A NETWORK ANALYSIS APPROACH TO ROMANIAN RESILIENCE - COPING MECHANISMS IN THE COVID-19 ERA

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A R T I C L E   I N F O

A B S T R A C T

The COVID-19 pandemic has posed unprecedented challenges to individuals worldwide, demanding the rapid development and utilization of coping mechanisms to navigate the recurring waves of uncertainty and disruption. Coping mechanisms are mediated by personality traits, cognitive schemes and developed perceptions. They are activated in states of stress, danger or events such as the COVID-19 period. Our study employing a network analysis approach sheds light on the coping mechanisms utilized during the recurring periods of the COVID era among a convenience sampling of 403 respondents in Romania. The findings highlight that substance use emerges as the most destabilizing factor within the pandemic resilience network, while the use of instrumental support exhibits the highest expected influence, offering valuable insights into the adaptive and maladaptive strategies that shape the Romanian population's resilience during these challenging times.They highlight the complex interplay of coping strategies and the need for tailored interventions that consider the influential positions and susceptibilities of specific coping mechanisms within the context of recurring COVID-19 waves.

Introduction

As the COVID-19 pandemic continues to impact societies globally, understanding the coping mechanisms that individuals employ in response to the persistent uncertainties and stressors becomes increasingly critical [1]. The unprecedented global challenge posed by the COVID-19 pandemic has reverberated through every facet of human existence, affecting individuals, communities, and nations on an unprecedented scale [2]. As societies grappled with the recurring waves of uncertainty, disruption, and adversity, the rapid development and utilization of coping mechanisms emerged as a critical determinant of individual and collective well-being. Understanding how populations adapt and build resilience in the face of such multifaceted crises is a topic of paramount importance. This study endeavors to delve into the complexities of Romanian resilience during the COVID-19 era, employing a network analysis approach to uncover the complex associations between coping mechanisms within this specific context.

Since its emergence in late 2019, COVID-19 has rapidly spread across the globe, impacting millions of lives. Romania, like many other nations, has faced its own set of challenges in responding to this public health crisis. Up to the present day, Romania, like many other nations, has faced the profound impact of the COVID-19 pandemic. This global challenge has emphasized the importance of comprehending the coping mechanisms developed by the Romanian population to navigate the recurrent waves of the virus and the socio-economic uncertainties that have arisen.

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Resilience, a concept rooted in psychology and sociology, encapsulates an individual's or a community's ability to adapt and bounce back in the face of adversity [3]. It involves a dynamic interplay between various factors, including individual psychological characteristics, social support systems, and the environment [4]. In the context of the COVID-19 pandemic, resilience becomes a lens through which we can understand how individuals and communities navigate the ongoing challenges, mitigate psychological distress, and thrive despite adverse circumstances.

Resilience is not a fixed trait but a dynamic process that individuals and communities can cultivate and enhance [5]. Coping mechanisms, which encompass a range of psychological and behavioral strategies used to manage stressors, play a pivotal role in this process [6]. Coping mechanisms can be adaptive, helping individuals maintain emotional well-being and adapt to changing circumstances, or maladaptive, exacerbating distress and hindering resilience [7].

The COVID-19 pandemic has introduced a novel dimension of uncertainty-social uncertainty [8], Lockdowns, social distancing measures, economic disruptions, and a constantly evolving public health landscape have led to a profound sense of unpredictability and instability in individuals' lives [9]. This dynamic social uncertainty poses unique challenges to resilience, as individuals must navigate not only health-related concerns but also the complex interplay of societal and economic factors [10]. Understanding how individuals in Romania have coped with these multifaceted stressors is essential for developing targeted interventions and fostering a deeper appreciation of the human capacity for adaptation and resilience [11].

In light of these considerations, this transversal study utilizes a network analysis approach to unravel the coping mechanisms that have emerged among the Romanian population during the COVID-19 era. By identifying the key factors influencing resilience and shedding light on the adaptive and maladaptive strategies adopted, we aim to contribute valuable insights into the intricacies of Romanian coping mechanisms in the face of social uncertainty imposed by recent COVID-19.

Materials and Methods

Instrument

The Brief COPE (Coping Orientation to Problems Experienced) questionnaire is a widely used self-report tool designed to assess various coping strategies employed by individuals in response to stressors and challenging situations [12]. This instrument is particularly valuable in understanding how individuals cope with stress, adversity, and life changes. The Brief COPE questionnaire consists of 28 items that cover 14 different coping strategies, with two items per strategy. Respondents are asked to rate how often they use each coping strategy on a scale ranging from "I haven't been doing this at all" (1) to "I've been doing this a lot" (4). The 14 coping strategies assessed by the Brief COPE include:

- Self-distraction: Engaging in activities to take one's mind off the problem.
- Active coping: Taking steps to try to remove or reduce the stressor.
- Denial: Refusing to believe that the stressor exists.
- Substance use: Using substances like alcohol or drugs to cope.
- Use of emotional support: Seeking emotional support from others.
- Use of instrumental support: Seeking practical help and advice from others.
- Behavioral disengagement: Reducing one's effort and giving up.
- Venting: Expressing negative emotions and frustrations.
- Positive reframing: Trying to see the situation in a more positive light.
- Planning: Creating a plan of action to deal with the stressor.
- Humor: Finding humor in the situation to reduce stress.
- Acceptance: Acknowledging and accepting the reality of the stressor.
- Religion: Turning to religious or spiritual beliefs for support.
- Self-blame: Criticizing oneself for the situation or blaming oneself for the stressor.

The Brief COPE questionnaire provides valuable insights into an individual's coping style and preferences.

In terms of reliability, the obtained Cronbach's Alpha value of 0.844 falls well above the commonly accepted threshold of 0.70, which researchers often use as a benchmark for considering a scale or questionnaire to be reliable [13]. This result affirms the reliability of our questionnaire for assessing the specific construct of interest. In essence, it underscores that our measurement instrument is well-suited for collecting data related to the construct under investigation, instilling confidence in the robustness of our research findings.

Participants

The participants in this study were recruited using a convenience sampling method, primarily through the dissemination of the questionnaire link across various social media platforms. This approach facilitated the engagement of a diverse group of individuals who voluntarily chose to participate in the research. A total of 403 respondents took part in the study, comprising both male and female participants. The gender distribution within the sample indicated that approximately 60% of the respondents identified as male, while the remaining 40% identified as female.

Regarding the age distribution of the participants, the data reveals a diverse representation across various age groups. The majority of respondents fell within the age range of 26 to 35 years, accounting for approximately 32.75% of the sample.

Additionally, individuals aged 36 to 45 years constituted 24.32% of the participants, followed by those aged 18 to 25 years at 11.41%. Respondents aged 46 to 55 years accounted for 3.97% of the sample, and participants aged over 56 years represented 2.23% of the total respondents.

It is noteworthy that there were no missing data points in the age category, indicating complete responses from all participants. The diverse age and gender composition of the sample enhances the generalizability of the study's findings and provides valuable insights into coping mechanisms across different demographic groups.

Results and Discussion

In **Table 1** we provide an overview of the descriptive statistics for the various coping strategies as assessed by the questionnaire. These statistics offer insights into the central tendencies and variability of responses among the participants. We also include 95% confidence intervals and measures of variance to comprehensively describe the data.

Table 1. Descriptive Statistics

| | Valid | Missing | Mean | Std. Deviation | 95% Confidence Interval Variance | | Shapiro-Wilk | P-value of Shapiro-Wilk | Minimum | Maximum |
					Upper	Lower				
Self-distraction	403	0	5.692	1.416	2.271	1.733	0.938	< .001	2.000	8.000
Active coping	403	0	5.551	1.524	2.606	2.040	0.943	< .001	2.000	8.000
Denial	403	0	3.367	1.407	2.307	1.674	0.849	< .001	2.000	8.000
Substance use	403	0	2.459	1.005	1.330	0.725	0.508	< .001	2.000	8.000
Use of emotional support	403	0	4.754	1.734	3.317	2.685	0.940	< .001	2.000	8.000
Use of instrumental support	403	0	4.380	1.575	2.778	2.172	0.933	< .001	2.000	8.000
Behavioral disengagement	403	0	2.586	1.115	1.566	0.927	0.594	< .001	2.000	8.000
Venting	403	0	4.129	1.527	2.610	2.035	0.927	< .001	2.000	8.000
Positive reframing	403	0	5.615	1.492	2.502	1.965	0.939	< .001	2.000	8.000
Planning	403	0	4.501	1.343	2.060	1.546	0.940	< .001	2.000	8.000
Humor	403	0	4.489	1.563	2.731	2.170	0.944	< .001	2.000	8.000
Acceptance	403	0	6.362	1.261	1.802	1.365	0.901	< .001	2.000	8.000
Religion	403	0	5.303	1.916	4.007	3.312	0.921	< .001	2.000	8.000
Self-blame	403	0	2.913	1.205	1.781	1.158	0.750	< .001	2.000	8.000

Participants reported an average score of 5.692 (SD = 1.416) for the self-distraction coping mechanism. The 95% confidence interval for this strategy ranged from 2.271 to 1.733. The Shapiro-Wilk test for normality resulted in a statistic of 0.938, with a significant p-value (< .001), indicating a deviation from normal distribution. Scores for self-distraction ranged from a minimum of 2.000 to a maximum of 8.000.

For the active coping mechanism, participants had an average score of 5.551 (SD = 1.524). The 95% confidence interval ranged from 2.606 to 2.040. The Shapiro-Wilk test statistic was 0.943, with a significant p-value (< .001), suggesting non-normality in the distribution of scores. Responses for active coping varied between a minimum of 2.000 and a maximum of 8.000.

The denial coping mechanism yielded an average score of 3.367 (SD = 1.407) among participants. The 95% confidence interval for this strategy spanned from 2.307 to 1.674. The Shapiro-Wilk test indicated non-normality with a statistic of 0.849 and a significant p-value (< .001). Scores for denial ranged from 2.000 to 8.000.

Similarly, for each of the remaining coping mechanisms, the descriptive statistics provide insights into the participants' responses, variability, and distribution, allowing for a comprehensive understanding of their coping strategies, as depicted in **Table 1**.

Further, we have employed a correlation analysis to comprehend the interrelationships between these coping mechanisms. This approach allows us to investigate how different strategies may be associated with each other and whether they exhibit patterns of positive or negative correlation. Such insights enable us to explore whether individuals tend to employ multiple coping mechanisms simultaneously or whether certain strategies are mutually exclusive.

Our correlation analysis facilitates a deeper understanding of the coping strategies utilized by our study participants during the recurring challenges posed by the Covid era. By examining the relationships between these strategies, we aim to uncover potential clusters of coping mechanisms and identify whether specific patterns emerge within our sample. The correlation matrix is visually presented in **Figure 1**.
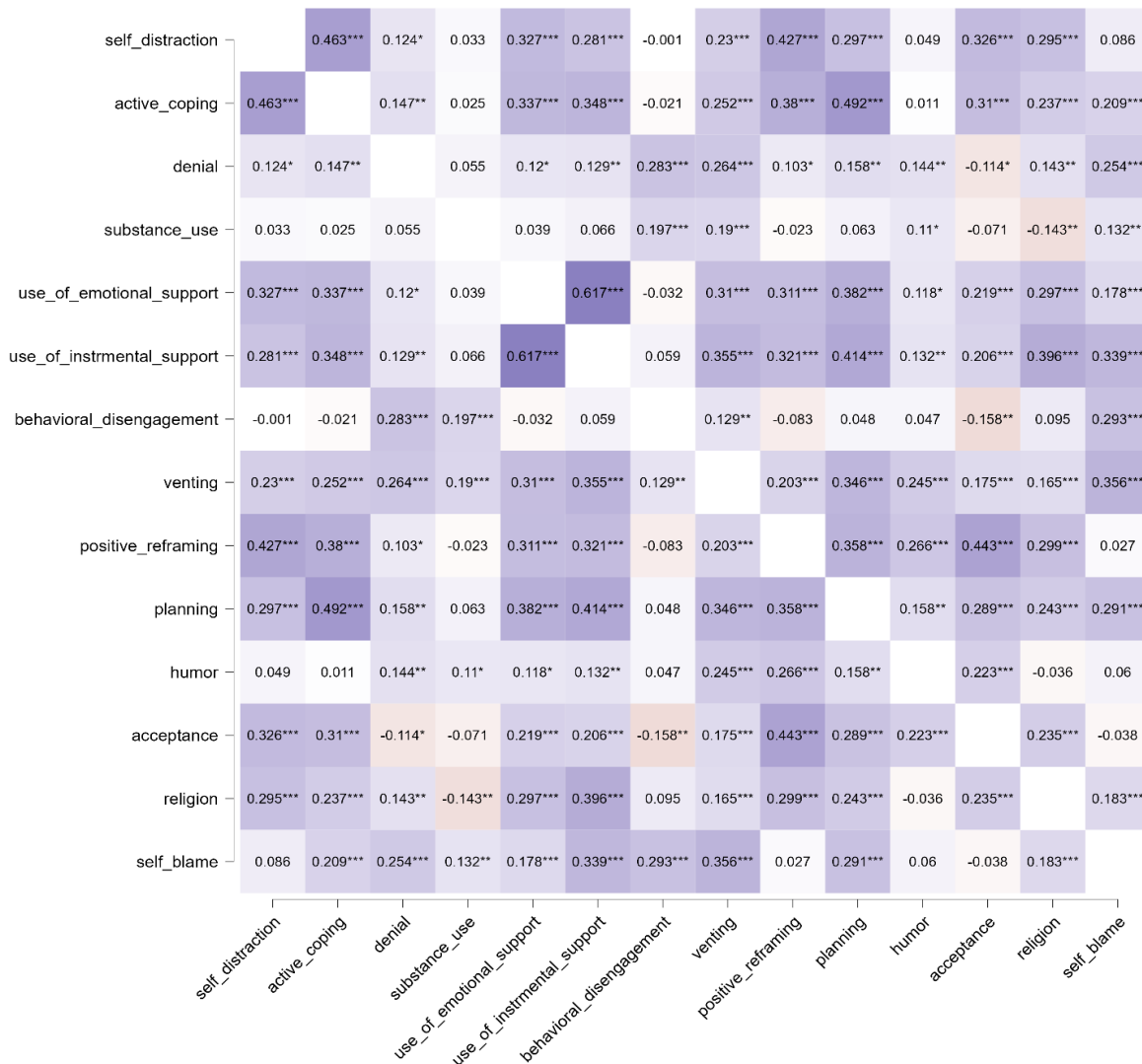
Figure 1. Correlations heatmap between coping mechanisms

Pearson's correlations were employed to examine the associations between various coping mechanisms. Active coping exhibited a robust positive correlation with planning (r = 0.492) and use of instrumental support (r = 0.348). Positive reframing also showed strong positive correlations with planning (r = 0.358) and active coping (r = 0.380). Venting displayed a strong positive correlation with the use of instrumental support (r = 0.355) and active coping (r = 0.252). Furthermore, the use of emotional support displayed a strong positive correlation with the use of instrumental support (r = 0.617). Self-distraction demonstrated moderate positive correlations with active coping (r = 0.463) and positive reframing (r = 0.427). The use of emotional support exhibited moderate positive correlations with planning (r = 0.382) and positive reframing (r = 0.311). Acceptance was negatively correlated with denial (r = -0.114) and substance use (r = -0.071). Several coping mechanisms, such as substance use, humor, and religion, displayed weak correlations with many other coping mechanisms.

Correlation analysis and network analysis are two powerful techniques used in the field of data analysis, particularly in psychology, social sciences, and various other domains [14]. They are interconnected and often complement each other, making their combined use essential for gaining a comprehensive understanding of complex systems. Correlation analysis is primarily focused on measuring the strength and direction of relationships between variables. It helps identify which variables are associated with each other and the nature of those associations (positive, negative, or none) [14]. However, correlation analysis provides a limited view of the overall structure of relationships within a dataset. Network analysis, on the other hand, takes correlation analysis to the next level by visualizing and quantifying the intricate network of connections among variables. Instead of examining pairwise correlations in isolation, network analysis constructs a network or graph where each variable is a node, and the edges represent the relationships between them [14]. This approach uncovers the complex structures and dependencies that might be overlooked in traditional correlation matrices. Network analysis also helps identify central nodes (variables) in the network that play crucial roles in influencing other nodes. These central nodes are often referred to as "hubs" and are essential for understanding the flow of information, influence, or interactions within a system [15]. Correlation analysis alone cannot provide this level of insight into centrality. In situations where there are numerous variables to consider

simultaneously, network analysis is particularly advantageous. It can handle high-dimensional data by representing the relationships in a visually interpretable format, making it easier to discern patterns and interactions [16], as in our case.

We have further employed a network analysis in JASP software. Results show that the structure of the network indicates that there are 14 nodes (14 coping mechanisms), and 66 edges (connections) exist among them. The sparsity of the network coefficient is 0.275, indicating that the network is not densely connected, suggesting some level of independence or separation among variables.
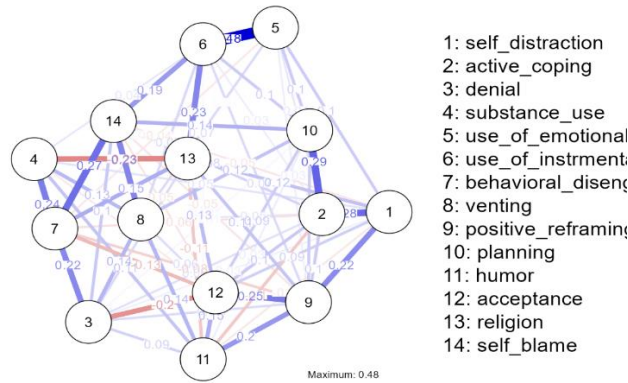

1: self_distraction
2: active_coping
3: denial
4: substance_use
5: use_of_emotional
6: use_of_instrmenta
7: behavioral_diseng
8: venting
9: positive_reframing
10: planning
11: humor
12: acceptance
13: religion
14: self_blame

Figure 2. Network analysis results for the coping mechanisms

The network analysis presented in **Figure 2** offers a visual and quantitative representation of the relationships among variables, shedding light on the complex relationships within the coping mechanisms.

The centrality measures per variable coefficients provide a quantitative perspective on the centrality measures.

Table 2. Centrality measures per variable

Variable	Network			
	Betweenness	Closeness	Strength	Expected influence
Self-distraction	-0.298	-0.666	-0.438	0.350
Active coping	-0.298	-1.193	0.407	0.296
Denial	-1.033	-0.739	-0.676	-0.642
Substance use	-0.788	-0.108	-1.605	-1.618
Use of emotional support	-1.033	-1.421	-1.497	0.126
Use of instrumental support	1.173	0.137	0.978	1.807
Behavioral disengagement	1.418	1.244	0.852	-0.630
Venting	-1.033	0.100	-0.517	0.983
Positive reframing	-0.543	-0.239	1.210	0.937
Planning	0.438	-0.625	-0.683	0.892
Humor	-1.033	-0.638	-0.731	-1.026
Acceptance	0.193	0.875	1.488	-1.096
Religion	1.418	1.599	0.543	-0.937
Self-blame	1.418	1.674	0.669	0.558

The network analysis results presented in **Table 2** provide valuable insights into the centrality measures of each variable within the studied network. These centrality measures offer a deeper understanding of the roles and importance of individual variables in the context of the larger network structure.

Betweenness centrality measures the extent to which a variable acts as a bridge or intermediary between other variables in the network. Variables with higher betweenness values, such as "Behavioral Disengagement" (1.418), "Religion" (1.418), and "Self-Blame" (1.418), exhibit notably high betweenness centrality values, suggesting that they serve as key bridges in the flow of information or influence within the network.

Closeness centrality assesses how quickly a variable can access all other variables in the network. Variables with higher closeness values are more central and have shorter average distances to other variables. In this analysis, "Active Coping" (-1.193) demonstrates the highest negative closeness centrality, indicating that it is relatively less central in terms of accessibility to other variables. Conversely, "Self-Blame" (1.674) exhibits the highest positive closeness centrality, signifying its central position and ease of access within the network.

Strength centrality quantifies the overall influence of a variable based on the sum of its connection strengths with other variables. High-strength variables are influential and have strong direct connections with other variables. In this analysis, "Acceptance" (1.488) and "Use of Instrumental Support" (0.978) emerge as the highest-strength variables, implying that they have a substantial direct influence on other variables within the network. Conversely, "Substance Use" (-1.605) shows the highest negative strength centrality, suggesting a weaker influence compared to others.

Expected influence represents the expected impact of a variable within the network, considering its structural position and connections [17]. Positive values indicate variables expected to exert influence, while negative values suggest variables expected to be influenced by others. "Use of Instrumental Support" (1.807) stands out with the highest positive expected influence, indicating its potential to influence other variables positively. On the other hand, "Substance Use" (-1.618) exhibits the highest negative expected influence, suggesting that it may be more susceptible to influence from other variables in the network.

The centrality measures obtained through network analysis offer valuable insights into the roles and dynamics of coping mechanisms in the context of recurrent COVID-19 challenges. Two coping mechanisms, the Use of Instrumental Support and Substance Use, exhibit distinct expected influence coefficients, providing important implications for their roles in navigating the recurrent COVID-19 landscape.

Within the recurrent COVID-19 context, the use of instrumental support emerges as a coping mechanism with a notably high positive expected influence coefficient (1.807). This finding underscores the pivotal role that instrumental support plays in helping individuals and communities cope with the ongoing challenges posed by the pandemic. The theoretical explanation for this high positive influence coefficient can be linked to the nature of instrumental support, which often involves practical assistance, problem-solving, and resource mobilization [18]. These actions are vital for addressing the evolving complexities of recurrent COVID-19 situations. Variables associated with instrumental support are naturally positioned to exert substantial influence within the coping network as they contribute to problem-solving, resource allocation, and the overall resilience of the community.

Conversely, substance use exhibits the highest negative expected influence coefficient (-1.618) within the recurrent COVID-19 coping network. This finding suggests that substance use as a coping mechanism may be particularly susceptible to influence from other variables in this context. It aligns with the understanding that substance use can be a response to stress, emotional distress, or the challenges posed by recurrent COVID-19 waves [19]. The negative expected influence coefficient implies that interventions, support networks, or external factors within the coping network have the potential to significantly impact the utilization of substance use as a coping strategy [20-24]. This vulnerability underscores the importance of targeted efforts aimed at promoting healthier coping strategies, providing support, and addressing substance use concerns amid the ongoing pandemic challenges [25-29].

Conclusion

In the recurrent COVID-19 context, these findings emphasize the critical roles and adaptability of coping mechanisms. Theoretical explanations shed light on the nature of these coping mechanisms and their interactions with other variables in the face of ongoing pandemic-related stressors. They highlight the complex interplay of coping strategies and the need for tailored interventions that consider the influential positions and susceptibilities of specific coping mechanisms within the context of recurring COVID-19 waves. As we continue to grapple with the challenges posed by the pandemic's recurrence, these insights underscore the importance of promoting effective coping strategies, enhancing support systems, and addressing vulnerabilities such as substance use. Future research and practical applications can delve deeper into the dynamics of coping mechanisms within the recurrent COVID-19 context, informing strategies to bolster resilience, mental well-being, and adaptive responses to ongoing challenges.

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