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Just Deal With It: A Network Analysis of Resilience, Coping, and Sense of Belonging Among Children

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Abstract
When considering developmental psychology three concepts stand out; (1) resilience: the resistance to stress, (2) coping: the strategies used to reduce stress, and (3) sense of belonging: the connectedness towards peers. Although all three concepts are important for a child's development, the academic literature lacks research on the interrelations and interplay between them. This study employed network analysis to investigate the interplay between resilience, coping, and sense of belonging in children. Three hundred and seventy-three children (aged 10-12; 51% boys, 49% girls) completed a pen-and-paper survey including the Resiliency Scales for Children and Adolescents (RSCA), Coping Orientation to Problems Experienced (Brief-COPE), and PISA sense of belonging scale. Results revealed resilience to be associated with both coping and sense of belonging, yet weaker associations emerged between coping and sense of belonging. Three striking node patterns of high interconnectedness were revealed that further deepen our understanding of the interplay between these concepts. Implications for research and practice and limitations of the current study are discussed.

Keywords
Resilience, coping, sense of belonging, network analysis, primary school

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Children need to learn from an early age that not everything can go their way. Fortunately, some children have more effective ways to deal with stressors than others (Brown, 2019). Cheung and colleagues (2013) assert that, among other factors, a child's stress management comes down to their resilience, coping, and sense of belonging.

Resilience is an important factor that influences the way a child deals with stressful situations. It is generally characterized as the ability to resist when facing a stressor, as well as, to recover from its exposure (Rosenberg et al., 2019; Zolkoski & Bullock, 2012). Additionally, resilience is assumed to be a natural protective system that both shields one in the face of stressors and facilitates recovery after loss or failure (Masten & Narayan, 2012). Prince-Embury (2008) asserts that resiliency is comprised of three intra- and interpersonal working mechanisms: Sense of Mastery (SoM) refers to the child's belief in their ability to solve problems and influence future outcomes. Sense of Relatedness (SoR) is comprised of the social aspect of resilience, specifically their ability to establish and maintain social relationships, feeling of being supported, and experiences of trust in relationships. Thirdly, Emotional Reactivity (ER) describes a child's emotional response when facing stressful situations in terms of overall emotional sensitivity, the time needed to recover, and the level of impairment during the stressful event (Prince-Embury, 2008). Generally, SoM and SoR can be characterized as protective factors in that they can act as a buffer against negative life experiences (Rak & Patterson, 1996; Walsh et al., 2020), while ER is seen as a potential risk factor since it can impede one's positive development (Prince-Embury & Saklofske, 2013). For example, if a child has high levels of SoM and SoR, and low levels of ER, they would be considered resilient as these factors would most likely lead to these children being able to endure setbacks, recover from stress faster, and develop positively. Moreover, there are long-term benefits of being resilient such as lower risks of mental health problems and higher levels of psychosocial skills (Mesman et al., 2021; Tang et al., 2021).

Next to resilience, coping plays a crucial role in how a child deals with stressful situations (Fenwick-Smith et al., 2018; Stelzig & Sevecke, 2019). Coping can be defined as the use of cognitive and behavioral efforts to manage external demands that are perceived as burdensome and potentially exceeding one's resources (Folkman et al., 1991; Stelzig & Sevecke, 2019). However, these cognitive and behavioral efforts can be both adaptive and maladaptive depending upon the outcome and situation (Folkman et al., 1991; Stelzig & Sevecke, 2019). Moreover, coping strategies can also be viewed as either problem-focused, emotion-focused, or avoidant (Baker & Berenbaum, 2007; Hampel & Petermann, 2005). Problem-focused coping encompasses active efforts aimed at reducing one's tension stemming from a stressful situation (Folkman et al., 1991). On the other hand, emotion-focused coping encompasses efforts that aim to reduce one's emotional reaction to the situation by employing humor or seeking emotional support (Baker & Berenbaum, 2007). Finally, avoidance coping consists of efforts that aim to circumvent having to deal with stressful situations by engaging in procrastination, passive-aggressiveness, and rumination (Elliot et al., 2011).

Besides the cognitive and behavioral efforts that one can employ to deal with stressful situations, the degree to which one feels connected (SoB) can play a crucial in one's stress management, as well as, psychosocial development (Kayama & Yamakawa, 2020; Organization for Economic Cooperation and Development [OECD], 2019). SoB can be described as the extent to which an individual feels personally involved in social relations and this can lead one to have a sense of being an "integral part of that system or environment" (Hagerty et al., 1992, p. 173). The development of and the increasing importance of social relationships in childhood exemplify the cruciality of feeling connected and building and maintaining relationships in this critical developmental period (Capone et al., 2018; Villarroel et al., 2021). The lack of belonging, in other words, alienation, has been linked to negative consequences in terms of one's group identity and group position (Newman & Newman, 2001).

While resilience, coping, and SoB appear to be highly interrelated, research suggests these concepts are in fact distinct (Rice & Liu, 2016; Van der Hallen et al., 2020). Some researchers have suggested that resilience should be viewed as a moderator between coping and positive and negative development outcomes (Leipold et al., 2019), while others argue that resilience is a predictor of coping (Pidgeon & Pickett, 2017). Looking at SoB, high levels of resilience have been positively associated with SoB (Chassin et al., 2004). Equally, adaptive coping strategies have been shown to be supportive of higher levels of SoB (Wilczyńska et al., 2015). Taking these studies into account, SoB seems to play a crucial role in

both being resilient as well as choosing to employ certain coping strategies (Nuttman-Shwartz, 2019; Sulimani-Aidan & Tayri-Schwartz, 2021). This being said, there appears to be a scarcity of studies that have specifically investigated these three concepts together.

Network analysis (NA) is a powerful analysis method to investigate relationships between complex concepts broken down to the level of sub-concepts or symptoms, which are then conceptualized as nodes and visualized in a network (Epskamp et al., 2018). Between all nodes, statistical parameters such as partial correlations are estimated. In clinical psychology research, the technique has been employed to investigate the interrelatedness between the complex symptomatology of psychological disorders such as posttraumatic stress disorder and depressive symptoms (Armour et al., 2017; Isvoranu et al., 2021). Besides displaying the network's topology and node relationships, individual nodes that play an important role in the network can be highlighted via centrality indices (Hevey, 2018). Additionally, bridging nodes can be identified that play a crucial function in connecting different nodes in the network (Hevey, 2018). Conducting cross-sectional network analysis has the potential to shed light on important connections of sub-concepts in a bottom-up fashion. This exploratory investigation is devoid of any a priori assumptions or hypotheses as to the eventual network configuration.

Aim of the Current Study

The current study aims at exploring the relationship between resilience, coping, and SoB among children by employing a cross-sectional NA approach. By identifying patterns of high interconnectedness and particularly bridging or central nodes in the network, a meaningful picture of the relationship between the research concepts can be derived. Insight into the inter-relationships between resilience, coping and SoB can crucially inform and deepen our insights into these highly relevant concepts in developmental psychology. By doing this, the findings of the present study could act as a guide for future clinically relevant research. Additionally, by getting a grasp on where the connection happens between resilience, coping, and SoB, the formulation of new evidence-based interventions (e.g., at school) can be advanced.

Methods

Procedure and Participants

The study procedure was approved by the Ethics Review Board of the Erasmus University Rotterdam, Netherlands (EC 20-003). Elementary schools were recruited via their school districts and written parental consent was arranged through the participating schools. $N = 373$ elementary school-aged children, located in the Netherlands, participated in this research study ($n = 190$ [50.9%] identified as boys, $n = 183$ [49.1%] identified as girls). All children were either six (33.5%), seven (35.4%), or eighth graders (31.1%), between the ages of 10-12 years old. About one in five participants ($n = 74$ [19.8%]) reported a migration background, that is that either their mother, their father, they themselves were not born in the Netherlands.

Measurements

The survey contained demographic items as well as the Resiliency Scales for Children and Adolescents (RSCA; Prince-Embury, 2008), the Coping Orientation to Problems Experienced Inventory (Brief-COPE), and the PISA Sense of Belonging scale (OECD, 2019).

The Resiliency Scales for Children and Adolescents (RSCA; Prince-Embury, 2008), consists of 64 statements. The RSCA features a three-factor model with 10 subscales including SoM (Optimism, Self-efficacy), SoR (Trust, Support, Comfort, Tolerance), and ER (Sensitivity, Recovery, Impairment). Each statement can be answered using a 5-point Likert scale, ranging from 0 (never) to 4 (almost always). The Adaptability subscale was not administered given that this subscale has been previously deemed too be inappropriate for this age range (Prince-Embury, 2008). To assess the internal consistency, Cronbach's alpha was calculated for each of the subscales, ranging between .67 and .88, indicating acceptable reliability.

The Brief-COPE (Carver, 1997) contains 28 statements on a wide range of different coping strategies. All 28 statements result in 14 two-statement subscales: Active Coping, Planning, Positive Reframing, Acceptance, Humor, Religion, Use of Emotional Support, Use of Instrumental Support, Self-distraction, Denial, Venting, Substance Use, Behavioral Disengagement, Self-blame. Each statement (e.g., "I try and get help and advice from

other people") can be answered on a 4-point Likert scale, ranging from 1 (I haven't been doing this at all) to 4 (I've been doing this a lot). To test the internal consistency of the subscales, the Spearman-Brown correlation was calculated for each two-item scale (Eisinga et al., 2013), ranging between .02 and .71 (see Data Analysis).

The PISA SoB scale (OECD, 2019) consists of six statements (e.g. "I make friends easily at school") and assesses the level to which children feel that they belong or feel alienated from their peers at school. Each statement can be answered using a 4-point Likert scale, ranging from 1 (never) to 4 (almost always). One item was not administered ("I feel lonely at school") per request of the Ethical Committee as it may prove too confronting for this age range. To assess the internal consistency, Cronbach's alpha was calculated for each of the subscales, ranging between .74 and .75, indicating acceptable reliability.

Data Analysis

The data was analyzed using the open-source software R, version 4.1.4, including the following packages: qgraph, psych, bootnet, networktools, and ggplot2 (Epskamp et al., 2012; Jones, 2017). First, the network was estimated and visualized. Next, centrality and bridge indices were examined. Finally, the network's stability and accuracy were evaluated. Subscales Self-distraction, Denial, and Venting of the Brief-COPE were not included in the analysis due to a low Spearman-Brown correlation ($r < .60$).

Network Estimation and Visualization. To visualize the relationship between coping, resilience, and SoB, the 10 subscales of the COPE, nine subscales of the RSCA, and two subscales of the PISA SoB scale were used as nodes in a united partial correlation network, featuring a total of 21 nodes. Partial correlations were estimated between these nodes, referred to as "edges". The edges were estimated with a graphical Least Absolute Shrinkage and Selection Operator (short: gLASSO). The Extended Bayesian Information Criterion (short: EBIC) was used with a tuning parameter of .25 determining how strong an edge must be to be shown (Hevey, 2018).

Centrality and Bridge Centrality Indices. To evaluate how important a node is to the network's structure, seven centrality indices were investigated. First, degree centrality was assessed, which is the number of connections that a node has to other nodes of the network (Hevey, 2018). Next, node strength, node closeness, and node betweenness were assessed. Of those indices, node strength is the most meaningful, deserving the most attention when assessing a node's centrality. Node strength is calculated by adding all absolute edge values that are connected to the corresponding node and refers to the direct influence that a node has (Dalege et al., 2017). Node closeness describes how close a node is to all other nodes in the network by summing up the shortest path lengths that a node can have to other nodes (Dalege et al., 2017). High closeness therefore also indicates high centrality. Node betweenness refers to the extent of how disruptive a node is to other shortest path connections of the network by lying on them (Dalege et al., 2017). After, the bridge centrality indices of bridge strength, bridge expected influence one-step, and bridge expected influence two-step were estimated. These three indices describe how connected a certain node of one concept is with the nodes of other concepts (Jones, 2017). For that, the nodes are grouped into communities with respect to the concept they originate from. Bridge strength is computed by adding all absolute edge values of edges that a certain node shares with nodes of other concepts (Jones, 2017). Bridge expected influence one-step is the sum of all edges that are connected to the corresponding node; bridge expected influence two-step measures the same as bridge expected influence one-step, yet it also includes the sum of all edges that are up to two edges away from the corresponding node (Jones, 2017).

Network Stability. To assess the network's stability and thus the interpretability of the results, three different bootstrap procedures were conducted (1,000 iterations each). First, edge weight variation was tested by bootstrapping within 95% of the confidence intervals. Secondly, the significance of edge and node strength differences were assessed. Thirdly, a correlation stability analysis was performed, determining the correlation-stability (CS) coefficient for the centrality indices node strength, node betweenness, node closeness, and bridge strength.

Results

Network Estimation and Visualization

To investigate the relationship between resilience, coping, and SoB, a partial correlation network was estimated, featuring the subscales of the RSCA, the Brief-COPE, and the PISA SoB scale as nodes (see Fig. 1).

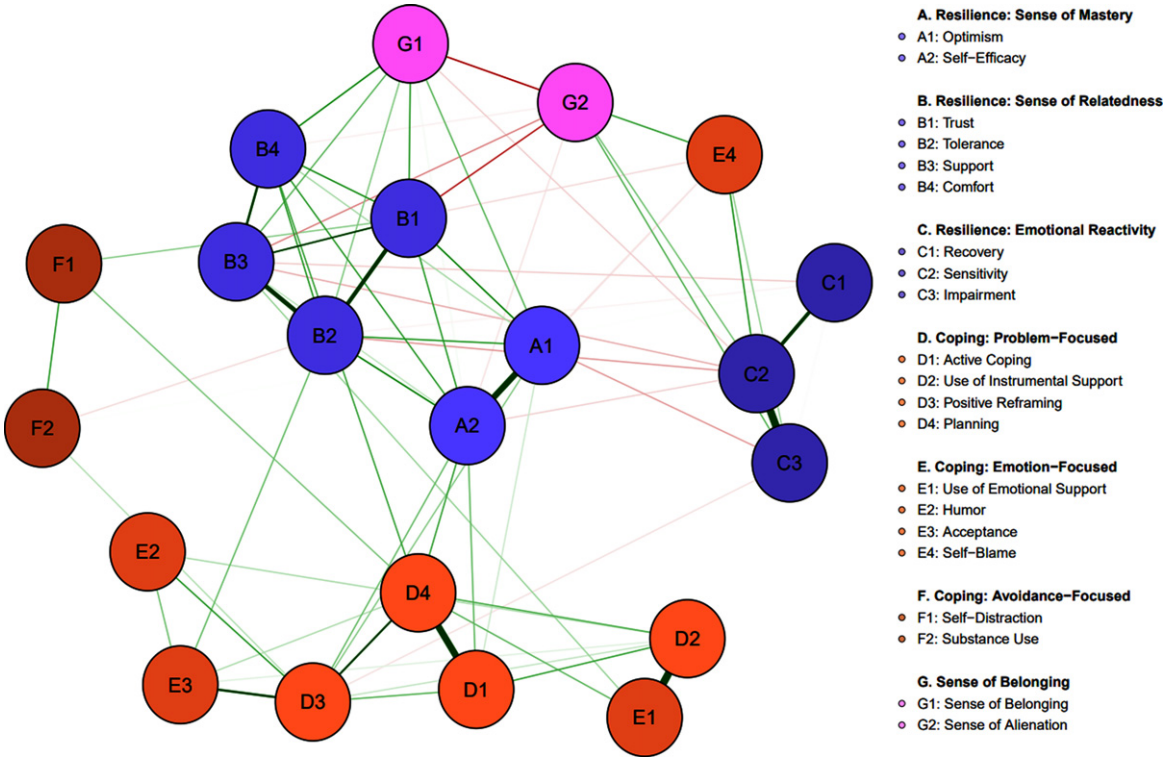

Fig. 1. Visualized partial correlation network.
Note. Visualized partial correlation network of resilience (A1-C3), coping (D1-F2), and SoB (G1-G2). The lines between the nodes represent edges, green represents a positive association and red represents a negative association. The thicker the line, the stronger the partial corrections for that edge. The absence of an edge indicates no correlation between the respective nodes when controlling for all other nodes in the network.

Across the network, 21 nodes were connected by 67 out of 210 (31.9%) possible edges. Of those, 44 arose within the three research domains resilience, coping, and SoB, while 23 were bridging edges between them. Regarding their partial correlations, the edges that were identified within coping, resilience, and SoB were overall stronger than the edges that emerged as bridges between the three concepts. For exact edge weights, see Fig. 4 in the supplementary material. Bridging all three research concepts, one pattern of four nodes arose indicating high interconnectedness, namely with six out of six (100%) possible, positively weighted edges: Sensitivity (C2), Impairment (C3), Self-Blame (E4), and Sense of Alienation (G2).

Regarding the connection between resilience and coping, the nine resilience nodes were connected to the ten nodes of coping by 14 out of 90 (15.5%) of the possible bridging edges. Bridging these concepts, one pattern of four highly interconnected nodes arose: Optimism (A1), Self-Efficacy (A2), Active Coping (D1), and Planning (D4) were connected by five out of six (83.3%) of the possible edges. Bridging resilience and SoB, the nine resilience nodes shared eight out of 18 (44.4%) of the possible edges with the two SoB nodes. SoB's nodes Belonging (G1) and Alienation (G2) are particularly connected to the resilience nodes Trust (B1), Tolerance (B2), Support (B3), and Comfort (B4). Within this pattern, 13 out of the possible 15 (86.7%) edges arose. Coping and SoB were only connected through one out of 20 (5%) possible bridging edges, namely Self-blame and Alienation (E4-G2).

Within resilience, 9 nodes were connected by 20 out of 36 (55.5%) of the possible edges. Optimism (A1), Self-Efficacy (A2), Trust (B1), Tolerance (B2), Support (B3), and Comfort (B4) were highly intercorrelated, sharing only a few negative edges with Recovery (C1), Sensitivity (C2), and Impairment (C3). Across the coping nodes, 19 out of the possibly 45 (42.2%) edges emerged. The majority of these nodes appeared as an interconnected structure, consisting of Active Coping (D1), Use of Instrumental Support (D2), Positive Reframing

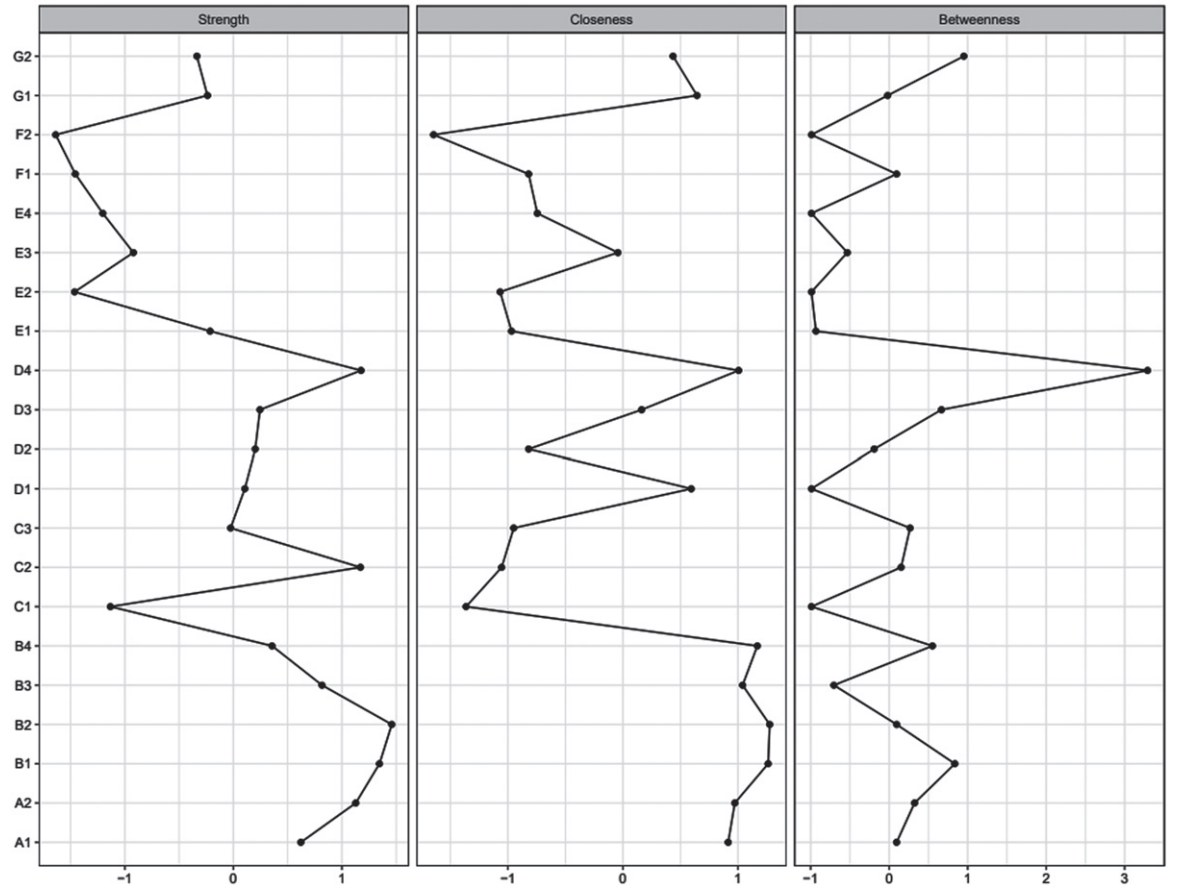

Fig. 2. Visualization of the centrality indices node strength, closeness, and betweenness.
Note. Node strength, node closeness, and node betweenness of all 21 nodes of the network. On the X-axis, values are expressed in standardized z-scores. For an explanation of the abbreviations on the Y-axis, see the legend in Fig. 1.

(D3), Planning (D4), Use of Emotional Support (E1), Humor (E2), and Acceptance (E3). Self-distraction (F1), Substance Use (F2), and Self-Blame (E4) only shared a few, mostly weak edges with the other coping nodes. Within SoB, the two nodes Belonging and Alienation were connected through one edge (G1-G2).

Centrality and Bridge Centrality Indices

To investigate which nodes were most important for the network's structure, centrality indices and centrality bridge indices were estimated for all nodes of the partial correlation network. This was done in three steps. First, degree centrality, the number of connections that a node has to other nodes of the network, was assessed. Among all nodes of the network, Self-efficacy (A2), Planning (D4), Belonging (G1), Self-blame (E4), and Comfort (B4) had the highest number of edges with other nodes in the network. Next, node strength, betweenness, and closeness were estimated, see Fig. 2.

High values of node strength indicate influential nodes (Opsahl et al., 2010). The strongest nodes in the network were the resilience node Tolerance (B2), the coping node Planning (D4), and the resilience node Sensitivity (C2). The highest node closeness was indicated by the resilience nodes Comfort (B4), Tolerance (B2), and Self-Efficacy (A2). Node betweenness was highest for the coping nodes Planning (D4) and Positive reframing (D3), followed by the resilience node Comfort (B4).

Thirdly, the bridge centrality indices, bridge strength, bridge expected influence (1-step), and bridge expected influence (2-step) were estimated, see Fig. 3. The nodes with the highest bridge strength

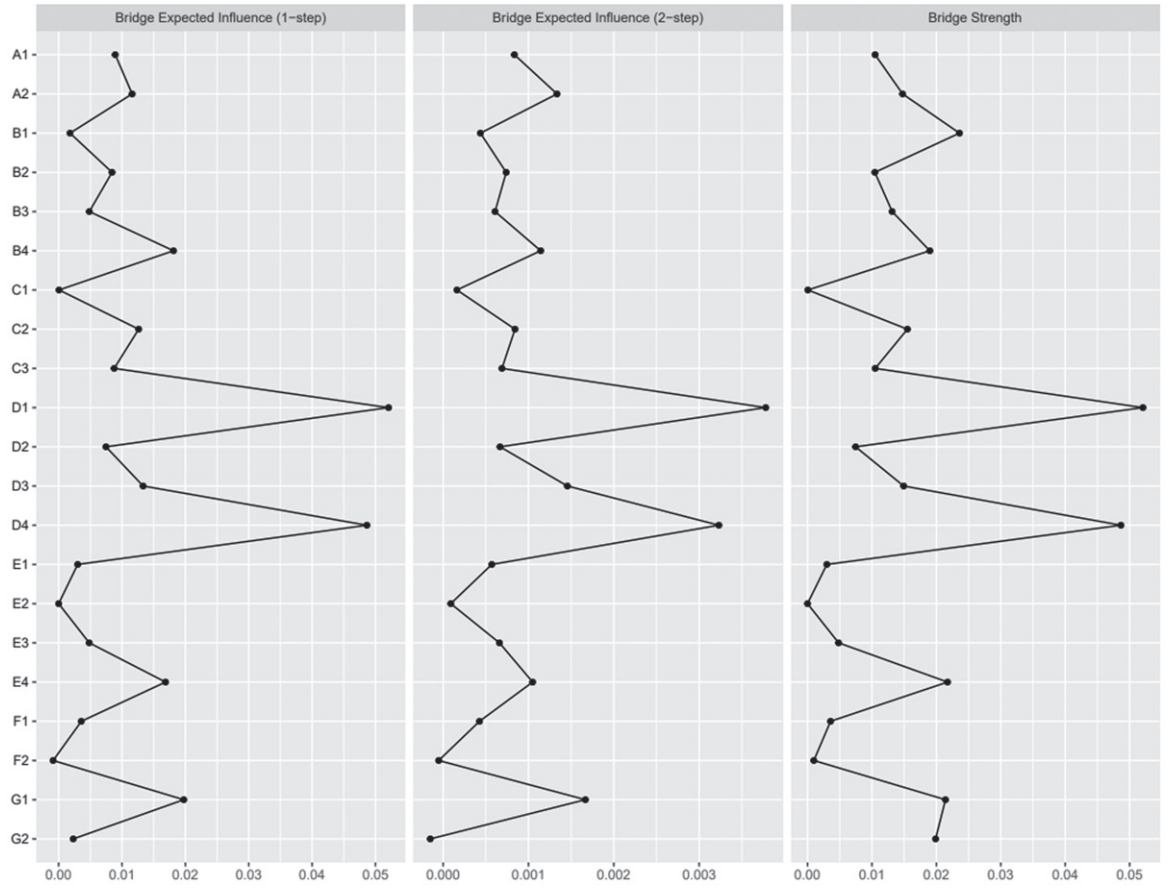

Fig. 3. Visualization of the bridge centrality indices bridge expected influence (1- and 2-step) and bridge strength.
Note. Bridge expected influence (1-step), bridge expected influence (2-step), and bridge strength for all 21 nodes of the network. On the X-axis, values are expressed in standardized z-scores. For an explanation of the abbreviations on the Y-axis, see the legend in Fig. 1.

were the coping nodes Active Coping (D1), Planning (D4), and the SoB node Belonging (G1).

Network Stability

To test whether the estimation of the partial correlation network was accurate and stable, three non-parametric bootstrap procedures were performed for edge weight variation, the significance of edge weight and node strength differences, and correlation stability for the three centrality indices node strength, bridge expected influence and bridge strength. For each, a new bootstrap sample was created through re-sampling 1,000 iterations within 95% of the confidence intervals of the respective measure. Overall, the undertaken measures indicate a stable and accurate network and good interpretability of the results. For the related figures and detailed explanations, see Figs. 5–9 in the supplementary material.

Discussion

The present study investigated the relationship between the concepts of resilience, coping, and SoB, among children using NA. Results revealed that resilience plays a central role in the network, linking both coping and SoB while also having the strongest nodes in the network. In contrast, coping and SoB were mostly unconnected. Aside from the resilience nodes, the coping node Planning (D4) proved to be a highly impactful node within the overall network. Three node patterns demonstrating high interconnectedness were revealed. These strongly demonstrate exactly where the three research concepts are connected at the level of sub-concepts. Besides that, the two coping nodes Active Coping (D1) and Planning (D4), were identified as the strongest nodes in bridging these research concepts.

When specifically investigating each research concept separately, the strong associations within the three resilience subscales SoM, SoR, and ER are in line with Prince-Embury's (2008) assertion that resilience is comprised of three factors. Moreover, the current study demonstrated that SoM and SoR are highly positively associated, while ER has a negative association with both SoM and SoR. This again is supported by research and theory that asserts that both SoM and SoR are protective factors, thus explaining their positive association. The strong positive connections between SoM and SoR suggest that both sub-concepts potentially foster each other, which has also been previously reported (Weiss, 2008). However, ER is generally characterized as a risk factor, this equally supports the negative association to both SoM and SoR (Furrer & Skinner, 2003; Murphy & McKenzie, 2016; Pitzer & Skinner, 2017).

Regarding coping, the overall positive associations among all the coping strategies suggest that access to one specific strategy would potentially create access to the other strategies as well. Equally, problem-focused coping strategies were strongly interrelated, appearing as one cluster. This indicates that for this specific population, it is the cluster of problem-focused coping strategies that is strongly associated with resilience and can thus play a central role in stress management. Moreover, this finding highlights the important role that problem-focused coping has in building up resilience in childhood as well as, also aligning with previous research (Leipold et al., 2019). Conversely, emotion-focused and avoidance coping strategies did not show such interconnectedness. However, both emotion-focused and avoidance coping strategies were connected to differing problem-focused coping strategies, contrary to previous research where emotion-regulation methods were linked to enhancing resilience in children (Prout et al., 2019).

For SoB, alienation and belonging appear grouped and negatively correlated, demonstrating alignment of this concept as asserted in previous research (Juvonen, 2006; OECD, 2019). Additionally, these two concepts appear as distinct variables within the network. This finding strongly supports the notion as well as, the inclusion of these concepts in this network as distinct concepts worth investigating within childhood development.

Focusing on the connections between resilience and coping, this study revealed that both concepts are intercorrelated, in line with previous research (Rice & Liu, 2016; Van der Hallen et al., 2020). Four concepts; Optimism (A1), Self-Efficacy (A2), Active Coping (D1), and Planning (D4) presented as bridging nodes with high interconnectedness. This demonstrates an important relationship between problem-focused coping strategies such as active coping and planning and the resilience factors optimism and self-efficacy. In other words, children's beliefs about their ability to perform certain coping strategies lead to higher levels of those behaviors, or conversely, successfully engaging in certain coping behaviors can lead to higher levels of believing one's capabilities and certain self-explanatory styles (Greenberg, 2006).

Focusing on the connections between resilience and SoB, this study revealed SoB's belonging was strongly associated with resilience nodes on trust, tolerance, support, and comfort. This implies that when one is feeling high levels of trust, tolerance, support, and comfort, this is then associated with a feeling of fitting in or being part of a system or group, in line with previous research (Juvonen, 2006; Nowicki, 2008). In other words, this study demonstrated that perceived higher levels of trust in terms of feeling seen and being accepted for who you are is associated with both higher levels of belonging as well as, lower levels of alienation. Equally, higher levels of comfort in the sense of feeling liked by the group and feeling at ease with new members is positively associated with higher levels of sense of belonging. Within the overall picture of resilience, SoB thus plays a crucial role due to its bridging connections among the different subconstructs of resilience.

Focusing on the interconnections between resilience, coping, and sense of belonging, this study revealed strong associations between the resilience risk factors (Sensitivity (C2), Impairment (C3)), avoidance coping (Self-Blame (E4)), and SoB in terms of alienation. While these associations are positive, their associations with other sub-concepts elsewhere in the network are negative. What emerges from these connections encapsulating risk factors can be described as the potential to increase the chances that life experiences or events will negatively affect one's development (Prince-Embury & Saklofske, 2013). In other words, children who are more sensitive to stressors and experience more impairment during stressful situations tend to employ higher levels of avoidance coping (self-blame) and this is associated with higher levels of feeling alienated in the classroom. These findings support previous research reporting the association between

self-blame and alienation (Bentley & Matthewson, 2020).

Limitations

This study contains new insights into how coping, resilience, and SoB are interrelated. However, caution should be taken in any potential inferences of casualty or the generalization of these results to other populations as well. This research is a cross-sectional investigation therefore no implications can be made about time-series associations between the research concepts. Future research could employ a time-series design to attempt to predict the research variables or investigate potential changes over time. Secondly, dividing the network's nodes into the according communities has not been driven by for instance using a priori factor analysis, the Fruchterman-Reingold algorithm, or exploratory graph analysis (Fried, 2016). This can be problematic if the visual clustering of the nodes is interpreted as a main point of interest, which was not the case in the present study. Instead, network analysis was used to reveal associations between the previously set communities, relying on the existing sub-concepts of resilience, coping, and SoB. The validation of these findings was addressed by different parameters of network stability, guaranteeing satisfying interpretability of the results. Another point worth mentioning is that the population of this study was elementary school-aged children in The Netherlands. Issues of generalization might arise when applying these results to different populations or cultures. Additionally, no inferences can be made as to the clinical status of these children since such data was not collected. Future research might benefit from gathering this data to investigate potential differential relationships among these concepts between different groups of children. Moreover, by including clinical status, additional, clinically relevant, implications might be identified to add insight into how coping, resilience and SoB are interconnected in a clinical sample.

Conclusions

The current study adds new insights concerning the complex relationship between coping, resilience, and SoB using NA. This study demonstrated within the three research concepts, resilience is central to the network, connecting coping and SoB. Moreover, key bridges identified in this study were problem-focused coping strategies; specifically bridging resilience and coping. Additionally, a strong conceptual connection between SoB was shared specifically for the sub-concept SoR of resilience. A strong node pattern containing four risk factors was also demonstrated in this study.

Supplementary Material

The supplementary material is available in the electronic version of this article: https://dx.doi.org/10.3233/DEV-221324.

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