Resilience Categories in the Literature of the COVID-19 Era from 2020 to 2024

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Abstract

Resilience has been approached from dimensions that the association to the categories of risk, danger and vulnerability. In this sense, the Sendai framework and the Hyodo agreement suggest that such relationships anticipate scenarios such as the pandemic. The objective of this work was to develop the resilience structure evaluated by expert judges who were selected considering their citation index h. A cross-sectional, systematic and psychometric study was carried out with a sample of resilience experts. The results noted the prevalence of urban and organizational resilience indicated by schooling and income as nodes of proximity, intermediation, gradation, and influence. In relation to the state of the art, the scope and limits of the study are discussed and anti-COVID policies are recommended.

Keywords: COVID-19; Hazard; Resilience; Risk; Vulnerability

Introduction

The Hyogo Agreement on Disaster Risk Reduction 2005-2015 was an earlier international agreement adopted in 2005 [1]. The Hyogo approach also focused on disaster risk reduction and resilience promotion it proposed five priorities for action:

Integrate disaster risk reduction into public policies: promoting the inclusion of disaster risk management in development plans and sectoral policies [2].

Identify, assess and monitor disaster risks: improving monitoring and early warning systems, as well as data collection and analysis on disasters and risks [3].

Use knowledge, innovation and education to build a culture of safety and resilience: promoting research and training in disaster risk management, as well as public education on disaster prevention and response [4].

Reduce underlying risk factors: addressing underlying causes of vulnerability, such as poverty, environmental degradation and lack of adaptive capacity [5].

Strengthen disaster preparedness, response capacity, and recovery: improve early warning systems, disaster response planning, and post-disaster rehabilitation [6].

Resilience in the Sendai and Hyogo framework refers to the ability of communities and systems to effectively resist, absorb, adapt and recover from the impacts of natural disasters [7]. Both the Sendai Framework and the Hyogo Accord are two key international instruments that address disaster risk reduction and promote resilience.The Sendai Framework for Disaster Risk Reduction 2015-2030 is a global action framework adopted by the United Nations in 2015 [8]. Its main objective is to substantially reduce the loss of life and the economic impact of disasters, as well as reduce the risk of disasters globally. The Sendai approach is based on four priorities for action:

Understanding disaster risk: involves strengthening the capacity of communities to assess and understand the risks they face, including natural hazards and existing vulnerabilities [9].

Strengthen disaster risk governance: refers to the improvement of institutional and legal frameworks for disaster risk management, involving all sectors and levels of government, as well as the participation of civil society [10].

Investing in disaster risk reduction for resilience: involves implementing measures to reduce disaster risk, including improving infrastructure and land use planning, as well as promoting safe and sustainable practices [11].

Disaster preparedness, response capacity and recovery for resilience: refers to strengthening early warning systems, training communities in disaster response and promoting recovery and long-term improvement [12].

The Hyogo Accord and the Sendai Framework address resilience in the context of disaster risk reduction [13]. Both instruments promote measures to strengthen the capacity of communities and systems to resist, adapt and recover from disasters, with the aim of reducing loss of life and economic impacts.

Resilience in the COVID-19 era refers to the ability of individuals, communities, and societies to effectively cope with and recover from the impacts of the pandemic [14]. The health crisis generated by COVID-19 has presented significant challenges in terms of health, economy, education, and social and emotional aspects. In the context of resilience against COVID-19, some key aspects can be highlighted:

Health and well-being: Resilience involves taking steps to protect physical and mental health and well-being [15]. This means following public health guidelines and measures, such as social distancing, mask wearing, and handwashing, as well as seeking support and maintaining good mental health during these challenging times.

Adaptation and flexibility: Resilience implies the ability to adapt to rapid changes and new circumstances [16]. This includes adapting work and education models through technology, finding ways to generate new income, and adjusting routines and ways of life to cope with the restrictions and limitations imposed by the pandemic.

Support networks and solidarity: Resilience is strengthened when there is a solid support network [17]. This involves maintaining and strengthening family and community ties, seeking help when needed, and offering support to others. Solidarity and collaboration are essential to overcome the challenges posed by the pandemic.

Innovation and creativity: Resilience is also related to the ability to find innovative and creative solutions to face challenges [18]. This may involve implementing new technologies, developing new business models, or adapting services to respond to changing needs.

Learning and growth: Resilience involves learning from experiences and using that learning to grow and become stronger [19]. The pandemic has provided opportunities to reflect on our priorities, balance our ways of living, and better prepare for future crises.

Importantly, resilience does not simply mean resisting or surviving the pandemic, but also adapting, learning and building a stronger and more prepared future [20]. Resilience in the COVID-19 era implies the ability to face current and future challenges, maintain hope and the determination to overcome this global crisis.

Civil protection and resilience are related in the context of disaster management and community safety [21]. Both concepts focus on preparedness and responsiveness to adverse events but have slightly different approaches.

Civil protection refers to the measures and actions taken by governments, organizations and communities to prevent and mitigate the effects of disasters, as well as to protect and help the affected population [22]. This includes emergency planning and coordination, risk assessment and management, implementation of early warning systems, evacuation and rescue, medical care and attention to the basic needs of affected people.

On the other hand, resilience refers to the ability of a community or society to effectively resist, adapt and recover from disasters and adversities [23]. Resilience implies strengthening individual and collective capacities to face the impacts of disasters, as well as to adapt to new conditions and recover quickly.

Civil protection focuses on the planning and implementation of measures to reduce risks and protect people during and after a disaster [24]. For its part, resilience focuses on strengthening the capacity of communities to absorb shocks, adapt to changes and recover from disasters, building a solid foundation for a more secure future.

Both concepts are complementary and reinforce each other. Civil protection provides a framework for disaster preparedness and response, while resilience seeks to strengthen the capacities and resources of a community to face future challenges [25]. By promoting resilience, it seeks

to reduce the vulnerability of communities and improve their resilience, which in turn will contribute to more effective and sustainable civil protection.

The risks are socially constructed but guided by the resources and capacities of a civil protection system [26]. In fact, the definition of civil protection is anchored in the premise of risk, since if risks emerge in a socially constructed environment, then civil protection will be the system in charge of reducing and eventually preventing risks.

Thus, the structure of the civil protection system emerged with the 1985 earthquake and the creation of the National Reconstruction Commission [27]. The legal framework of the system guides a civil protection subsystem. From the system and the subsystem in charge of risk reduction, CONAPRED and C5 arise. It means then that the units in charge of reducing risks, analyzing them, evaluating them and managing them will focus their attention on Comprehensive Disaster Risk Management through instruments such as the Risk Atlas and resilience policies.

The debate around the Disaster Risk Management system and subsystems revolves around the political, economic and cultural scales [28]. If the problem is analyzed from public policies, the problem of nepotism and the absence or scarcity of budgets stand out. If a lack of budget is noted, then it alludes to a deficient administration of resources in the face of disaster risk crises. Or the emergence of problems inherent to the lack of funds or trusts dedicated to risk reduction. If you consider participation and governance around IRMD, then you will see a culture of risk appetite rather than risk aversion.

In this framework of risks, civil protection and resilience, the parties involved seem to develop and consolidate limitations and disabilities that submerge them in a greater scenario of risks and disasters [29]. The State can be seen as responsible for the absence of leadership or stewardship, but the socially constructed nature of the risks justifies the non-interference of the government in citizen liberties.

There are various instruments and tools used to measure and assess resilience in different contexts. These instruments are usually based on indicators and metrics that make it possible to assess different dimensions of resilience.

Community Resilience Index (IRCO): It is an instrument developed to assess the resilience of communities in the face of natural disasters [30]. Consider multiple dimensions, such as governance, natural resources, infrastructure, health and well-being, disaster preparedness and response, among others.

Climate Resilience Index (IRCI): It is used to measure the resilience of a region or community in the face of climate change [31]. It evaluates aspects related to adaptation to climate change, recovery capacity and vulnerability reduction.

Cities Resilience Index (IRCD): Evaluates the resilience of cities against multiple threats, such as natural disasters, climate change, conflicts, among others [32]. It examines aspects such as governance, urban planning, infrastructure, basic services, health and education.

Organizational Resilience Assessment (ERO): Focuses on the resilience of organizations, assessing their ability to resist and recover from disturbances [33]. It examines factors such as risk management, adaptability, decision-making, communication, diversification, and the ability to learn.

Assessment of Psychological Resilience (ERP): It is used to measure resilience at the individual level, evaluating a person's ability to face difficult situations and recover from them [34]. It examines factors such as self-efficacy, social support, coping ability, cognitive flexibility, and self-acceptance.

This is how resilience studies established a diagnosis based on risk exposure, but no research has been carried out on virtual, gamified, augmented or neural realities that anticipate resilience against pandemics of immeasurable, unpredictable and uncontrollable magnitude and impact [35]. Precisely, the objective of this work is to establish the neural networks of the resilience categories, considering a structure elaborated by Artificial Intelligence and contrasted by expert evaluations.

Method

A cross-sectional, descriptive and retrospective study was carried out with a sample of experts in resilience issues, selected from their citation index published in academic google.

The focus group technique was obtained for the homogenization of the concepts and agreement of the resilience categories [36]. Next, the Delphi technique was used to evaluate summaries alluding to resilience in the face of the pandemic. In three phases, the experts evaluated the contents, considering a zero for summaries not related to resilience and the pandemic, as well as a maximum value of five for summaries that include resilience and the pandemic. In the second phase, the experts compared their ratings with the average of their peers so that in a third phase they could reflect and argue for their ratification or change of rating.

The data were captured in Excel and processed in SPSS version 29. The coefficients of centrality, grouping and structuring were estimated to be able to contrast the hypothesis of significant differences between the structure of the artificial neural network versus the structure of the neural network established with experts. Values close to unity were assumed as evidence of non-rejection of the null hypothesis.

Results

Centrality measures the relationships of proximity, closeness and influence between the nodes that make up a network. In this sense, the resilience relative to organizational entry as a response to the pandemic stands out. It means then that intermediation, proximity, gradation and influence are focused on the financial resources that organizations have to respond to the health crisis.

Clustering refers to the cumulative difference gradients between nodes. In this sense, income and schooling are organizational and urban factors that take precedence over the health crisis. By partnering with other nodes, the accumulation of responses to the pandemic is concentrated as axes of organizational and urban resilience.

Centrality and grouping are phases prior to the analysis of structuring. In this way, the network includes a model of relations between the nodes and their dimensions. It highlights the cohort or group most vulnerable to epidemic risks. Consequently, the learning network distances itself from the analysis of vulnerable groups. The grid can be read from left to right. Consequently, it begins with the verbalization of the pandemic as the main effect of the health crisis and culminates with the stratification of the groups in the face of the exceptional event. In other words, resilience follows a line that goes from verbalization to problem stratification according to income and education.

Discussion

The contribution of this work to the state of the art lies in the establishment of a neural network to explain the analysis of resilience in the literature from 2020 to 2024. The results show that organizational and urban resilience prevails, indicated by income and education in the face of the health crisis. Such findings contravene the results of augmented, gamified and virtualized reality where risk exposure depends on benefit expectations [37]. In the present work, it was found that income and schooling are elements of organizational and urban resilience that contribute to reducing the impact of the pandemic. In other words, the urban unemployment insurance and salary increase policies have an impact on the reduction of epidemic risks.

In addition, in the case of organizations, a measure that increases the education of the parties involved shows an increase in income and both significantly reduce the impact of the pandemic. Research on gamified reality ensures that the management of the pandemic is achieved through health promotion, studies on augmented reality suggest that exposure to SARS CoV-2 infection and the spread of its viral load in organs are predictors of the use of anti-COVID devices [38]. In this document, it was found that urban and organizational resilience are coupled in an anti-COVID policy consisting of the distancing and confinement of people based on an epidemiological traffic light. Therefore, the extension of the study to augmented, gamified or virtualized reality is recommended in order to be able to establish a predictive model of exposure to risks of contagion, illness and death from COVID-19. Such a model will allow an anti-pandemic policy to be evaluated from its strategies of confinement and distancing of people.

Conclusion

The objective of this work was to establish the learning network of experts in resilience in the face of the pandemic. The results achieved show that schooling and income are central nodes of resilience in the face of the health crisis. In addition, the results contravene the state of the art where a direct and significant effect of virtual, increased and gamified risk exposure is demonstrated. It is recommended to extend the model of neural networks with the variables reported in the state of knowledge to be able to anticipate scenarios of prevention, exposure and reduction of epidemic risks.

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