

Cultural Patterns of Self-Compassion and Prosocial Behavior: A Bayesian Network Analysis in the United States and Hong Kong

1. Introduction

1.1. *Self-Compassion, Compassion for others, and Prosocial Behaviour*

Self-compassion is defined as an adaptive, caring attitude toward oneself in times of suffering, encompassing self-kindness, recognition of common humanity, and mindful acceptance of distress (Neff, 2023). And compassion for others refers to feeling moved by others' suffering and the desire to relieve it (Chan et al., 2022). Although self-compassion and compassion for others are directed toward different targets, they share a common foundation of kindness and empathetic understanding in response to distress. Theoretically, self-compassion's emphasis on common humanity means recognizing that all people suffer and are worthy of care, suggesting that *being compassionate toward oneself can foster compassion for others* (García-Campayo et al., 2023). Importantly, while research has indicated that both types of compassion correlate with several positive psychological outcomes, prosocial behavior has received increasing attention in recent research because of its unique capacity to serve as both a measurable outcome and an effective intervention for enhancing well-being (Leiberg et al., 2011).

Prosocial behavior refers to voluntary actions intended to benefit others, such as helping, sharing, or offering comfort. Indeed, empirical research increasingly supports a link between both types of compassion and prosocial behavior. More specifically, a growing number of studies find that people high in self-compassion tend to be more other-oriented in positive ways. For example, self-compassionate individuals show greater perspective-taking, empathic concern, and altruistic tendencies (Yang et al., 2019). Another study showed that higher self-compassion correlates with stronger caring and forgiving attitudes toward others (e.g. more compassion for humanity and apologizing to others; Erus & Topçu, 2023). Such other-focused dispositions then translate into prosocial intentions and behaviors, where self-compassionate people report greater intent to help others and are rated by relationship partners as more supportive and caring in their interactions (Bolt et al., 2019). Experimental evidence further reinforces this connection, indicating that inducing a self-compassionate mindset (through guided self-affirmation or meditation) has been shown to increase helping behavior. For instance, participants prompted to feel self-compassion were more likely to assist in a lab emergency scenario (Lindsay & Creswell, 2014). Likewise, compassion for others is a well-documented driver of prosocial action. Feeling compassion entails not just understanding someone's pain but being moved to alleviate it, which naturally fuels helping and altruism. Indeed, middle school students who report higher compassion for others are more likely to engage in constructive prosocial defending of peers (such as standing up for a bullied classmate), and they show less aggressive bystander behavior (Hikmat et al., 2024).

1.2. *Adolescence as a Sensitive Period*

The linkage between compassion and prosocial behaviour is particularly important during adolescence, as it's a uniquely plastic stage for social-emotional development (Crone & Dahl, 2012). During these years, brain systems that support social cognition, valuation, and self-control continue to mature, with the increase of sensitivity to social cues and motivation to engage with peers (Blakemore & Mills, 2014). Neurodevelopmental work shows that adolescence is marked by continued maturation in networks supporting social cognition, valuation, and control, alongside heightened motivation to engage with peers (Cheng et al., 2024). These changes make it easier for adolescents to better understand others' needs and turn

those feelings into helpful actions. Indeed, longitudinal studies indicate that the competencies that underlie compassion mature meaningfully across the teen years and are tied to increases in prosocial behavior. For example, a six-wave study from ages 13 to 18 found that growth in perspective taking and empathic concern predicted higher levels of prosocial actions (Graaff et al., 2017).

Adolescence is also a period when social and emotional learning can shift trajectories. Large meta-analyses of universal school-based programs across K–12 find reliable improvements in students’ social–emotional skills, attitudes, and prosocial behaviors compared with controls, indicating that the relevant skills are malleable in school contexts (Yeager et al., 2017). Design work in educational psychology further shows that interventions tailored to adolescents’ heightened sensitivity to respect, status, and belonging are more engaging and more likely to change behavior. (Durlak et al., 2011). Therefore, adolescence offers a high-leverage window where social motivation is high, the “social brain” is still tuning, and both other-focused compassion and self-compassion are malleable. As these capacities consolidate, they more readily translate into real-world helping (Crone & Achterberg, 2022).

1.3. Theoretical Framework

Theoretically, the empathy–altruism framework is a well-established hypothesis that explains the relationship between compassion and prosocial behavior (Batson et al., 2015). According to this hypothesis, when individuals experience compassion for someone in need, it evokes an altruistic motivation to help, with the ultimate goal of improving the other person’s welfare. This hypothesis suggests that compassion for others activates a caregiving mindset, driving individuals to engage in prosocial actions, such as helping, sharing, or comforting those who are suffering. Extensive research in adolescent development supports this hypothesis, showing that greater compassion for others is strongly associated with higher moral reasoning, cooperation, and helping behavior (Ricon & Katz, 2024). Adolescents who recognize another’s suffering and feel genuine concern for their well-being are more likely to act to relieve that suffering through kind and helpful acts. The empathy–altruism hypothesis has been highly influential in explaining why compassion for others consistently fosters prosocial behavior across different age groups, including adolescents. Indeed, compassion for others in adolescents reliably predicts increases in charitable and cooperative behaviors over time (Konrath et al., 2025).

Within this hypothesis, self-compassion can be understood as an enabling factor that complements and supports compassion for others and prosocial behavior. To illustrate, self-compassion helps to foster emotional resilience and a sense of connection with others, as described by Neff’s concept of “common humanity” (Neff, 2009). By viewing one’s own imperfections and difficulties as part of a broader human condition, self-compassionate adolescents may become more attuned to others’ suffering, rather than feeling isolated by their own flaws. This theoretical model suggests that caring for oneself can naturally extend compassion beyond the self to others, which in turn enable oneself to exhibit prosocial behaviour (Figure 1). Empirical evidence found that adolescents with higher levels of self-compassion report feeling more connected to others who are struggling and show greater altruistic tendencies (Petruța & Stănculescu, 2025). However, few studies focus on the mechanism of how compassion to others and self-compassion are linked to prosocial behaviours.

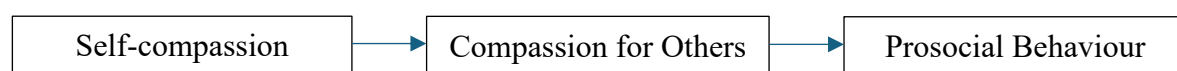


Figure 1. The Compassion-Prosocial Behavior Pathway

1.4. Network Modelling Approach and the Current Study

Traditional research on compassion and prosocial behavior has often used correlational designs or linear models (e.g. regression, structural equation modelling) to examine how these variables relate (Yue & Yang, 2021). While informative, such approaches treat the constructs as static factors or assume unidirectional influence. In reality, self-compassion, compassion for others, and prosocial behavior likely influence each other in dynamic, reciprocal ways. Indeed, research using longitudinal designs and bidirectional statistical models has empirically demonstrated reciprocal relationships between self-compassion, compassion for others, and prosocial behavior, indicating dynamic rather than unidirectional correlation (Alessandri et al., 2009; Yang et al., 2021). To capture this complexity, the present study employs a network modelling approach, specifically using Bayesian Network analysis (BNs). BNs are probabilistic graphical models that represent variables as “nodes” and their conditional dependency relations as directed edges in a graph (Nielsen & Jensen, 2007; Pearl, 2009). In contrast to undirected correlation networks, a BN produces a Directed Acyclic Graph (DAG) that can suggest possible directional relationships among variables (Briganti et al., 2022). In other words, BNs not only estimate which variables are directly connected after accounting for others (as a regular network would) but also infer the likely direction of influence that offers hypotheses about what could cause what in the system (Pearl, 2009a). This feature is especially valuable for psychological data, as it allows us to get deeper insights into potential causal pathways, even the data are cross-sectional (Tennant et al., 2021; VanderWeele & Robins, 2010).

Recent studies in clinical psychology illustrate the utility of Bayesian networks. McNally et al. (2017) pioneered using BNs to explore symptom interactions in mental disorders. For instance, they modelled posttraumatic stress symptoms as a network and identified which symptoms might trigger others. In that analysis, the BN approach revealed plausible causal chains among symptoms that were not evident from correlations alone. Unlike standard variable-centred approaches, network models conceptualize psychological phenomena as systems of interacting elements (Epskamp & Fried, 2018). Applying this to our topic, a network perspective would treat self-compassion, compassion for others, and prosocial tendencies as a system of mutually influencing attributes rather than isolated traits. A BNs can learn the underlying graph structure from the data, which essentially “discovering” how these adolescent compassion-related variables are connected and in what directional pattern (Scutari, 2010). Furthermore, the BNs use conditional independence tests to discern which links are direct and how the directionality might be oriented, yielding a data-driven model of the interrelations (Scutari & Denis, 2014). This approach provides several advantages over simple correlational analysis. First, it identifies direct relationships after accounting for other variables. Second, it can reveal mediating pathways. Lastly, it generates testable hypotheses about causal direction that can be further examined. Therefore, BNs offer a powerful exploratory tool for visualizing and quantifying the complex dependencies in psychological constructs.

While compassion has been compared across cultures in mean levels or correlations, no prior work has modelled the network of relationships among self-compassion, compassion for others, and prosocial behavior in different cultural contexts (Neff et al., 2008; Montero-Marín et al., 2018). While Researchers have recently begun to apply BNs outside of psychopathology (e.g., personality and social psychology), this study is among the first to use BN to investigate positive traits like compassion (Briganti et al., 2022). Using BN, the current study aims to address three primary research objective: (1) To identify the network structure and directional relationships among self-compassion, compassion for others, and prosocial behavior in adolescents using data-driven Bayesian network analysis; (2) To examine whether the learned network structures differ between individualistic (United States) and collectivistic (Hong Kong) cultural contexts; (3) To generate testable hypotheses about causal pathways

among compassion-related constructs that can inform future intervention and longitudinal research.

2. Methodology

2.1. Participants

A total of 2,313 adolescents participated in the study. Participants were aged between 13 and 17 years ($M = 15.53$, $SD = 1.24$). In terms of gender distribution, 1,192 identified as female (51.5%), 1,080 as male (46.7%), and 41 as non-binary or other (1.8%). Participants were recruited from two regions: 63.2% ($n = 1,461$) were from United States, and 36.8% ($n = 852$) from Hong Kong. In the Hong Kong subsample, the majority identified as Asian ($n = 296$, 98.7%), with a small number identifying as Caucasian/White ($n = 1$, 0.3%) or Mixed Race ($n = 2$, 0.7%); one participant did not report their ethnicity. In the United States subsample, participants identified as Caucasian/White ($n = 713$, 48.4%), Black ($n = 219$, 14.9%), Hispanic ($n = 213$, 14.5%), Mixed Race ($n = 170$, 11.5%), and Asian ($n = 91$, 6.2%); 55 participants (3.7%) did not report their ethnicity.

2.2 Measures

SCSY. The Self-Compassion Scale-Youth Version (SCS-Y; Neff et al., 2021) is a 17-item self-report instrument designed to assess self-compassion among adolescents aged 11 to 18. It consists of six subscales: Self-Kindness (e.g., “I try to be loving toward myself when I’m feeling emotional pain”), Self-Judgment (e.g., “When I fail at something important to me, I feel like I’m not good enough”), Common Humanity (e.g., “When I feel bad, I know I’m not alone”), Isolation (e.g., “When I fail, I feel alone in my failure”), Mindfulness (e.g., “When something upsets me, I try to keep my emotions in balance”), and Over-Identification (e.g., “When I’m upset, I get carried away with my feelings”). Each item is rated on a 5-point Likert scale from 1 (almost never) to 5 (almost always). Subscale scores were computed by averaging the relevant items, with higher scores reflecting greater presence of that self-compassion component (e.g., more self-kindness or more self-judgment). Following Neff et al.’s (2021) recommendation and scoring procedure, items measuring negative components (e.g., self-judgment, isolation, over-identification) were not reverse-coded. Instead, a bifactor model approach was used for scoring in some studies, but in this analysis, each subscale was used independently as a node in the Bayesian Network. The minimum possible score for each subscale is 1, and the maximum is 5. The Chinese version used in this study was translated and validated among Hong Kong adolescents. The Cronbach’s alpha coefficients for the six self-compassion subscales in the current sample were as follows: self-kindness ($\alpha = .85$), self-judgment ($\alpha = .85$), common humanity ($\alpha = .83$), isolation ($\alpha = .83$), mindfulness ($\alpha = .86$), and over-identification ($\alpha = .84$), indicating good internal consistency across all subscales.

CS. The Compassion Scale (Pommier, 2011) is a 16-item self-report measure that assesses compassion for others across six subcomponents: kindness, indifference, common humanity, separation, mindfulness, and disengagement. Each item is rated on a 5-point Likert scale from 1 (almost never) to 5 (almost always). In the present study, four composite scores were used. The kindness composite was calculated by averaging the kindness items, and the indifference composite was calculated by averaging the indifference items (e.g., “When people cry in front of me, I feel discomfort”). The common humanity composite combined common humanity items with reverse-coded separation items (e.g., “I realize everyone feels down sometimes; it’s part of being human”). The mindfulness composite was created by averaging mindfulness items with reverse-coded disengagement items (e.g., “I pay careful attention when others talk about their problems”). In each case, higher scores reflect greater levels of

compassion in that domain. All negatively phrased items were reverse-coded prior to scoring. The Chinese version of the scale was adapted for use with adolescents using a forward–backward translation method and reviewed by bilingual experts. In the current study, Cronbach’s alpha values were .81 for the kindness composite, .79 for the common humanity composite, .89 for the indifference composite, and .83 for the mindfulness composite, indicating acceptable to good internal consistency across subdomains.

PSA. The Prosocialness Scale for Adults (Caprara et al., 2005) is a 16-item self-report measure designed to assess individuals’ tendency to engage in prosocial behaviors, such as helping, sharing, caring, and empathizing with others. Although originally developed for adults, research emphasizes that self-report of prosocial tendencies is appropriate by mid-adolescence given socio-cognitive development. Indeed, cross-national research supports a robust general “global prosociality” factor alongside specific facets, justifying a total score (PSA_total) as an index of overall prosociality (Kanae et al., 2021). Moreover, adolescent samples (ages ~11–19) have used and psychometrically examined this same 16-item scale, showing acceptable reliability and measurement invariance across gender/age (Carrizales et al., 2017). A reliability-generalization meta-analysis also documents widespread use of the APBS/PSA in adolescent studies, with adequate internal consistency (Badenes-Ribera et al., 2022). Given the scale’s item content, prior adolescent applications, and evidence for a general prosociality factor, we retained PSA_total for ages 13–17. Participants rate how true each statement is for them on a 5-point Likert scale ranging from 1 (never/almost never true) to 5 (almost always true). Example items include “I try to console people who are sad” and “I easily lend money or other things.” All item responses were averaged to create a total prosocialness score, with higher scores indicating more frequent prosocial behavior. The Chinese version of the PSA was translated using a standard forward–backward translation procedure and reviewed by bilingual researchers to ensure conceptual equivalence. In the present sample, the PSA showed high internal consistency, with a Cronbach’s alpha of .88.

2.3. Statistical Analysis

Initial preprocessing began with checking for redundant indicators among variables representing self-compassion, compassion for others, and prosocial behavior. We evaluated item-level correlations within each cultural group (i.e., United States and Hong Kong) to identify excessive collinearity. With a redundancy threshold set at a correlation of .75, no redundant pairs were detected among the selected 11 variables, confirming conceptual distinctiveness (Table 1). The raw-score mean, standard deviations, and Pearson correlation among 11 variables were first examined (Appendix). Variables were then standardized into z-scores within each group to facilitate comparative interpretations without altering network structures. Multivariate outlier analyses identified no influential cases requiring removal.

Main analyses were conducted using two different network models. First, we estimated an undirected network in which edges represent conditional associations among the observed variables. Due to the continuous nature of variable in the current study, we used a Gaussian Graphical Model (GGM) estimated with the graphical LASSO and Extended BIC selection (EBICglasso; Friedman, Hastie, & Tibshirani, 2008; Foygel & Drton, 2010; Epskamp & Fried, 2018). In the graphical representation, an edge’s thickness depicts the magnitude (absolute value) of the partial correlation between two nodes conditional on all others, and edge color denotes its sign.

As in high-dimensional network estimation generally, many parameters are estimated simultaneously and spurious (false-positive) edges can occur. To mitigate this risk, we applied ℓ_1 -regularization (graphical LASSO), which shrinks small partial correlations toward zero and yields a sparse network that retains only the most robust associations. The EBIC criterion

controls the degree of sparsity by selecting the penalty parameter; this approach is widely used to minimize false-positive edges while preserving conditional dependencies (McNally et al., 2017). Analyses used complete cases and correlations were computed (Epskamp et al., 2018). We estimated the network with bootnet and visualized it with qgraph (Epskamp et al., 2012). To quantify node importance we computed centrality indices, including strength, expected influence, betweenness, and closeness (McNally et al., 2017). To evaluate stability and accuracy, we used case-resampling bootstrap ($R = 1,000$) to obtain edge-weight intervals and the correlation-stability (CS) coefficient for centrality (Epskamp, Borsboom, & Fried, 2018).

In the second analysis, we estimated BN structures separately for each cultural group using a score-based approach via the hill-climbing algorithm. The algorithm iteratively modifies network arcs to maximize model fit, measured by the Bayesian Information Criterion (BIC). To avoid local maxima, the search procedure involved 50 random restarts, each allowing up to 100 perturbations. Final structures were parameterized using maximum likelihood estimation, yielding conditional probability distributions for all nodes. Each Bayesian network was visualized to illustrate structural dependencies clearly. Nodes represented psychological constructs, and edges (directed arrows) represented conditional relationships. These directed acyclic graphs (DAGs) visually demonstrate differences in variable interrelations between the two cultural contexts. Furthermore, a nonparametric bootstrap (1,000 resamples) assessed the stability of network edges. For each resample, BN structures were re-estimated, and edge inclusion frequencies were calculated. An averaged consensus network retained only edges with inclusion frequencies $\geq 85\%$, providing a robust representation of the most reliable connections.

Conditional probability queries were conducted to illustrate specific relationships within the networks. Probabilities of particular events (e.g., high prosocial behavior given high self-compassion) were estimated, and queries were based on median splits or quartile cut-offs to define high/low conditions. Structural differences between the US and HK networks were quantified using Structural Hamming Distance (SHD), reflecting the total number of differences in edge presence/direction. The Hamming distance was additionally computed on undirected network skeletons to distinguish directionality effects. Validation through simulation ensured robustness of learned structures. Synthetic datasets ($N=1000$ each) were generated from each fitted network model, and structures were re-learned using the same hill-climbing method. Structural recovery was quantified by computing SHD between original and simulated structures. Lastly, model fit indices were evaluated to balance explanatory power against complexity. BIC and AIC values were computed for each network model. Cross-validation was performed (10-fold) to assess predictive accuracy of the networks.

Table 1. Node abbreviations and corresponding variables names of the subscales

Abbreviation	Variable
1. SCSY_sk	Self-Kindness
2. SCSY_sj	Self-Judgment
3. SCSY_cm	Common Humanity
4. SCSY_i	Isolation
5. SCSY_m	Mindfulness
6. SCSY_o	Over-Identification
7. CS_K	Kindness
8. CS_M	Mindfulness (CS)
9. CS_CM	Common Humanity (CS)

10. CS_I	Indifference
11. PSA_total	Prosocialness

3. Results

The final sample comprised 1461 participants from the United States and 852 participants from Hong Kong. All participants completed measures of self-compassion, compassion for others, and prosocial behavior, resulting in 11 variables for network analysis. Goldbricker analysis revealed no redundant variable pairs in either the US or Hong Kong samples, indicating that all measured variables contributed unique information to the network structure.

3.1. EBICglasso network model

An undirected network was estimated via EBICglasso, where edges represent conditional associations among variables (see Figure. 2). Edge thickness indicates the magnitude of the partial correlation and colour denotes its sign. Strength reflects ΔBIC when removing the arc, therefore more negative indicates a larger fit drop and thus a more important edge. The corresponding adjacency matrix is reported in Table 2. The matrix is square and symmetric (one row/column per node), and off-diagonal entries are the estimated edge weights and the diagonal is zero. The strongest associations are shown in Figure 1 and Table 2.

Figure 3 presents the standardized centrality metrics for strength, closeness, expected influence, and betweenness. The variables with the highest strength centrality are kindness (CS_K), followed by Mindfulness (CS_M), self-kindness (SCSY_sk), common humanity (SCSY_cm), and self-judgement (SCSY_sj), respectively. The variables with the highest betweenness centrality are self-kindness (SCSY_sk), significant decrease in common humanity (CS_CM), followed by self-judgement (SCSY_sj), and common humanity (SCSY_cm), respectively. Also, the variables with the highest closeness centrality are self-kindness (SCSY_sk) and common humanity (SCSY_cm). The self-kindness variable showed consistent high positive values across the centrality metrics. This shows the importance of self-kindness in the estimated network, which is consistent with extensive research demonstrating that self-kindness serves as a central therapeutic target and key resilience factor in psychological interventions (Pank et al., 2025). Furthermore, according to Figure. 3, links between mindfulness and kindness, and overidentification and self-judgement (i.e. CS_M - CS_K and SCSY_o – SCSY_sj) appeared as the strongest connections. This is consistent with the summary of the centrality indices shown in Fig. 2.

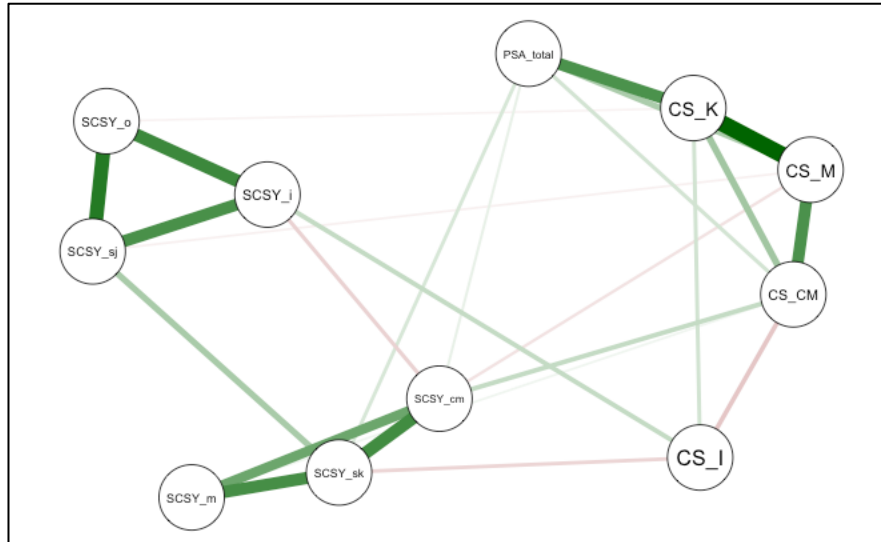


Figure. 2. Undirected EBICglasso network model of partial correlation structure among study variables. Each variable is represented as a node (circle) in the network, and edges indicate regularized partial correlations estimated by the EBICglasso method. The thickness of each edge reflects the strength of the conditional association between variables, controlling for all other variables in the network. Edge width and opacity are proportional to the absolute value of the regularized partial correlation. More opaque and wider edges indicate stronger conditional associations, whereas lighter and thinner edges indicate weaker associations approaching zero. Green- and red-colored edges correspond to positive and negative partial correlations, respectively. Variable abbreviation information is presented in Table 1. The spring layout algorithm was used for visualization.

Lastly, to investigate the stability of the network, 1000 bootstrap samples were generated to examine the reliability of the centrality metrics (Fig. 4a) and the accuracy of estimated edges in the network (Fig. 4b). Both reliability and accuracy are confirmed based on the bootstrap simulation results. As a sensitivity check, re-estimating the model with a stronger penalty ($\gamma = 0.75$) produced a sparser yet qualitatively similar pattern of associations and centralities, supporting the robustness of the whole-sample EBICglasso results.

Table 2. Partial correlation (adjacency) matrix from the EBICglasso-estimated network model

Variable	CS_K	CS_CM	CS_M	CS_I	PSA_total	SCSY_sk	SCSY_sj	SCSY_cm	SCSY_i	SCSY_m	SCSY_o
CS_K	0.00										
CS_CM	0.19	0.00									
CS_M	0.51	0.36	0.00								
CS_I	0.10	-0.12	0.00	0.00							
PSA_total	0.36	0.10	0.17	0.00	0.00						
SCSY_sk	0.00	0.00	0.00	-0.09	0.09	0.00					
SCSY_sj	0.00	0.00	-0.04	0.00	0.00	0.18	0.00				
SCSY_cm	0.00	0.12	-0.07	0.00	0.05	0.38	0.00	0.00			
SCSY_i	0.00	0.00	0.00	0.13	0.00	0.00	0.37	-0.10	0.00		
SCSY_m	0.00	0.04	0.00	0.00	0.00	0.37	0.00	0.30	0.00	0.00	
SCSY_o	-0.04	0.00	0.00	0.00	0.00	0.00	0.44	0.00	0.39	0.00	0.00

Note. See Table 1 for variable abbreviation descriptions.

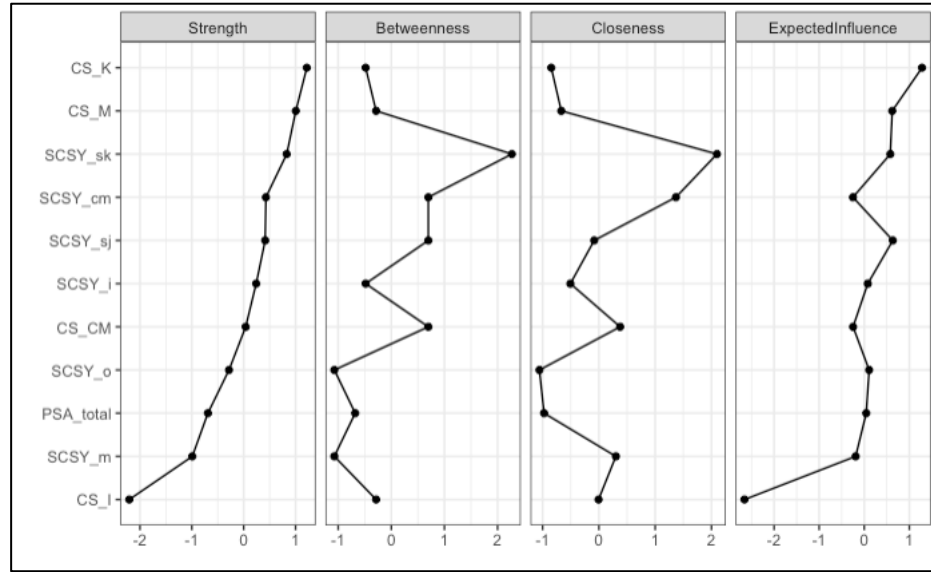


Figure. 3. Plot of the standardized centrality metrics (strength, closeness, betweenness, expected influence) for variables (variable abbreviation descriptions are provided in Table 1). The y-axis represents the 11 variables while the x-axis represents the standardized values of centrality metrics.

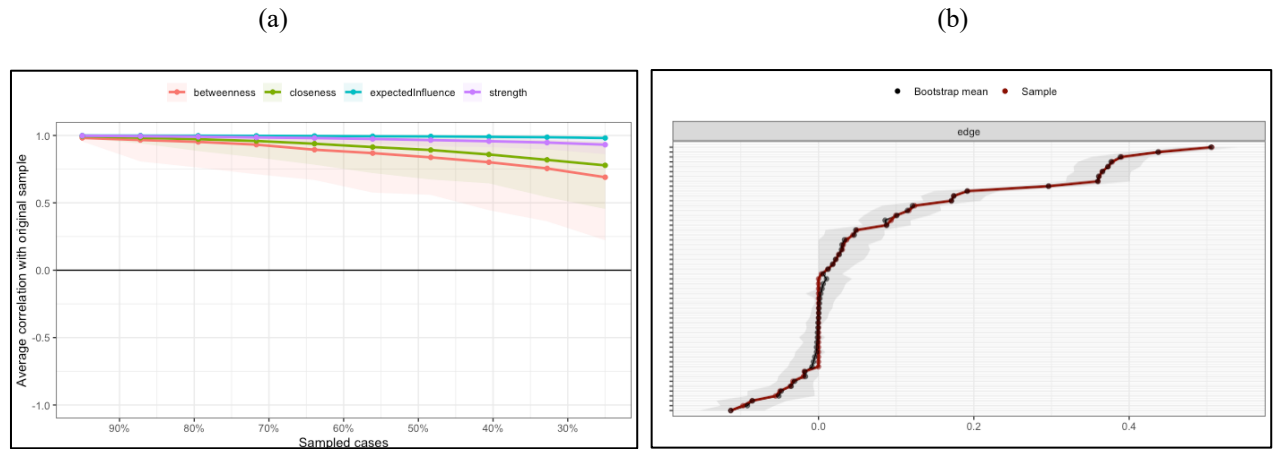


Figure. 4. (a) Stability of the centrality metrics (strength, closeness, betweenness, expected influence); (b) The accuracy of estimated edges. (a) Graphic summary of the average correlation of a variable's centrality using bootstrapping of centrality in the original estimated network as a function of percentages of the sample. Horizontal lines indicate mean correlations and vertical lines demarcate areas ranging from the 2.5th quantile to the 97.5th quantile. This plot shows that even when bootstrap samples are generated with only 70% of the original subjects, the correlations remain quite high. These bootstrapping results can be used as an index of the reliability of the centrality metrics (strength, closeness, betweenness, and expected value). (b) Summary of differences between network estimated and bootstrapped edges (x-axis). The black line, red line, and grey shaded area show the bootstrap mean, sample values, and their bootstrapped confidence intervals, respectively. Each horizontal line represents an edge of the network, ordered from the highest edge-weights to the lowest ones. Only differences in edge-weights at the extremes differ significantly from each other.

3.2 Bayesian Network (BN)

We next learned Bayesian network structures separately for the Hong Kong and United States samples using hill-climbing, which successfully identified directed acyclic graph

structures for both cultural groups. The US network contained 28 directed edges, while the Hong Kong network contained 34 directed edges, and both networks satisfied acyclicity and directedness criteria, confirming their suitability for causal interpretation. The resulting directed acyclic graphs (DAGs) represent the most probable dependency structure among nodes related to self-compassion, compassion for others, and prosocial behavior (see Figure 9 and 10 in appendix). The networks were estimated to retain only the strongest and most informative connections among variables, reflecting conditional dependencies while minimizing spurious links.

The estimated directional networks are summarized in Table 3 (United States sample) and Table 4 (Hong Kong sample), where edge weights are ordered from strongest to weakest. These weights reflect the impact of each directed connection on the model fit, where the more negative the weight, the more critical that edge is to the network structure. Furthermore, to evaluate structural stability and identify the most reliable network features, we conducted bootstrap resampling with 1000 iterations using the hill-climbing algorithm. Following established procedures, bootstrap-averaged networks were constructed by retaining only arcs that demonstrated both high bootstrap frequency ($\geq 85\%$ appearance across samples) and consistent directionality (directional probability > 0.5 ; Scutari & Nagarajan, 2013). This conservative thresholding ensures that only the most robust structural features survive the averaging process, providing networks with enhanced specificity for genuine dependencies while maintaining acceptable sensitivity for true relationships. The bootstrap-averaged networks revealed both culturally-invariant and culturally-specific pathways (Figures 5 and 6). Comparison between averaged networks using graphical overlay analysis identified three categories of structural relationships, including universal edges present in both cultural contexts (depicted in black), Hong Kong-specific edges absent or reversed in the US network (shown in red), and US-specific edges not replicated in the Hong Kong network (represented by dashed blue lines).

According to Table 3, the strongest directed dependency in the US network was $CS_K \rightarrow CS_M$ (kindness $\rightarrow$ mindfulness; weight = -810.89). The second and third most influential edges occurred entirely within the self-compassion domain: $SCSY_sj \rightarrow SCSY_o$ (self-judgment $\rightarrow$ over identification; -356.71) and $SCSY_sk \rightarrow SCSY_cm$ (self-kindness $\rightarrow$ common humanity; -291.33), respectively. The fourth strongest connection is between compassion for others and prosocial behaviour: $CS_K \rightarrow PSA_total$ (kindness $\rightarrow$ prosocial behaviour; -124.88). Subsequent edges reflected smaller but still meaningful influences, including mindfulness influencing common humanity ($CS_M \rightarrow CS_CM$; -96.32) and self-judgement influencing indifference ($SCSY_sj \rightarrow CS_I$; -85.29). In the Hong Kong network, $CS_K \rightarrow CS_M$ again emerged as the strongest edge (-523.26). The next two most powerful dependencies were within self-compassion: $SCSY_sj \rightarrow SCSY_i$ (self-judgment $\rightarrow$ indifference; -327.93) and $SCSY_sk \rightarrow SCSY_m$ (self-kindness $\rightarrow$ mindfulness; -142.29). The fourth strongest edge was $SCSY_i \rightarrow SCSY_o$ (isolation $\rightarrow$ over-identification; -120.45), highlighting substantial intra-domain cohesion. Kindness to prosocial behaviour remained present but weaker ($CS_K \rightarrow PSA_total$; -65.35), and indifference to self-judgement ($CS_I \rightarrow SCSY_sj$; -117.69) were more prominent than in the US sample.

Table 3. Estimated edge weights in Bayesian network in US sample

	From	To	Strength		From	To	Strength
1	CS_K	CS_M	-810.89	13	SCSY_cm	CS_CM	-28.48
2	SCSY_sj	SCSY_o	-356.71	14	CS_K	CS_CM	-23.63
3	SCSY_sk	SCSY_cm	-291.33	15	CS_I	CS_CM	-22.45

4	CS_K	PSA_total	-124.88	16	CS_K	SCSY_sj	-21.76
5	CS_M	CS_CM	-96.32	17	SCSY_m	CS_I	-9.25
6	SCSY_sj	SCSY_i	-85.29	18	SCSY_sj	SCSY_cm	-9.16
7	SCSY_o	SCSY_i	-79.06	19	PSA_total	SCSY_cm	-5.33
8	SCSY_cm	SCSY_m	-77.89	20	SCSY_i	SCSY_sk	-4.78
9	SCSY_sk	SCSY_m	-61.09	21	CS_M	SCSY_m	-3.70
10	SCSY_sj	SCSY_sk	-52.44	22	CS_K	SCSY_o	-2.36
11	PSA_total	SCSY_sk	-36.03	23	CS_K	CS_I	-1.91
12	CS_M	PSA_total	-28.56	24	PSA_total	CS_CM	-1.76

Note. See Table 1 for variable abbreviation descriptions.

Table 4. Estimated edge weights in Bayesian network in HK sample

	From	To	Strength		From	To	Strength
1	CS_K	CS_M	-523.26	13	SCSY_cm	SCSY_m	-30.96
2	SCSY_sj	SCSY_i	-327.93	14	SCSY_i	SCSY_cm	-20.17
3	SCSY_sk	SCSY_m	-142.29	15	CS_M	PSA_total	-16.17
4	SCSY_i	SCSY_o	-120.45	16	CS_M	SCSY_sk	-14.59
5	CS_I	SCSY_sj	-117.69	17	CS_CM	SCSY_cm	-12.11
6	SCSY_sk	SCSY_cm	-99.45	18	SCSY_sk	SCSY_sj	-10.34
7	CS_M	CS_CM	-94.20	19	CS_K	SCSY_m	-7.88
8	CS_K	PSA_total	-65.35	20	CS_K	SCSY_cm	-5.79
9	SCSY_sj	SCSY_o	-63.10	21	CS_I	SCSY_i	-5.65
10	CS_K	CS_CM	-36.93	22	CS_CM	PSA_total	-4.51
11	PSA_total	SCSY_sk	-35.67	23	CS_CM	CS_I	-4.33
12	CS_I	SCSY_cm	-34.11	24	SCSY_sj	SCSY_cm	-3.46

Note. See Table 1 for variable abbreviation descriptions.

Figure 5 and 6 present the bootstrapped averaged networks in the HK and US sample. Variables placed at the top of the DAG graphic are more probable to affect other symptoms located lower in the graph. The HK network reveals a structure where compassion for others components form the foundational causal architecture. The network demonstrates two primary causal origins, including the CS_K (kindness) and SCSY_i (isolation), with kindness following a hierarchical cascade through CS_M (mindfulness) to CS_CM (common humanity) and PSA_total (prosocial behavior), while isolation creates interconnectivity within self-compassion components. Specifically, SCSY_i (isolation) serves as a central hub, directly influencing CS_I (indifference), SCSY_sj (self-judgment), SCSY_cm (self-common humanity), and SCSY_o (self-over-identification). The network also exhibits convergent pathways where multiple compassion for others components (CS_CM and CS_I) feed into SCSY_cm (common humanity), which subsequently influences SCSY_m (mindfulness).

The US network presents a fundamentally different causal architecture with CS_M (mindfulness) as the primary causal origin, influencing both CS_K (kindness) and CS_I (indifference). The kindness pathway branches toward PSA_total (prosocial behavior) and CS_CM (common humanity), while self-compassion components form a more single cluster. To illustrate, SCSY_cm (common humanity) emerged as a primary causal factor that directly influenced SCSY_m (mindfulness), which in turn was linked to SCSY_sk (self-kindness). At the same time, SCSY_cm (common humanity) also exerted a direct effect on SCSY_sk (self-

kindness), suggesting that SCSY_m (mindfulness) may partially mediate the pathway between SCSY_cm (common humanity) and SCSY_sk (self-kindness). Furthermore, the self-judgment pathway (SCSY_sj) operates relatively independently, creating connections to SCSY_sk (self-kindness), SCSY_o (over identification), and SCSY_i (self-isolation), with SCSY_o and SCSY_i forming the terminal nodes.

Comparing the networks reveals profound cultural differences in compassion architecture and prosocial behaviour. Both networks share four common pathways: CS_K → CS_CM, CS_M → CS_CM, CS_K → PSA_total, and SCSY_cm → SCSY_m. However, the directional relationship between kindness and mindfulness is reversed (CS_K → CS_M in Hong Kong vs. CS_M → CS_K in US), indicating fundamental differences in compassion initiation. Furthermore, Hong Kong-specific pathways emphasize isolation-driven self-compassion regulation (SCSY_i → CS_I, SCSY_i → SCSY_sj, SCSY_i → SCSY_cm, SCSY_i → SCSY_o), indicating that perceived social disconnection in this sample initiates heightened self-criticism, over-identification, and shifts in common humanity. US-specific pathways prioritize sequential self-compassion development (SCSY_cm → SCSY_m → SCSY_sk, SCSY_sj → SCSY_o → SCSY_i), highlighting a stepwise progression from self-awareness to self-kindness and from self-criticism to emotional distancing before re-engagement.

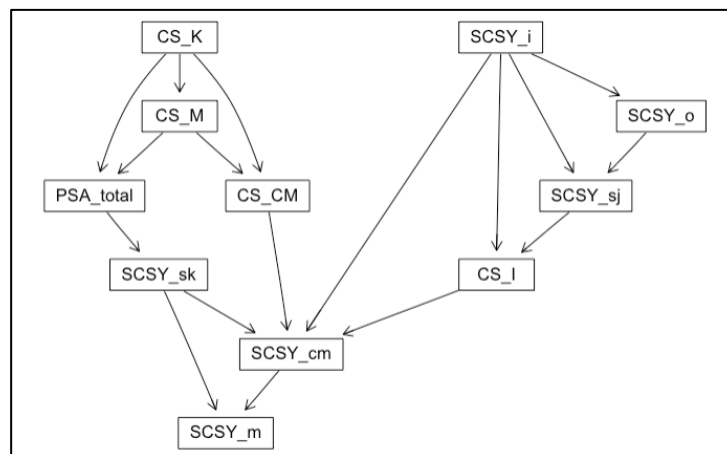


Figure 5. Averaged Bayesian Network for HK with Bootstrap Confidence

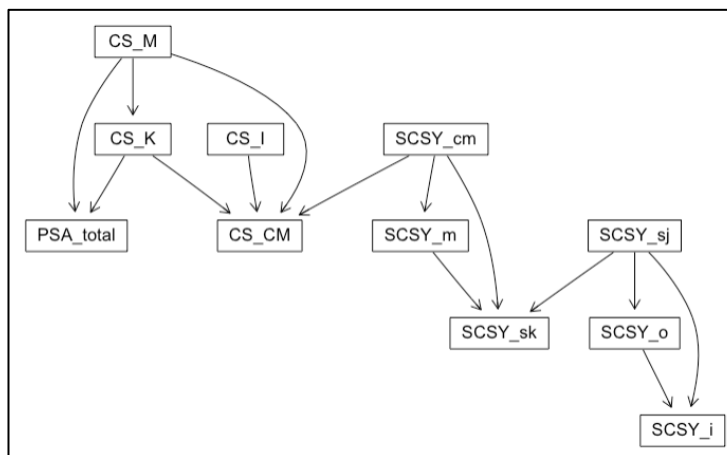


Figure 6. Averaged Bayesian Network for US with Bootstrap Confidence

3.2.2. Model Evaluation

To assess the robustness, fit, and generalizability of our Bayesian networks (BNs) for the US and Hong Kong samples, we conducted a comprehensive evaluation. Both networks demonstrated excellent internal consistency, where the Structural Hamming Distances of zero between each original BN and the BN re-estimated on one million simulated cases confirm that the learned structures are perfectly recoverable under ideal data. Out-of-sample predictive performance was strong, with test-set log-likelihoods of -12 194.38 (US) and -6 331.04 (HK). The 10-fold cross-validation (i.e., losses of 27.21 and 25.72) indicates that each model assigns high probability to unseen data. Information-criterion scores (US AIC = -39 751.61, BIC = -39 873.20; HK AIC = -21 891.28, BIC = -22 000.47) further confirm that both models strike an appropriate balance between fit and parsimony. Comparative analyses US and HK networks share some core structure but also exhibit region-specific dependencies (12 true positives, 12 false positives, 12 false negatives), while bootstrapped averaging highlighted eight universally stable arcs. Average edge-strengths (US = 0.444; HK = 0.476) show that most dependencies contribute meaningfully to model fit. The conditional-independence tests (MI-G > 300, $p < .000$) validate key direct connections, showing that even accounting for indifference (CS_I), common humanity (SCSY_cm) and self-kindness (SCSY_sk) remain statistically linked in both regions, confirming the necessity of a direct arc between them. These results demonstrate that our BNs are well-identified, predictive, and robust, capturing both shared and region-specific symptom relationships with confidence.

Table 3. Model Fit, Predictive Validity, and Conditional-Independence Tests

Sample	Log-Likelihood	AIC	BIC	CV Loss ^a	SHD ^b	Conditional Independence	
						MI-G ^c	p
US	-12194.38	-39751.61	-39873.20	27.21	0.00	605.72	< .001
HK	-6331.04	-21891.28	-22000.47	25.72	0.00	328.15	< .001

Note. ^aCV Loss: Expected log-likelihood loss from 10-fold cross-validation;

^bSHD (Simulated): Structural Hamming Distance between original and simulated network (1×10^6 cases);

^cMI-G (CS_I): Mutual-information G-test statistic for $SCSY_cm \perp\!\!\!\perp SCSY_sk \mid CS_I$.

4. Discussion

The present study is the first to apply a Bayesian network approach to examine the complex relationships among self-compassion, compassion for others, and prosocial behavior in adolescents from the United States and Hong Kong. The network findings revealed both universal patterns and culture-specific differences that shed new light on how self- and other-directed compassion contribute to adolescent prosocial development. In both cultural groups, the Bayesian network (BN) analysis identified meaningful directed connections between compassion constructs and prosocial tendencies, while also highlighting distinct central nodes in each network.

The undirected partial correlation network revealed that components of compassion clustered as expected into two coherent groups. The positive facets within compassion for others, including kindness, common humanity, and mindfulness, showed especially strong interconnections, with kindness and mindfulness most tightly linked. This pattern aligns with prior scale analyses indicating that these outward-focused compassionate qualities operate in concert as a unified construct (Pommier, 2011). Likewise, within self-compassion, the positive facets (self-kindness, common humanity, mindfulness) and the three negative facets (self-judgment, isolation, over-identification) formed their own tight-knit grouping. Such bifurcation mirrors the well-documented factor structure of self-compassion, where positive components

tend to interrelate strongly with each other, as do negative components, whereas correlations between the positive and negative components are weaker (Cleare et al., 2017). Large-sample studies have consistently reported that self-kindness, common humanity, and mindfulness co-load on a “compassionate self-responding” factor, while self-judgment, isolation, and over-identification define an “uncompassionate self-responding” factor (Brenner et al., 2017). The present network thus accords with Neff’s theoretical model positing that self-compassion entails actively cultivating kindness and mindful perspective while countering self-critical isolation (Neff et al., 2021). It also resonates with the view that these positive and negative elements represent opposing dimensions of a dynamic system (Muris & Petrocchi, 2016).

Notably, prosocial behavior was most strongly linked to the kindness component of compassion for others, whereas all other compassion components, either within compassion for others or self-compassion, showed only weak direct associations with prosocial behaviours. This finding aligns with research indicating that feeling compassionate concern and warmth toward others is a key driver of altruistic action (Batson et al., 2015). For example, one study found that emotional kindness toward someone in distress reliably predicts helping behaviors in both youth and adults (Eisenberg et al., 2010). In contrast, components like mindfulness or common humanity, whether toward others or self, showed weaker but meaningful correlation with prosocial behaviour. Indeed, Marshall et al. (2019) found that although self-compassionate teens were rated as more prosocial by peers, only empathy (but not self-compassion) predicted increases in helping behavior over time. Thus, our network’s low correlations between self-compassion and prosocial behaviour align with the view that caring for oneself mainly facilitates prosociality via reducing personal distress or enabling empathy, rather than directly spurring helping behavior.

The BNs largely aligns with the undirected network patterns while revealing more nuanced and culture-specific pathways. First, the BN network confirmed the pattern in previous undirected network, revealing the absence of any self-compassion component influencing prosocial behavior in either cultural group. This is inconsistent with given theoretical proposals that caring for oneself should enable compassion for others, and empirical correlations between self-compassion and prosocial dispositions (Neff, 2009; Yang et al., 2019). Our results suggest that, when considering all components together, self-compassion in and of itself did not drive altruistic action for these adolescents. This finding is in line with longitudinal evidence, indicating that while self-compassionate youth tend to be more empathetic and socially connected, self-compassion alone may not spur increased helping unless empathy toward others is also activated (Marshall et al., 2019).

Second, compassion for others components showed strong connection with prosocial behaviours. To illustrate, In both the US and HK samples, kindness toward others emerged as a direct factor to prosocial behavior. However, the mechanisms linking compassion and prosocial behaviour differed between the two cultural contexts. In the HK network, the network suggests that kindness has a dual influence on prosocial behavior: kindness → prosocial behavior (a direct path), and an indirect route kindness → mindfulness → prosocial behavior. In other words, HK adolescents who are kinder and more compassionate to others not only tend to help more directly, but their kindness also seems to foster greater mindfulness, which in turn promotes prosocial action. By contrast, the US network showed a reversed ordering between mindfulness and kindness: the sequence was mindfulness → kindness → prosocial behavior, complemented by a direct path from mindfulness to prosocial behavior. Thus, for US adolescents, higher mindfulness appears to lead to greater kindness, which then translates into helping, with mindfulness also independently encouraging prosocial acts.

Paul Gilbert’s Compassionate Mind model provides a theoretical lens to understand why both culture-specific pathways are plausible (Gilbert, 2014). Gilbert regards compassion as a motivation rooted in our caregiving system, supported by distinct competencies such as

attention and emotion regulation. In this model, compassion arises when a caring motive is guided by cognitive skills like mindfulness and perspective-taking. Gilbert distinguishes between motivational attributes of compassion (e.g. a kind, caring orientation) and attentional competencies (e.g. mindful awareness of suffering). This distinction helps explain the different directional patterns observed in HK and US sample. In the HK BN network, kindness precedes mindfulness and prosocial behavior, suggesting that a strong caring motivation activates attentional skills and leads to helping acts. From Gilbert's perspective, a prior motive of kindness can orient one's attention toward others' needs, manifesting as engaging mindfulness in the service of compassion. Indeed, research found that practicing kindness-focused compassion can enhance mindfulness. For example, multiple kindness-intervention studies found increased mindfulness levels in participants (Crego et al., 2025). As caring motivation grows, adolescents may become more attuned to others' distress, facilitating prosocial behavior. Conversely, in the US network, mindfulness precedes kindness and prosocial behavior, a pattern also consistent with Gilbert's model. Here the initial driver is an attentional competency (i.e., mindfulness), which can foster the emergence of kindness. Research in Western samples confirms that increasing mindfulness tends to increase compassionate feelings and altruistic action. Mindfulness training enhances emotion regulation and empathy, often leading to greater kindness and helping behavior (Iwamoto et al., 2020). Thus, Gilbert's framework accommodates both pathways, where compassion can be initiated by nurturing a caring motive or by cultivating attentional skills first, and both pathways allow individuals to engage in more prosocial behaviour.

Furthermore, the contrast between the HK and US pathways likely reflects deeper cultural orientations that shape the entry point into prosocial behaviour. Collectivist cultural contexts emphasize compassion as a normative duty, which is an expected moral obligation to care for others (Zhou et al., 2023). This makes a caring motivation more primary in driving prosocial behavior. Indeed, from an early age, individuals in collectivist societies are socialized to prioritize others' needs and uphold interpersonal harmony. Cross-cultural research shows that people in cultures influenced by Confucianism or other collectivist traditions tend to view helping others as a moral imperative rather than a personal choice. For instance, one study found that participants from collectivism culture were far more likely than those from individualism culture to help even in minor need situations, reflecting a broader sense of social responsibility (Aydinli et al., 2013). Furthermore, a study of mainland Chinese adolescents found that filial piety strongly predicted their voluntary service and helping behavior, both directly and by first increasing empathy (Zhang et al., 2024). In these contexts, compassion is culturally imbued as a responsibility, where adolescents develop a genuine motivation to be kind and caring because it is the "right thing to do" for family and community. Given that motive, they then engage prosocial behaviour to effectively carry out that duty.

By contrast, individualist cultural contexts place greater emphasis on personal agency, emotional self-regulation, and attentional control as foundations for pro-social growth (Leersnyder et al., 2013). In these societies, compassion is often seen as a desirable personal quality but not strictly obligatory. Prosocial behavior tends to be self-initiated, driven by individual values or personal fulfilment rather than enforceable duty (Lampridis & Papastylianou, 2014). For many Western adolescents, developing compassion begins with working on oneself, involving learning to manage one's emotions, expanding one's empathy, and paying mindful attention to others. Emotional regulation skills like mindfulness are heavily emphasized in Western educational and therapeutic programs as a gateway to kindness (Flook et al., 2015). Culturally, individualistic norms encourage people to choose compassionate action out of personal principle or growth. Research indicates that in individualist contexts, prosocial actions are often motivated by internal rewards, such as feeling good or authentic when helping (Liao et al., 2022). Thus, adolescents might first engage in mindfulness or

reflection to become aware of others' suffering and overcome self-focus, which in turn sparks genuine kindness. Research studies found that mindfulness practices in Western samples reliably increase empathic concern and caring behavior. For example, American adults who underwent mindfulness meditation training showed significantly higher compassionate responses to others' pain compared to controls (Condon et al., 2013). Furthermore, in a cross-cultural study, dispositional mindfulness had a stronger effect on altruistic behavior in a more individualistic sample, suggesting that when cultural norms do not mandate compassion, those with greater mindfulness are especially likely to choose kindness (Li et al., 2024). Therefore, the individualist cultural context makes mindfulness a critical entry point into compassion, which is a tool for individuals to broaden their concern beyond the self. Once mindful awareness is cultivated, it can activate compassionate motivations and yield prosocial behaviours.

5. Implications

This study yields several theoretical insights into compassion and prosocial behavior, particularly by illuminating cultural nuances. First, the findings refine classic models like the empathy–altruism hypothesis and Gilbert's Compassionate Mind model (Batson et al., 2015). We provide network-based evidence that compassion for others (especially empathic kindness) is a proximal driver of prosocial action, supporting Batson's premise, but we also show this mechanism is moderated by cultural context. In the individualistic US setting, mindfulness functions as the primary motivator of helping, consistent with Western theories that emphasize personal empathic concern as the catalyst for altruism. In collectivistic HK, however, kindness precedes mindfulness as important prerequisites for consistent prosocial behavior. This suggests that existing theories should consider that in cultures where kindness toward others is a strong social norm, variation in prosocial behavior relies on the strength of caring motivation, with mindfulness serving a supporting role rather than the primary driver.

Second, the cultural contrast in the kindness and mindfulness sequencing offers a theoretical contribution to understanding how compassion is activated. It aligns with the notion that cultural worldviews shape the dominant "entry points" of prosocial processes (Shukla et al., 2022). Western models of prosocial development often assume that increasing mindfulness or perspective-taking will naturally foster empathic concern and. Our U.S. data support this by indicating that mindfulness was the origin of the causal chain. Conversely, the Hong Kong model fits theories of an interdependent self, where motivation to care for others is deeply ingrained and what may be needed is the personal insight or balance to act on it. This implies that theories of compassion should be flexible – the "compassionate path" to altruism may commence at different points (motivation-first vs. awareness-first) depending on cultural socialization. Such a view is consistent with emerging cross-cultural psychology perspectives that caution against one-size-fits-all models of socioemotional development (Matsumoto et al., 2008).

Finally, from a methodological standpoint, this research demonstrates the value of a systems approach to positive psychology constructs. By using a Bayesian network, we treated self-compassion, compassion for others, and prosocial behavior as an interdependent system rather than isolated predictors. The resulting model provides theoretical nuance, revealing causality and mediating chains that traditional linear models might overlook. This lends support to theoretical models that conceptualize compassion as a dynamic network of mutually influencing components (Ferrari et al., 2022).

Practically, the insights from this study can inform interventions and youth programs aimed at fostering prosocial behavior. One clear implication is the importance of cultivating kindness and empathic concern for others as a route to increase altruism, especially in Western contexts. Given that compassion for others (kindness) showed to be the main direct predictor

of helping behavior in the US, interventions like empathy training, compassionate imagery, or loving-kindness meditation could be particularly effective in motivating adolescents to engage in prosocial acts (Ashar et al., 2021; Flook et al., 2015). Whereas in HK, our results suggest that encouraging self-compassion and mindful balance in youth could be a key supplement to traditional altruism education. Interventions that teach adolescents how to be kind to themselves in times of failure and how to mindfully manage their emotions might strengthen their capacity to help others sustainably. For instance, incorporating mindfulness and self-compassion training into school well-being programs could provide students with tools to handle stress and social disconnection, thereby indirectly supporting their prosocial engagement (Bluth et al., 2015). Importantly, a culturally sensitive approach is warranted. Western programs might focus first on nurturing empathy and kindness outwardly, whereas East Asian programs might place relatively more emphasis on building internal resilience and mindful self-regulation as a support for compassionate action. Policymakers and educators can draw on these insights to tailor social-emotional learning curricula that resonate with the cultural values and psychological drivers of their student populations.

6. Limitation

While this study offers valuable insights into the cultural dynamics of compassion and prosocial behavior, there are several limitations that need to be considered when interpreting the results. First, the cross-sectional design of the study limits our ability to infer causal relationships. While Bayesian network analysis suggests potential causal pathways, the absence of longitudinal data means that we cannot definitively establish the direction of influence between compassion constructs and prosocial behavior. Future research using longitudinal data could provide a clearer understanding of how these relationships evolve over time. Second, the study relies on self-report measures for both self-compassion and compassion for others, which can be prone to social desirability biases. Adolescents may underreport negative feelings such as self-criticism or overreport positive behaviors like helping others, which may influence the accuracy of the reported relationships. Including other forms of data, such as behavioral observations or peer reports, could complement self-reports and provide a more comprehensive view of adolescents' prosocial behavior. Finally, while the Bayesian network approach offers several advantages in capturing the complex interdependencies between variables, it assumes that the relationships in the model are accurately specified. There is always the possibility of omitted variables or confounding factors that may influence the results. Future research could address these limitations by using more diverse data sources and experimental designs to better understand the intricate dynamics of compassion in different cultural contexts.

7. Conclusion

In conclusion, this study highlights the complex and culturally specific relationships between self-compassion, compassion for others, and prosocial behavior in adolescents from the United States and Hong Kong. By employing Bayesian network analysis, we revealed that while compassion for others plays a central role in prosocial behavior in both cultures, the mechanisms differ dramatically. These findings contribute to our understanding of how compassion functions as a dynamic, culturally sensitive system, offering practical implications for designing compassion-based interventions tailored to cultural contexts.

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Appendix

Table 5. Mean and Standard deviation

Variable	<i>Mean</i>	<i>sd.</i>
SCSY_sk	9.5884	2.7432
SCSY_sj	8.0333	3.29218
SCSY_cm	9.2196	2.84645
SCSY_i	8.505	3.04608
SCSY_m	9.6597	2.67835
SCSY_o	5.2806	2.19339
CS_K	14.4518	4.14283
CS_CM	14.1366	3.90295
CS_M	14.4194	3.97294
CS_I	13.5067	3.9459
PSA total	56.3372	13.92856

Table 6. Correlation among 11 variables

	1	2	3	4	5	6	7	8	9	10	11
1. SCSY_sk											
2. SCSY_sj	.253**										
3. SCSY_cm	.607**	0.016									
4. SCSY_i	.111**	.685**	-.089**								
5. SCSY_m	.619**	.085**	.581**	-0.006							
6. SCSY_o	.180**	.720**	-0.018	.694**	.062**						
7. CS_K	.216**	-.118**	.236**	-.079**	.240**	-.124**					
8. CS_CM	.260**	-.070**	.322**	-.049*	.307**	-.082**	.711**				
9. CS_M	.208**	-.120**	.212**	-.066**	.254**	-.111**	.830**	.746**			
10. CS_I	-.118**	.138**	-.071**	.201**	-.124**	.129**	0.018	-.110**	-0.021		
11. PSA total	.302**	-.058**	.303**	-0.03	.299**	-.057**	.744**	.628**	.703**	-0.015	

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

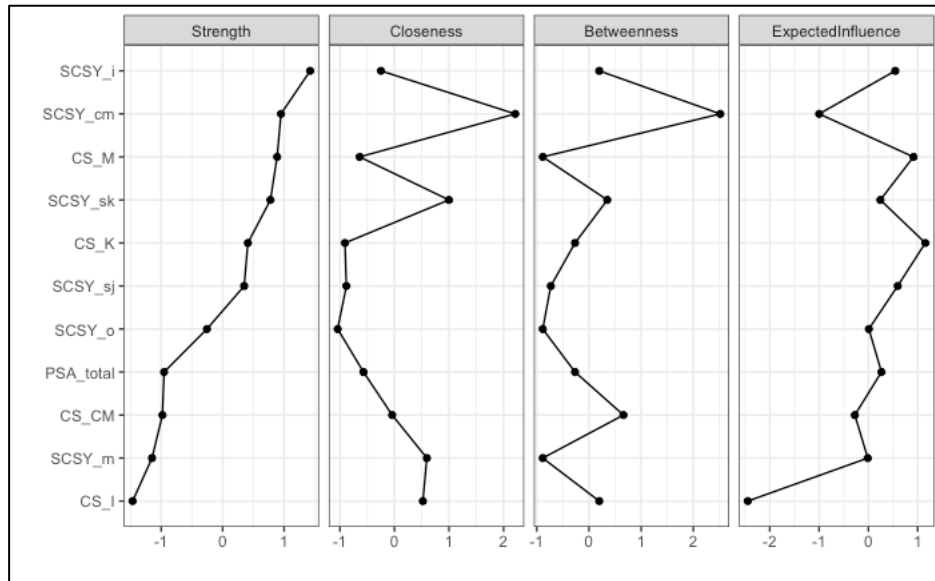


Figure 6. Plot of the standardized centrality metrics (strength, closeness, betweenness) for 11 variables in HK sample. The y-axis represents the subscale of self-compassion, compassion for others, and prosocial behaviour while the x-axis represents the standardized values of centrality metrics.

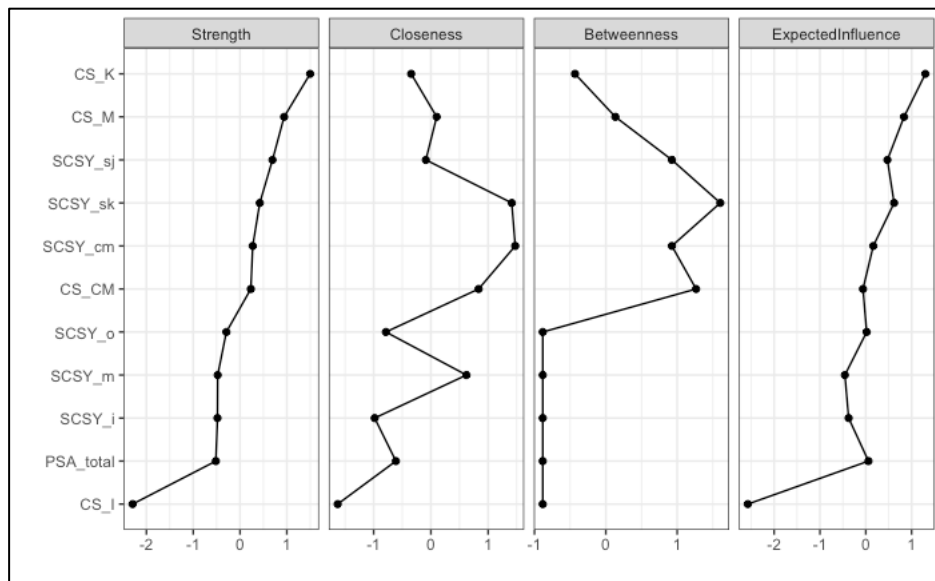


Figure 8. Plot of the standardized centrality metrics (strength, closeness, betweenness) for 11 variables in the US sample. The y-axis represents the subscale of self-compassion, compassion for others, and prosocial behaviour while the x-axis represents the standardized values of centrality metrics.

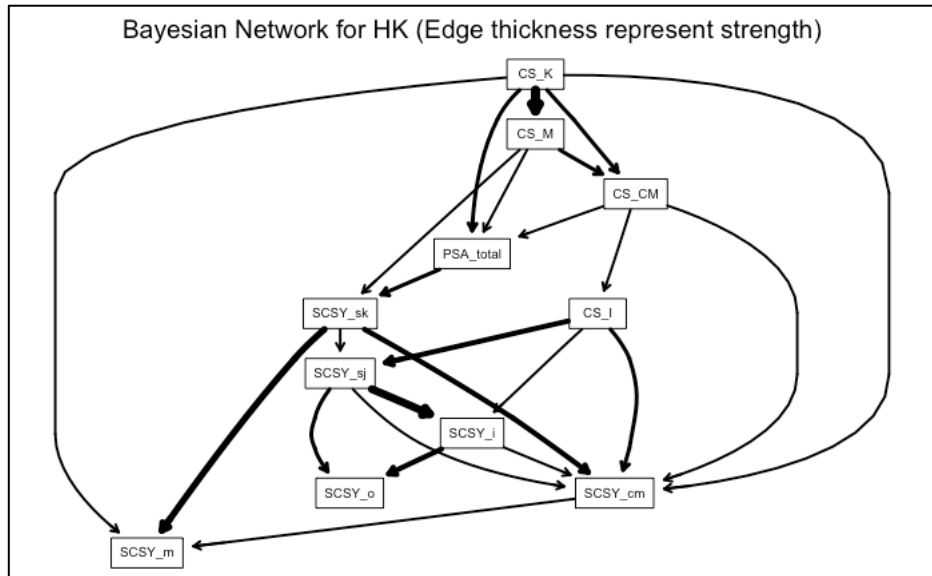


Figure 9. Bayesian Network for HK

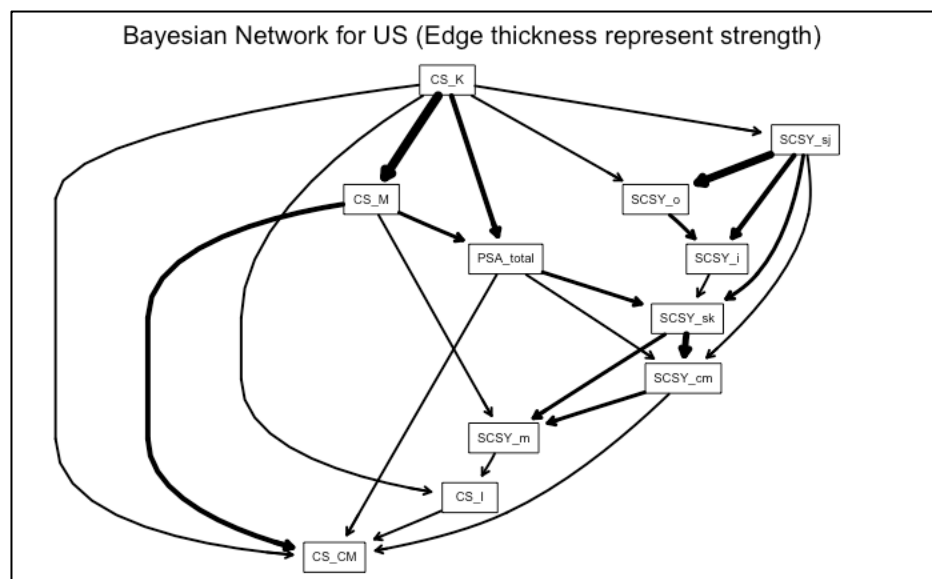


Figure 10. Bayesian Network for US

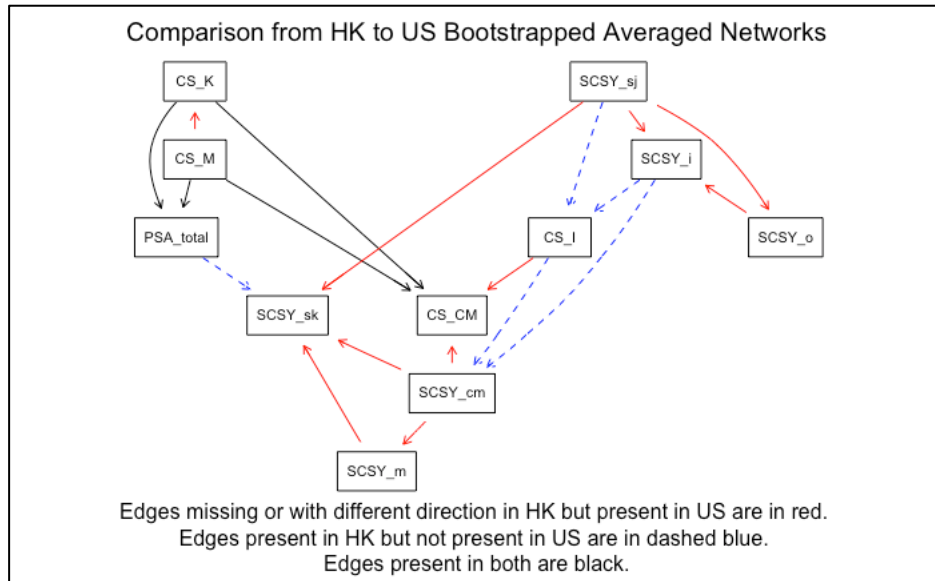


Figure 11. Cross-Cultural Differences in Self-Compassion and Prosocial Behavior Network Structure: Bootstrapped Averaged Bayesian Network Comparison Between US and Hong Kong (Comparison from Hong Kong to US perspective)

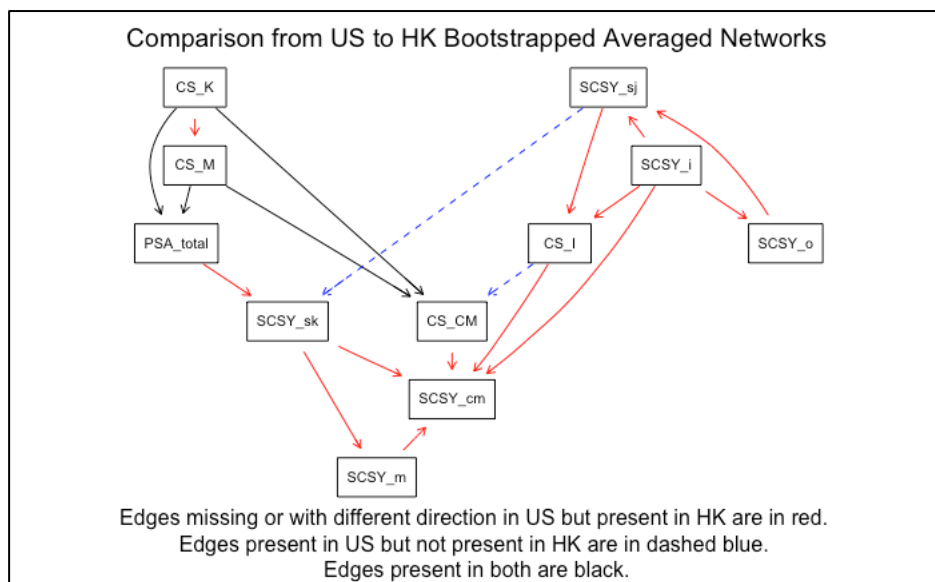


Figure 12. Cross-Cultural Differences in Self-Compassion and Prosocial Behavior Network Structure: Bootstrapped Averaged Bayesian Network Comparison Between US and Hong Kong (Comparison from US to Hong Kong perspective)