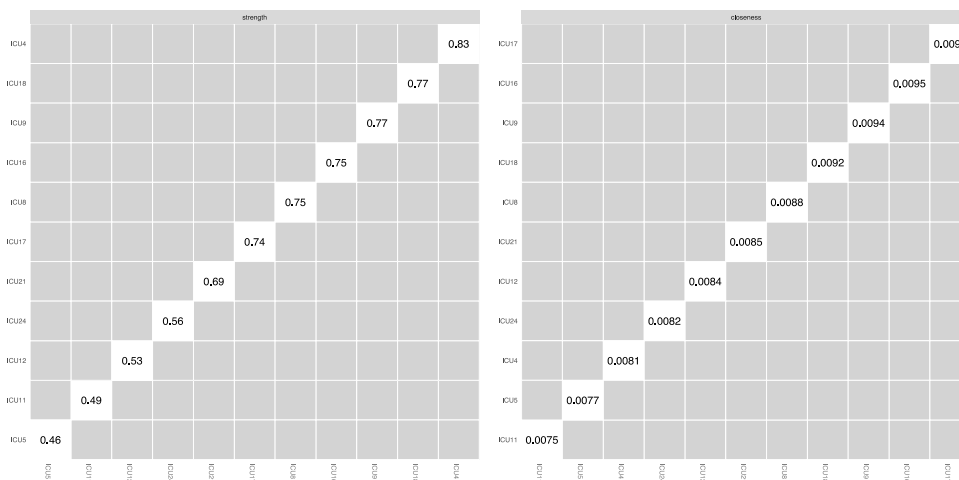
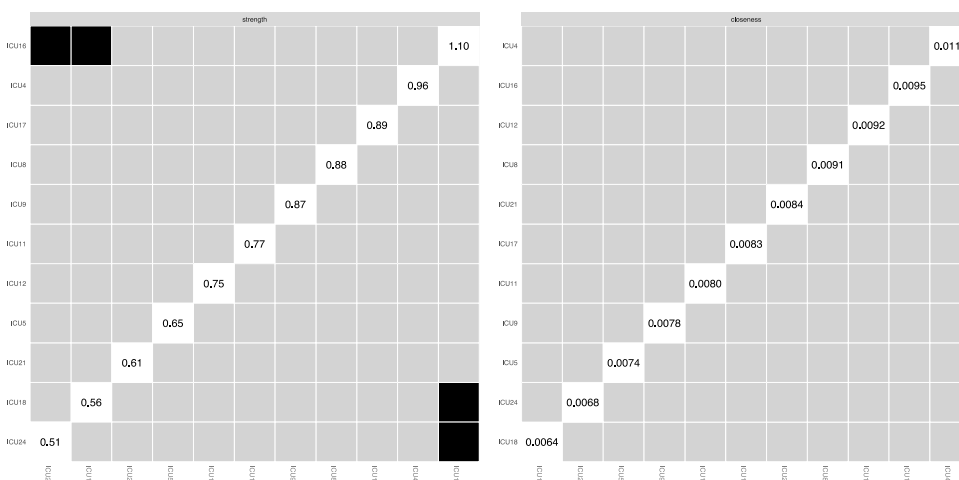


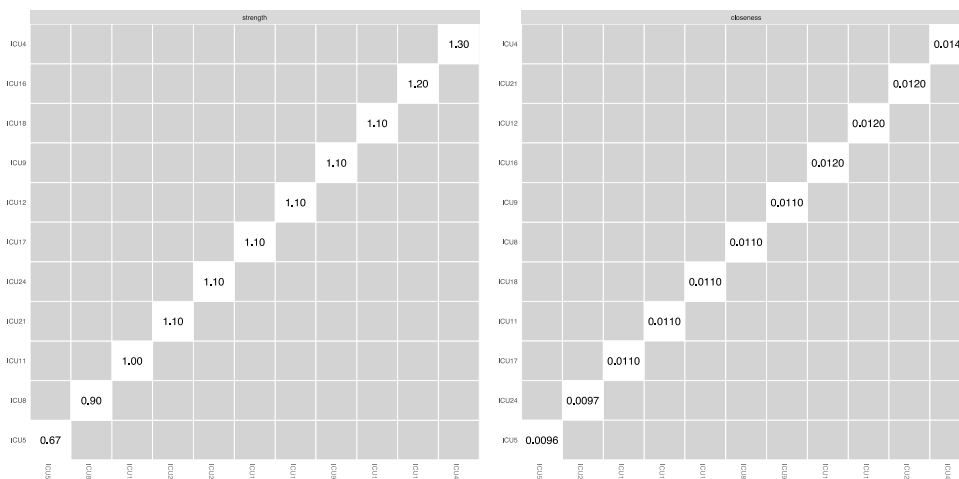
Figure S7 Stability of centrality indices of the ICU-11 items



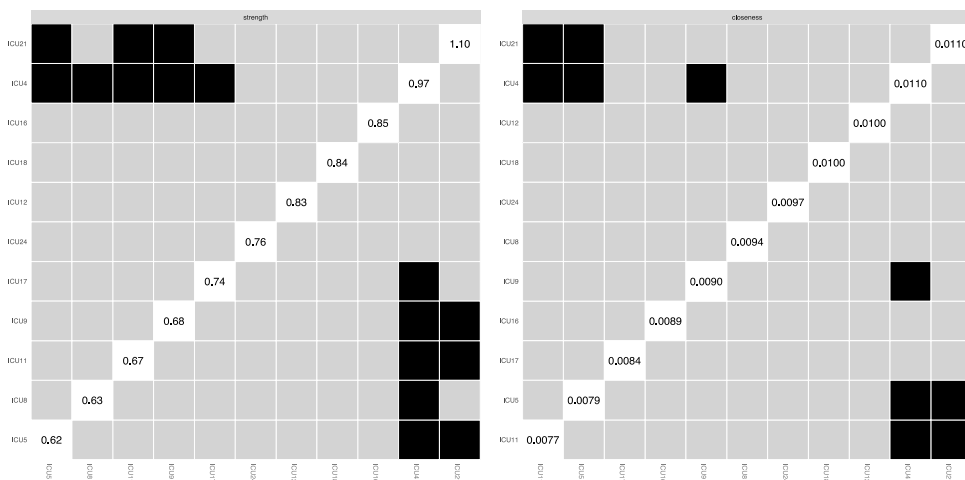
a. Australia self-report



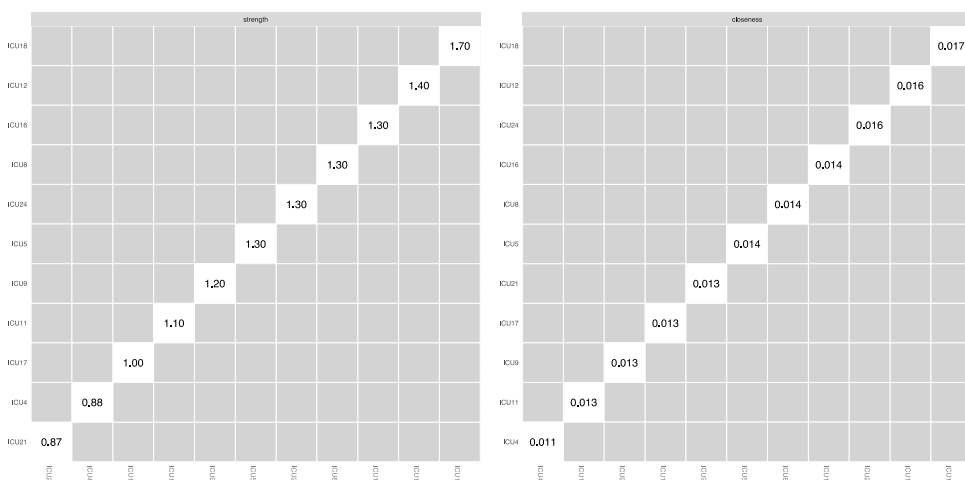
b. UK self-report



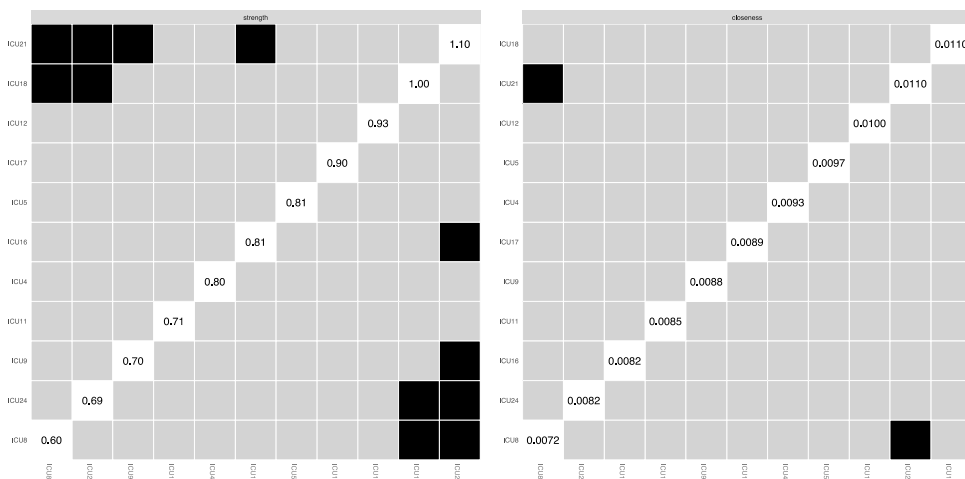
c. US self-report



d. Chinese self-report



e. US parent-report



f. Chinese parent-report

Figure S8 Bootstrapped difference among the ICU-11 items

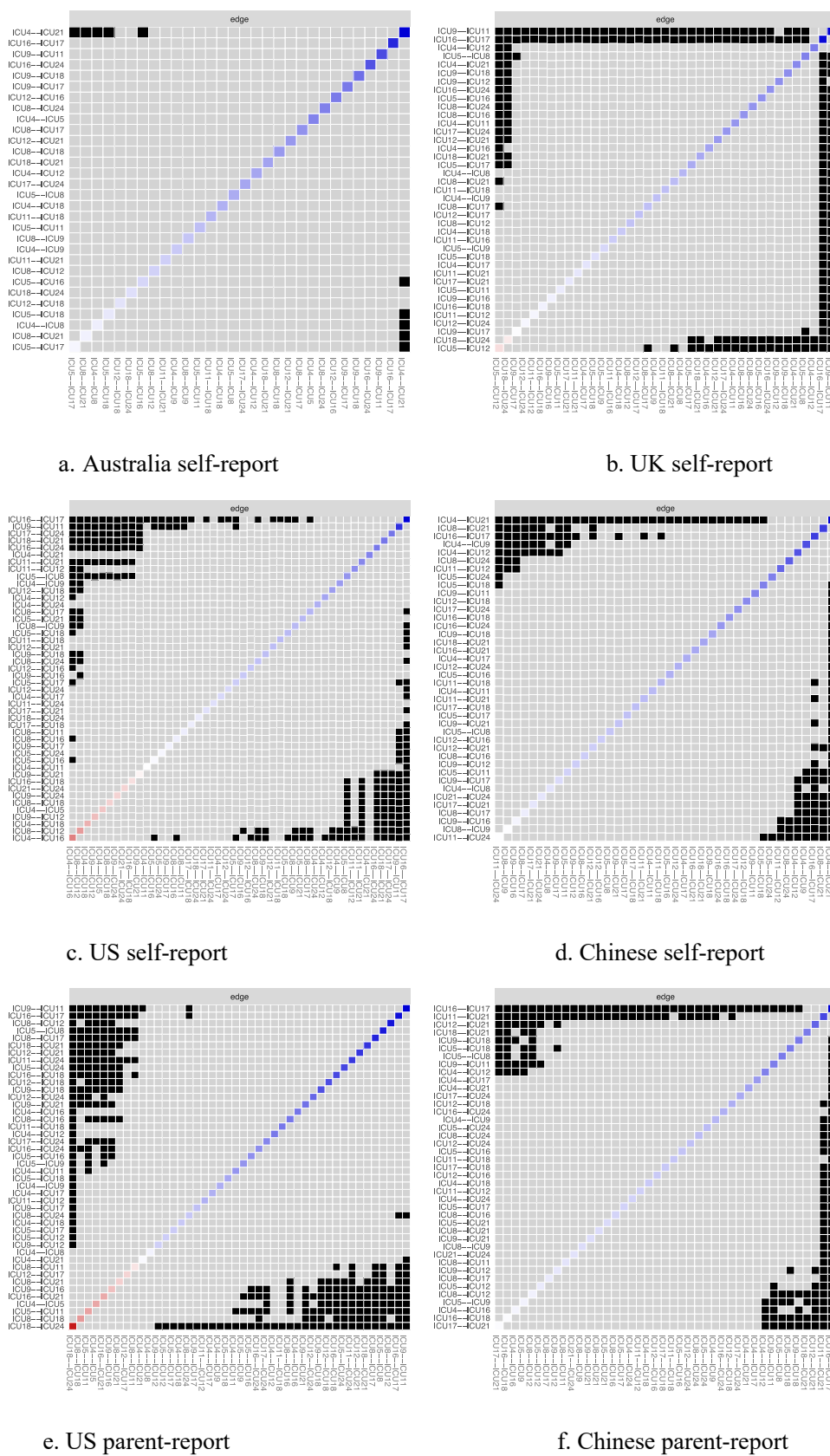
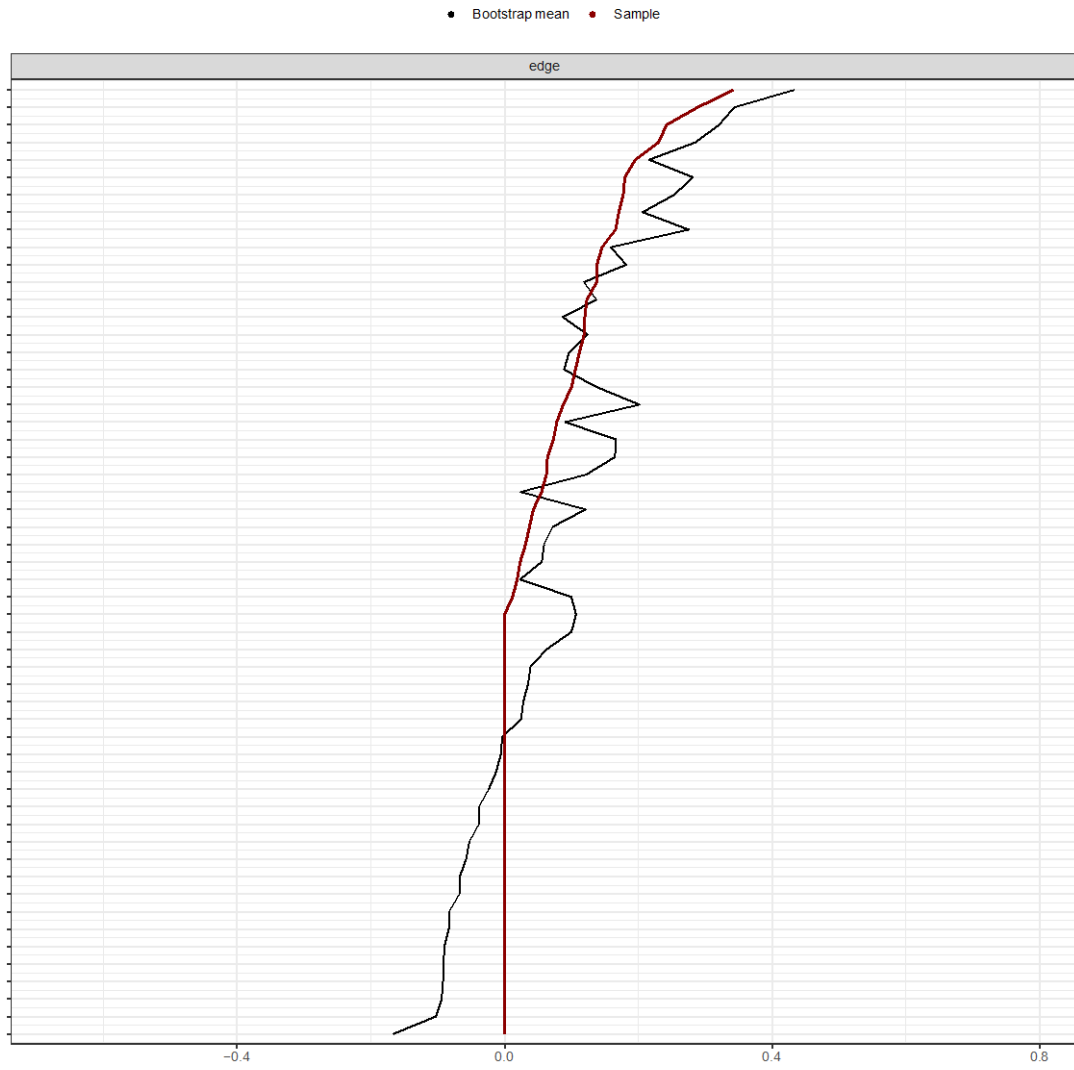
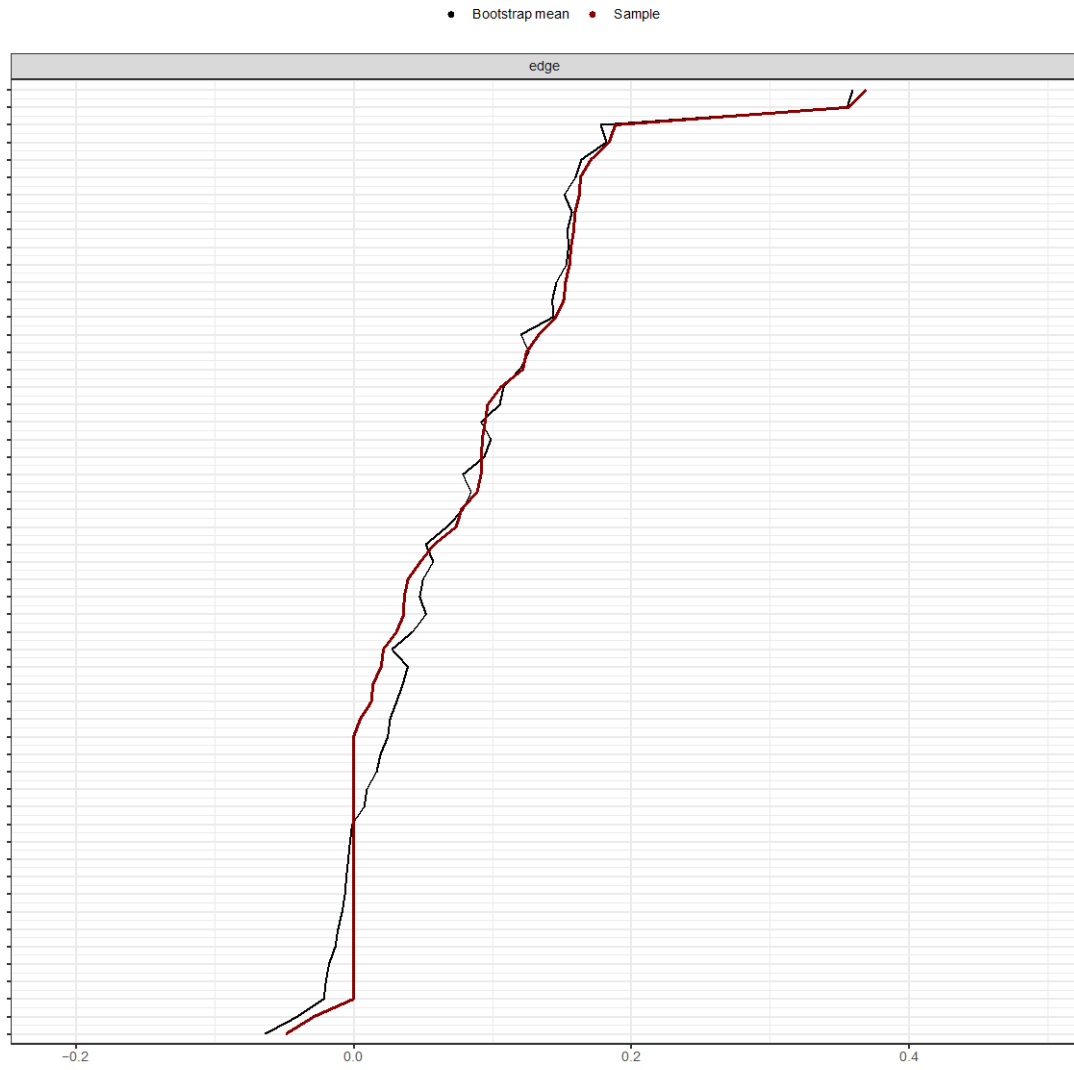


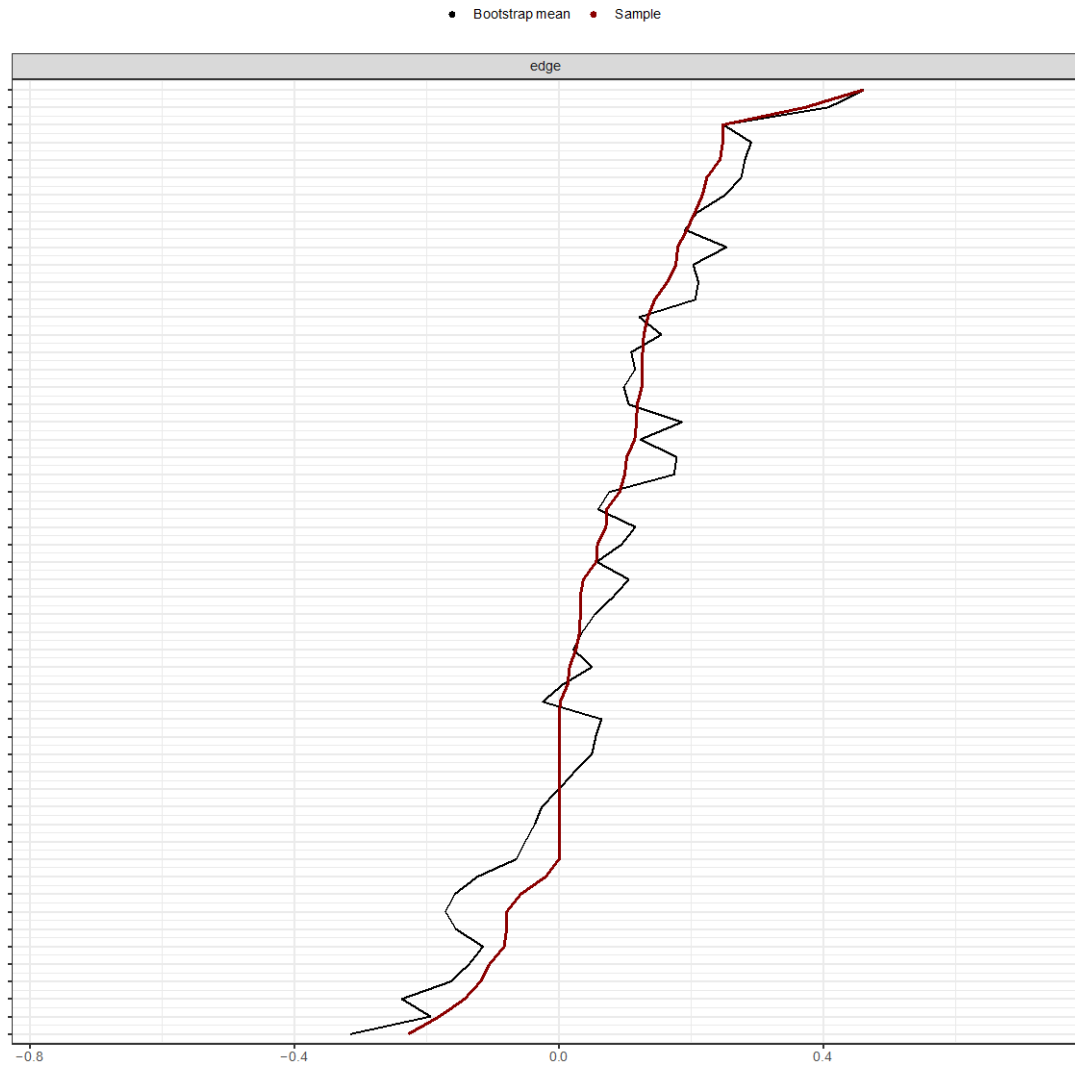
Figure S9 Bootstrapped difference among edges within ICU-11 networks



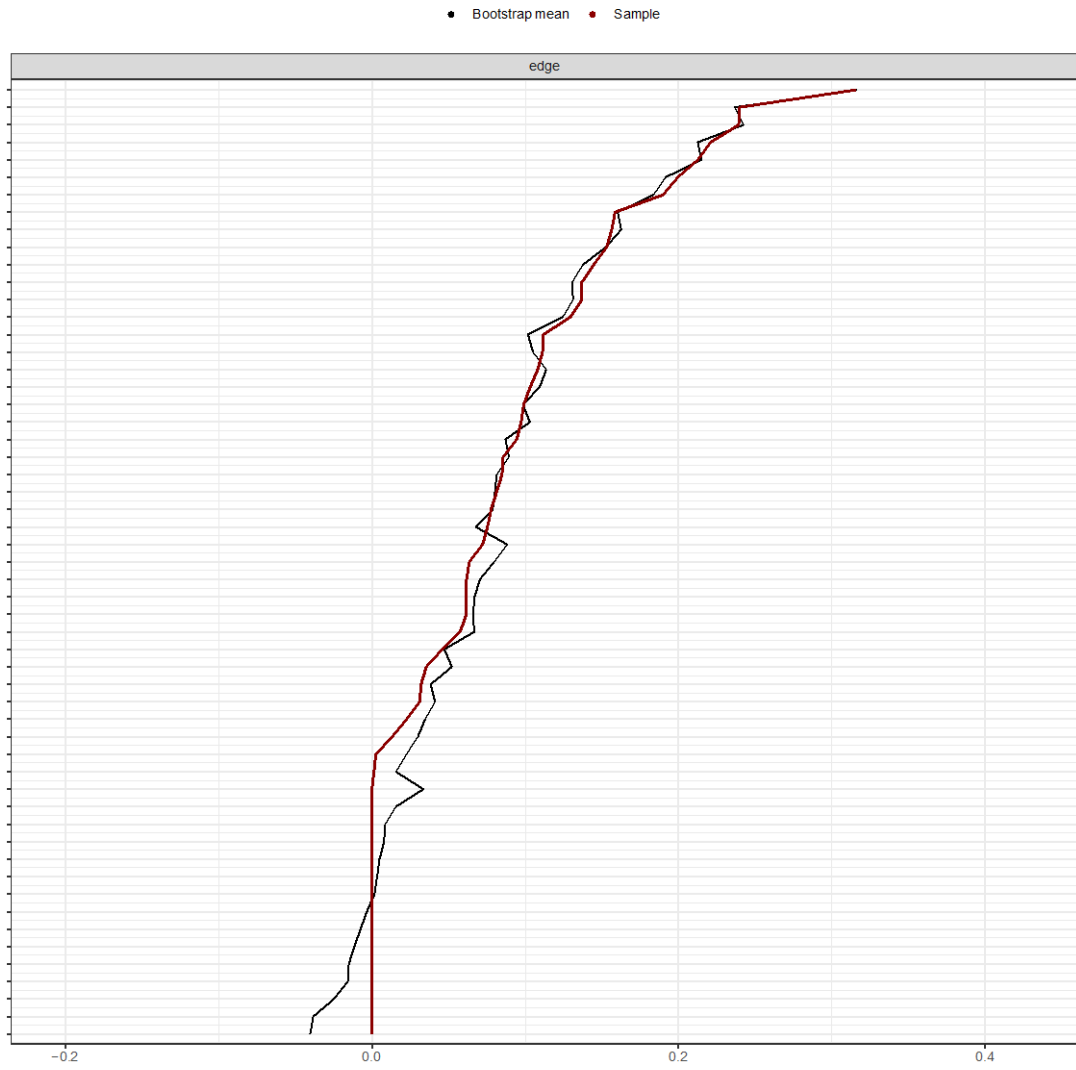
a. Australia self-report



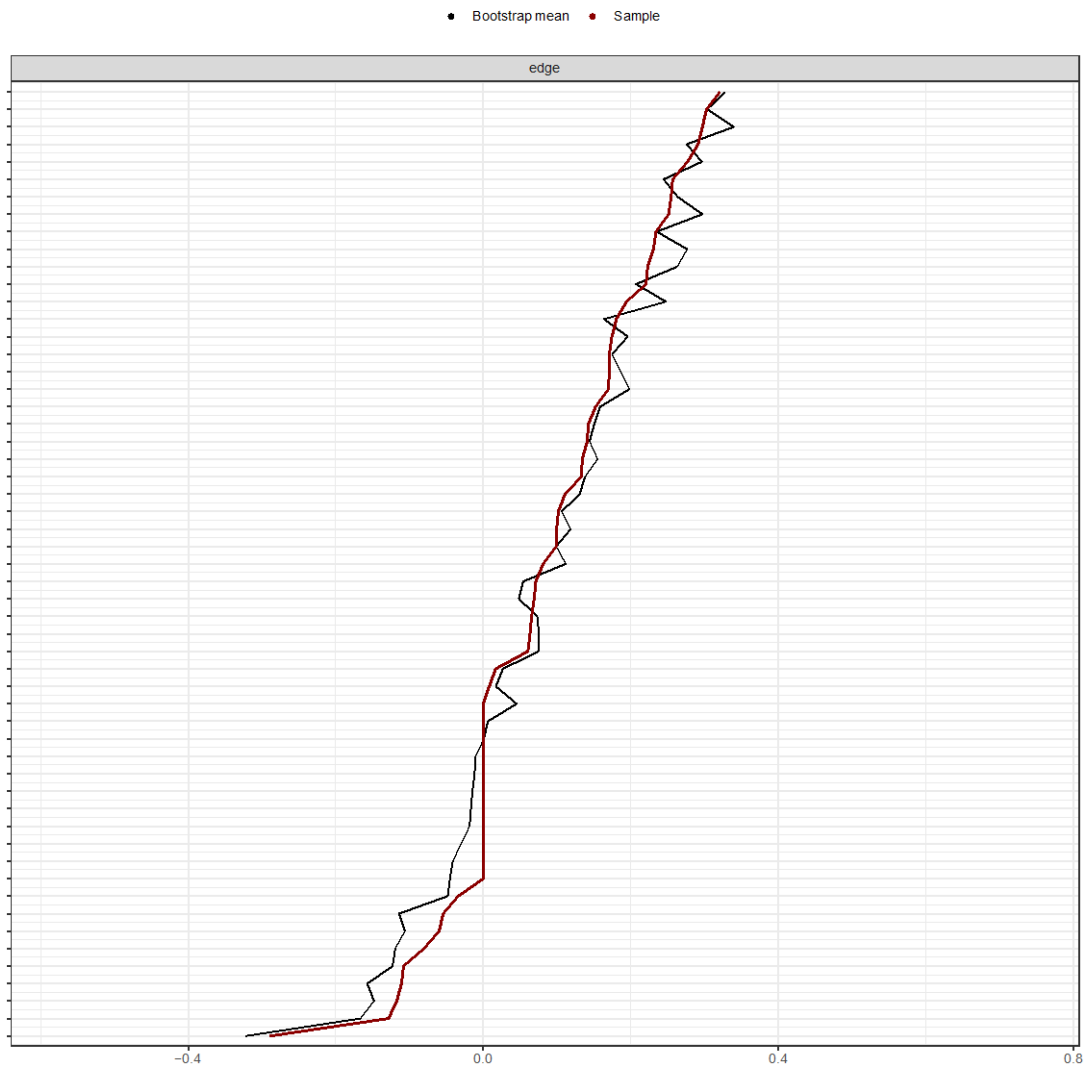
b. UK self-report



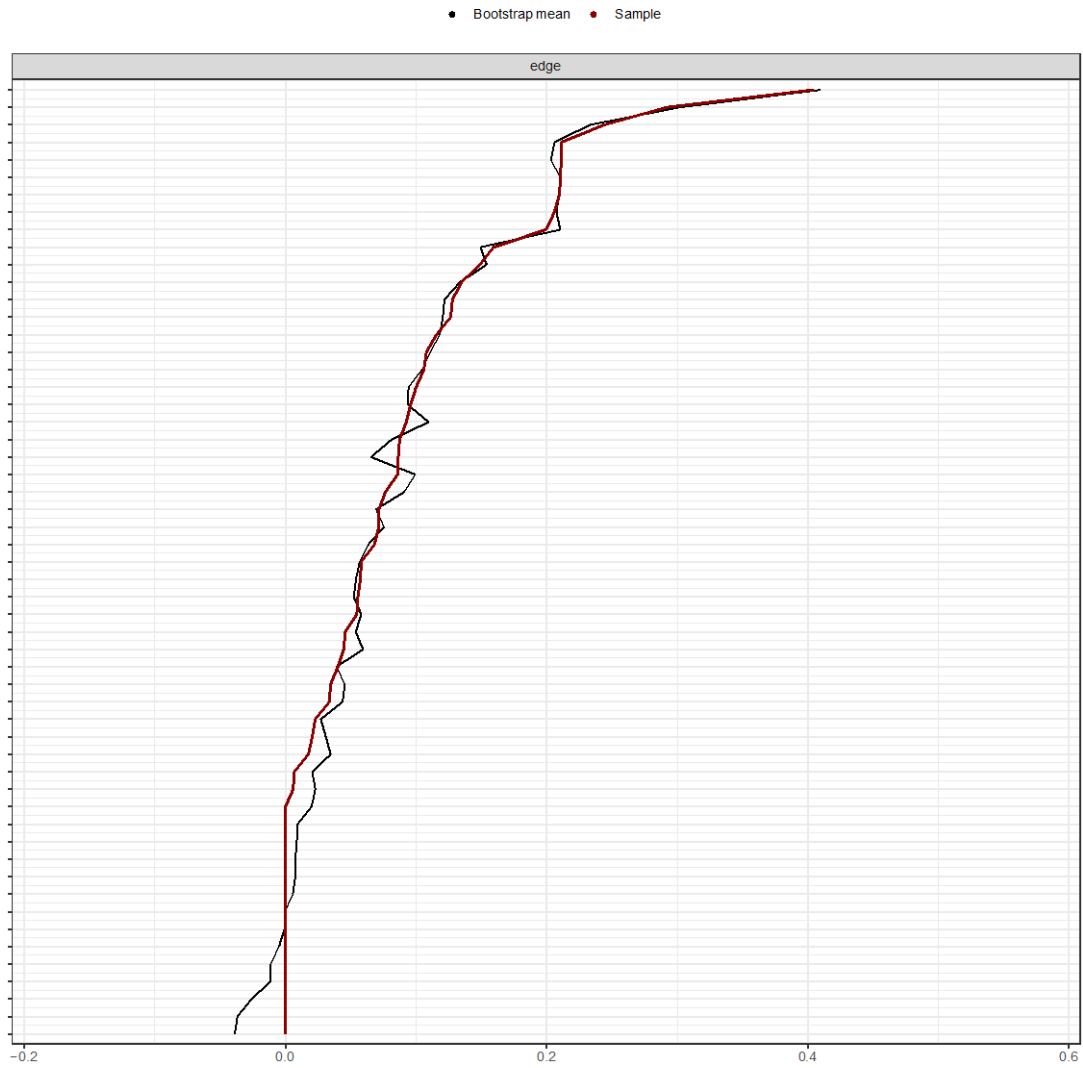
c. US self-report



d. Chinese self-report



e. US parent-report



f. Chinese parent-report

Figure S10 Edge-weight confidence intervals of the ICU-11 items