

# The Utility of Community Resilience Models for the Prevention of Online Violence

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## ABSTRACT

Online violence is a complex issue transcending national borders with digital and real-world consequences. It is a consequence of hate, fueled by real and perceived injustices. Communities must be able to adapt - improving citizens' social and material conditions to prevent hate from taking root or spreading. Community resilience research focuses on assessing a community's ability to adapt and how well it copes with disruptions both known and unknown. Therefore, community resilience models and methods should be adopted by those working to prevent online violence both to investigate new means of preventing hate speech and to test existing community resilience theory in a new context. This paper will review online violence and community resilience, explain their connection, review community resilience models that may be of interest for violence prevention work, and describe how those models are being used in a project that is currently in progress.

## Keywords

Community Resilience, Hate Speech, Online Violence, Violence Prevention, Sustained Adaptability.

## INTRODUCTION

Communities of people are complex adaptive systems comprising individuals, social networks, technologies, and the environment. To thrive over time, all complex systems must adapt, changing their underlying architecture to meet their goals as the external environment exposes them to new disruptions. For a community, this means maintaining citizens' quality of life, accommodating new peoples and technologies, and preserving the natural environment. The capability to continually adjust over time has been labeled Resilience (Hollnagel et al., 2006). Resilience is an emergent property fostered by the interaction of components and subsystems such that the whole system is poised to adapt and continues to function as conditions change over time (Woods, 2015). Communities therefore constantly engage in work to make sense of the world, plan for the future, and coordinate resources to maintain a high quality of life for citizens. Taking steps to foster resilience will allow communities to perform this work while dealing with the shocks and threats of the world.

One of the most urgent threats of the present day is the proliferation of hate speech online. Hate speech is an example of online violence - a continuum of behavior from subtle discrimination to violent crime (Gagliardone et al., 2015; Kim, 2021.; Lupu et al., 2023). Though hate speech is not new, the internet - because of its transnational reach, accessibility, and the anonymity it permits provides an excellent medium through which hate speech may spread (Gagliardone et al., 2015; Kim, 2021). Research has shown that hate speech creates real tangible threats of violence to citizens, particularly the most vulnerable members of a community. Though online and offline phenomena are substantively related their relationship is complex and still not well understood (Lupu et al., 2023). While the need to address hate speech online is clear, the practice of addressing it proves complicated. It requires

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communities to navigate fundamental tradeoffs between protecting individual liberties and the safety of citizens (Gagliardone et al., 2015). Limitations on speech must be specified in law, proportionate, and targeted to be justifiable. Victims are heterogeneous – people may become targets based on race, ethnicity, sexual orientation, gender identity or expression, religion, or disability. Furthermore, these behaviors have structural, interpersonal, and individual pre-determinants and impacts; effective prevention of violence-inducing behaviors requires an in-depth understanding of those pre-determinants. In other words, an understanding of the material and social characteristics of a community (its underlying architectural properties), how they interact to enable the spread of hate speech, and how they are affected by its spread and consequences. These principles are precisely the same as those central to research on community resilience.

The purpose of this paper is to elucidate the relevance of community resilience research to work preventing online violence such as hate speech. In section II we will elaborate on the concepts of online violence, hate speech, and community resilience and the links between them. In section III several models from the community resilience literature will be compared. In section IV we will discuss how these models could be applied to online violence prevention work and will recommend the most promising candidates for this application.

This work is ongoing and is part of the SOCYTI project - an in-progress, transdisciplinary initiative dedicated to developing new strategies and tools for the prevention of hate speech online. The work described in this paper represents the initial stages of our efforts to carry out this integration of community resilience research into online violence prevention. The project aims to develop a cloud-based, real-time detection system capable of evaluating text and images from social media posts for hateful content on a larger scale than ever previously possible. It is the hope of the research team that such tools can enable proactive interventions rather than just being used to reactively police hate speech online. Community Resilience research is integral to realizing this hope. In the future we will directly connect community resilience indicators to specific types of hate speech. These connections may reveal new means of preventing different kinds of hate speech from propagating.

## LITERATURE REVIEW

### Online Violence and Hate Speech

Hate speech is a product of hatred - a feeling of intense hostility and aversion, usually deriving from fear, anger, or a sense of injury. It relies on underlying tensions in society, which it seeks to re-produce and amplify. It is the expression of conflicts between different groups (Gagliardone et al., 2015; The Rabat Plan of Action, 2012). It is intended divide citizens into groups of ‘us’ and ‘them’ and then blame ‘them’ for the struggles of ‘us’. Such scapegoating obfuscates the real sources of threats to communities. It degrades the community’s capacity to monitor, anticipate, and respond to real threats, which are key cornerstones of system resilience (Hollnagel, 2009). This systemic resilience extends beyond just hate speech, dealing with how complex systems cope with all kinds of disruptions including natural and man-made disasters. As such, hate speech represents a legitimate compounding threat for myriad crises and disasters. In addition, such events in and of themselves can contribute to and exacerbate the aforementioned social and economic tensions which feed into the propagation of xenophobic ideology and sentiment.

Hatred can be constructed along several axes including race, ethnicity, language, gender identity or expression, religion, sexuality, or nationality. It may stem from political polarization – ‘having an enemy to oppose provides people with a sense of identity, and the possibility of victory in the face of issues that seem too large to hold’ (The Rabat Plan of Action, 2012). Economic issues such as unemployment, declining income, or increased living costs (especially during recessions) often contribute to anti-migrant sentiments. Groups that are excluded and/or discriminated against can become radicalized, which diminishes the possibility of establishing cohesion and cultural dialogue (Eminoğlu, 2020). Any combination of these factors, along with the absence of free and secure civic space, online disinhibition, and more may drive radicalization and the hate speech that results from it (The Rabat Plan of Action, 2012; UNOCT PVE Reference Guide, 2016) hence we label them *drivers*. The above list is not exhaustive. The structure and context of a community determine which drivers are present and how they combine to foster online violence.

Not all hate speech is illegal. ‘Only the most egregious forms of hate speech, namely those constituting incitement to discrimination, hostility, and violence, are generally considered unlawful (Gagliardone et al., 2015). While legal responses such as protections for migrant workers and diaspora communities are important, legislation is only one of many tools. legislation must be complemented by initiatives from various sectors of society geared towards the deeper structural issues that foster radicalization, hatred, and hate speech – the drivers. Addressing such issues will require a plurality of policies, practices, and measures nurturing social consciousness, tolerance, and understanding (Kim, 2021; UNOCT PVE Reference Guide, 2016). Strong community building initiatives,

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education and training programs, and intercultural dialogue foster acceptance and cultural literacy through interaction. Improving socio-economic parity, ensuring equitable access to basic and specialized services, and dedicating resources towards anti-radicalization plans assuage tensions on which hate speech depends (Eminoğlu, 2020). Healthy cooperation between local actors, civil organizations, and government is important to ensure that such changes are well supported and spread throughout society.

### Community Resilience and Models

The word ‘community’ can describe groups united by common interest, geography, or socioeconomic, cultural, political, or ethnic makeup. Community resilience describes the capability of a community, enabled by an interconnected network of systems, to continuously meet its primary goals to keep citizens healthy, happy, and safe (Fitzpatrick, 2016). These systems comprise socioeconomic, ecological, and built aspects. A community is resilient when: ‘... the population are connected to one another and work together, ... to function and sustain critical systems, even under stress; adapt to changes in the physical, social, or economic environment; be self-reliant if external resources are limited or cut off; and learn from experience to improve over time’ (Fitzpatrick, 2016). We have identified research investigating these underlying concepts from many sources using the labels ‘community resilience’, ‘societal resilience’, and ‘social resilience’ and will treat each label as synonymous in this review.

Synthesizing existing strands of community resilience literature, the first from social-ecological systems and the second from psychology, yields the following set of core principles: People–place connections; values and beliefs; knowledge, skills, and learning; social networks; engaged governance; diverse and innovative economy; Community infrastructure; leadership; and readiness to accept change (Berkes & Ross, 2013). The agency of actors in the community and the process of self-organization both emerge from the state and combination of these principles. *Fostering agency in people* and *allowing for self-organization* are thus important foci for efforts to build community resilience.

Societal resilience literature suggests that ‘societal resilience lies in techno-political macrostructures that actively shape societies and risks at a global level as well as in the skills of professionals’ (Haa vik, 2020). Techno-political macrostructures refer to critical infrastructures (power, telecoms, water, etc.) and critical societal institutions (health, political, family, etc.). This perspective contrasts with traditional safety science, which focuses wholly on infrastructure robustness and restricts the ability to explore the nature of risks that transcend infrastructures and national borders such as the proliferation of hate speech online. ‘If we accept critical infrastructures as the central risk object, we indirectly consolidate the politics, the technologies, and the practices that admit these structures their criticality’ (Haa vik, 2020). Adopting the new perspective creates space to investigate the adaptive capacity of a society by centering the socio-ecological production of risks.

Some social resilience literature argues that social resilience builds on the general concept of resilience, rooted in ecological systems thinking, and departs from it by incorporating an actor-oriented perspective recognizing the importance of power, politics, and participation. This conception of social resilience comprises three dimensions: Coping Capacities - the ability of social actors to cope with and overcome adversities, Adaptive Capacities - their ability to learn from past experiences and adjust to future challenges, and Transformative Capacities - their ability to craft sets of institutions that foster individual welfare and sustainable societal robustness towards future crises (Keck & Sakdapolrak, 2013).

A community resilience model must incorporate sociological, ecological, and infrastructural elements, an inherently complex task leading to many different model forms. Models can be qualitative, quantitative, or hybrid. Qualitative models create theoretical frameworks, highlighting key components of resilience and their schematic connections. Quantitative models generally seek to make resilience comparable between entities and locations, and trackable across time (Scherzer et al., 2019). A common modeling strategy is to deconstruct a community into ‘domains.’ Domains represent functional areas inherent to a standard community that can be assessed for resilience. Sometimes these are called ‘dimensions,’ or ‘subdomains.’ Qualitative or quantitative indicators are then organized into domains. Several domains reappear across models and others are functionally identical while being labeled slightly differently. Some models include unique domains or are not organized into domains at all. In the following section, we will inspect several models and frameworks from the literature. This paper will cover five models, two frameworks, one toolkit, and one strategy for combatting cyber-racism. We will group them according to how their indicators are structured. A summary of these sources is shown in Table 1.

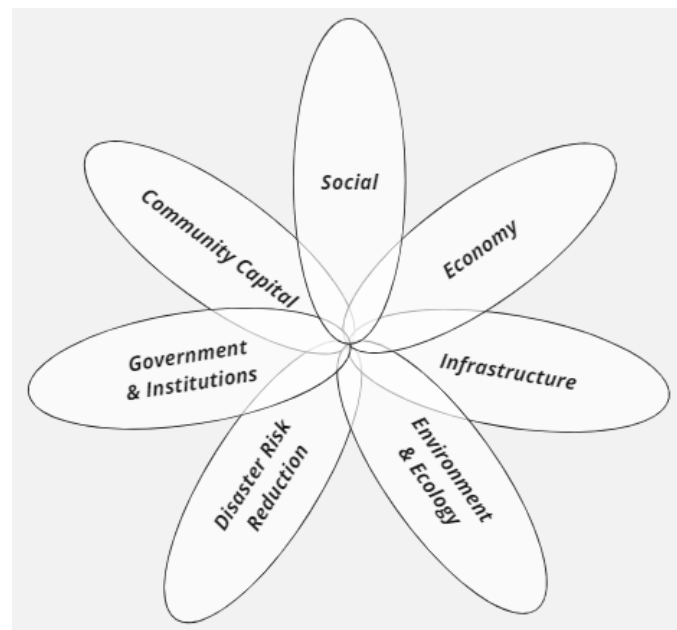
**Table 1. Overview of Sources from Community Resilience Literature**

| Name   | Type      |
|--|-----------|
| Resiloc Resilience Indicators  | Model     |
| Disaster Resilience Indicators for Benchmarking Baseline Conditions (BRIC) | Model     |
| Community Resilience Index for Norway (CRIN)                               | Model     |
| City Resilience Index (CRI)  | Model     |
| Communities Advancing Resilience Toolkit (CART)                            | Toolkit   |
| Community Disaster Resilience  | Framework |
| Cyber Racism and Community Resilience                                      | Strategy  |
| The Community Capitals Framework   | Framework |
| Intercultural Cities: Intercultural Dialogue as a Tool for Social Cohesion | Model     |

### COMPARATIVE ANALYSIS

The RESILOC Model, The Disaster Resilience Indicators for Benchmarking Baseline Conditions (BRIC) Model, and the Community Resilience Index for Norway (CRIN) model are highly similar structurally. We label this shared structure Domain Set 1 and visualize it in Figure 1. All three contain *Social*, *Infrastructure*, and *Economy* domains. The *Social* domain captures general demographic characteristics of a population that enhance their ability to deal with adverse events. It includes relationships between people and groups, social networks, and culture (Scherzer et al., 2019; Cutter et al., 2010; Akerkar et al., 2022). The *Infrastructure* domain relates to physical structures, technical facilities, and systems essential to community functioning. These include transportation, electricity, gas, water, communications systems, food distribution chains, health facilities, municipal services, and public administration services. The *Economy* domain intends to portray overall economic health and thus focuses on indicators such as variability and diversity of income sources, range and types of local businesses, assessments of existing wealth, and the income generating skills-base of citizens (Scherzer et al., 2019; Cutter et al., 2010; Akerkar et al., 2022).

RESILOC uniquely contains a domain for *Government* and *Disaster Risk Reduction*. BRIC and CRIN both contain a domain for *Institutions* and *Community Capital*. RESILOC and CRIN both contain an *Environment* domain. The *Government* domain and the *Institutional* domain are both concerned with institutional efficacy and transparency, and citizen engagement in political processes. Because the indicators present in each are so similar, we treat the two domains as synonymous. Thus, we visualize them as a single domain as shown in figure 1.



**Figure 1: Domain Set 1**

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The indicators of the *Government/Institutions* domain often overlap with other domains because institutions play an important role in organizing and regulating social, political, and economic activities (Akerkar et al., 2022). Indicators within the *Infrastructure* domain also often overlap with other domains because physical infrastructures can serve purposes specific to the other domains (Akerkar et al., 2022). We keep the *Infrastructure* domain distinct to maintain space for assessing the purely physical attributes of infrastructure such as infrastructure quality, or the proximity of citizens to important infrastructure (Scherzer et al., 2019; Cutter et al., 2010).

The *Community Capital* domain is highly related to the *Social* domain but is unique in seeking to capture capacities such as the strength of community organizations and citizen knowledge, skills, and resources rather than social relationships and connection between people (Scherzer et al., 2019; Cutter et al., 2010). Across reviewed models there is considerable indicator overlap and potential misplacement between the *Social* and *Community Capital* domains. Despite this, a conceptual distinction between indicators that point towards social relationships and community capital is important, so we keep these domains distinct.

The *Disaster Risk and Reduction* domain describes frameworks, processes, and resources dedicated to risk reduction and emergency management. This includes equipment, temporary housing, statutory and voluntary organizations, etc. (Akerkar et al., 2022). Though many such indicators are intrinsically linked to the government of a community this domain is kept distinct to accentuate a focus on processes and capacities specifically for crisis situations.

The *Environment* domain has two focuses. First, assessment of the natural environment that intersects and envelopes a community (i.e., hazard and exposure mapping of local topography, geography, geology, vegetation, and biodiversity). Second, assessment of a community's exposure and resilience to natural hazards (Akerkar et al., 2022). Such indicators are sometimes organized as the *Ecology* domain. Because the indicators of both these domains are environmentally focused, we treat them as synonymous. Conversely, while there is also considerable overlap between *Environment/Ecology* domain and *Disaster Risk Reduction* domain indicators, we keep these domains distinct to recognize that communities must prepare for man-made as well as natural disasters and to maintain space for environmental indicators not directly related to crises.

Some models group indicators into an *Individuals*, or *Physical*, or other similarly narrow domain (Nguyen & Akerkar, 2020). This review is interested in models which consider resilience as a systems-level property, not as something that resides in individual citizens alone. To prevent losing the value of these indicators we recommend that these domains be disregarded, and their indicators reorganized into another domain present in that model as appropriate. For example, the community domain (human capital/knowledge, skills & resources) or the infrastructure domain (physical structures).

The City Resilience Index (CRI) and the Communities Advancing Resilience Toolkit (CART) represent other forms of organization. The CRI comprises four dimensions split into twelve goals into which indicators are grouped (City Resilience Index, 2015). We label this structure Domain Set 2 and present a visualization in Figure 2.

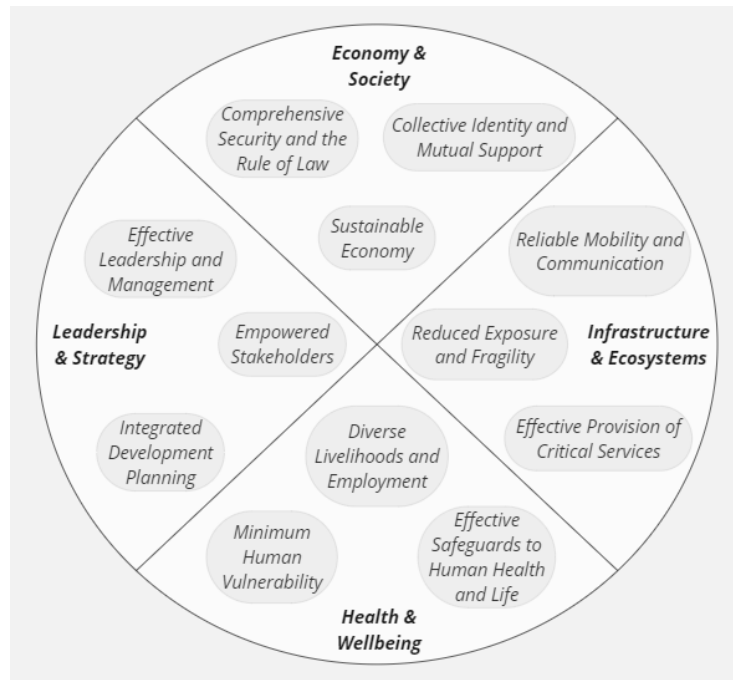


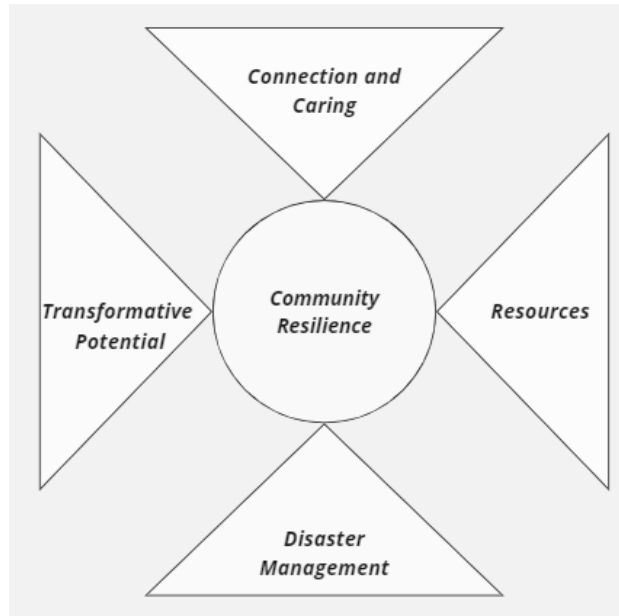
Figure 2: Domain Set 2

The *Leadership and Strategy* dimension includes indicators that would be found in the *Government/Institutions*, *Community Capitals*, and *Disaster Risk Reduction* domains of domain set 1. The *Infrastructure and Ecosystems* dimension includes indicators that would be found in the *Infrastructure*, *Environment/Ecology*, *Government/Institutions*, and *Disaster Risk Reduction* domains. The *Economy and Society* dimension contains indicators that would be found in the *Economy*, *Social*, *Community Capitals*, and *Government/Institutions* domains. The *Health and Wellbeing* dimension contains indicators that would be found in the *Disaster Risk Reduction*, *Economy*, and *Infrastructure* domains. A summary of the comparison of domain set 1 and domain set 2 is shown in Table 2. Domain set 1 is shown in the first column. The presence of an X in a table cell indicates that the domains listed in that column and row contain analogous indicators as described above.

Table 2. Comparison Between Domain Sets 1 and 2

| Domain (Set 1)            | Leadership & Strategy | Economy & Society | Infrastructure & Ecosystems | Health & Wellbeing |
|---------------------------|-----------------------|-------------------|-----------------------------|--------------------|
| Government & Institutions | X                     | X                 | X                           |                    |
| Community Capitals        | X                     | X                 |                             |                    |
| Social                    |                       | X                 |                             |                    |
| Economy                   |                       | X                 |                             | X                  |
| Infrastructure            |                       |                   | X                           | X                  |
| Environment & Ecology     |                       |                   | X                           |                    |
| Disaster Risk Reduction   | X                     |                   | X                           | X                  |

CART does not contain specific indicators and only describes four overlapping domains of resilience. These are *Connection and Caring*, *Resources*, *Transformative Potential*, and *Disaster Management* (Pfefferbaum et al., 2013). We label this organizational structure Domain Set 3 and present a visualization in figure 3.



**Figure 3: Domain Set 3**

*Connection and Caring* focuses on social relationships, support systems, and the connection between people, which would be found in the *Social* domain. *Resources* includes natural, physical, information, human, social, and financial resources, which encompasses the *Environment, Community Capital, Economy, and Infrastructure* domains. *Disaster Management* concerns everything related to prevention, mitigation, preparedness, response, and recovery for crises. These indicators are closest to the *Disaster Risk Reduction, Environment/Ecology, and Government/Institutions* domains of the previous models. Finally, *Transformative Potential* is the model’s most unique domain. It describes the ability to identify and frame collective experiences, examine successes and failures, and engage in critical analysis. Such indicators would be found in the *Government/Institutions, Community Capitals, Social, and Environment/Ecology* domains. A summary of the comparison of Domain Set 1 and Domain Set 3 is shown in Table 3 and a comparison between Domain Sets 2 and 3 is shown in Table 4.

**Table 3. Comparison Between Domain Sets 1 and 3**

| Domain (Set 1)            | Transformative Potential | Connection & Caring | Resources | Disaster Management |
|---------------------------|--------------------------|---------------------|-----------|---------------------|
| Government & Institutions | X                        |                     |           | X                   |
| Community Capitals        | X                        |                     | X         |                     |
| Social                    | X                        | X                   |           |                     |
| Economy                   |                          |                     | X         |                     |
| Infrastructure            |                          |                     | X         |                     |
| Environment & Ecology     | X                        |                     | X         | X                   |
| Disaster Risk Reduction   |                          |                     |           | X                   |

**Table 4. Comparison Between Domain Sets 2 and 3**

| Domain (Set 2)              | Transformative Potential | Connection & Caring | Resources | Disaster Management |
|-----------------------------|--------------------------|---------------------|-----------|---------------------|
| Leadership & Strategy       | X                        | X                   |           | X                   |
| Economy & Society           |                          | X                   | X         |                     |
| Infrastructure & Ecosystems | X                        |                     | X         | X                   |
| Health & Wellbeing          |                          |                     | X         | X                   |

Several sources do not organize their insights into a structured model. The *Community Disaster Resilience* (Fitzpatrick, 2016) framework provides a broad set of principles that explain why some communities cope with disaster events better than others. The paper on *Cyber Racism and Community Resilience* (Jakubowicz et al., 2017) positions racism and other forms of hate speech online as one of many challenges that undermine social cohesion and break down social capital. It also identifies resilience as the most critical element in resisting and overcoming hate speech. The *Community Capitals Framework* (Pigg et al., 2013) describes seven types of capital present in communities on which development efforts can focus. *Intercultural Cities: Intercultural Dialogue as a Tool for Social Cohesion* (Eminoğlu, 2020) explores a new model for social cohesion – interculturalism – and reports key aspects. These sources also show considerable overlap in their indicators.

All these sources contain indicators that relate to government, social networks and relationships, and community capital. Many of these indicators are written differently but point towards the same phenomena such as existing policies, civil engagement in political processes and community organizations, social cohesion and mutual care, and the skills of individuals. Indicators focused on the economy and the natural environment are present in the *Community Capitals Framework* and the paper on *Community Disaster Resilience*. Indicators focused on infrastructure are present in the *Community Capitals Framework* as well as the papers on *Cyber Racism and Community Resilience* and *Intercultural Cities*. Indicators focused on disaster risk reduction are present in the papers on *Community Disaster Resilience* and *Cyber Racism and Community Resilience*. A summary of the comparison of Domain Set 1 and these individual sources is shown in Table 4. A comparison between Domain set 2 and these sources can be inferred by referencing table 2. A comparison between Domain Set 3 and the unorganized sources is shown in table 5. Both *Community Disaster Resilience* and *Cyber Racism and Community Resilience* provide indicators that fit into each domain of set 3. *Intercultural Cities* presents indicators that are related to connection and caring and resources. Interestingly, *The Community Capitals Framework* only provides indicators that are categorizable as resources.

**Table 5. Comparison Between Domain Set 1 and Unorganized Sources**

| Domain (Set 1)            | Community Capitals Framework | Community Disaster Resilience | Cyber Racism & Community Resilience | Intercultural Cities |
|---------------------------|------------------------------|-------------------------------|-------------------------------------|----------------------|
| Government & Institutions | X                            | X                             | X                                   | X                    |
| Community Capitals        | X                            | X                             | X                                   | X                    |
| Social                    | X                            | X                             | X                                   | X                    |
| Economy                   | X                            | X                             |                                     |                      |
| Infrastructure            | X                            |                               | X                                   | X                    |
| Environment & Ecology     | X                            | X                             |                                     |                      |
| Disaster Risk Reduction   |                              | X                             | X                                   |                      |

**Table 6. Comparison Between Domain Set 3 and Unorganized Sources**

| Domain (Set 1)           | Community Capitals Framework | Community Disaster Resilience | Cyber Racism & Community Resilience | Intercultural Cities |
|--------------------------|------------------------------|-------------------------------|-------------------------------------|----------------------|
| Transformative Potential |                              | X                             | X                                   |                      |
| Connection & Caring      |                              | X                             | X                                   | X                    |
| Resources                | X                            | X                             | X                                   | X                    |
| Disaster Management      |                              | X                             | X                                   |                      |

## DISCUSSION

Regardless of form and organization, all the models shown exhibit commonalities. The health and well-being of citizens is paramount. Attention is repeatedly paid to the extent to which all people can meet their basic needs, particularly in times of crisis. The community must be able to provide for the health and well-being of citizens and safeguard it through normal and emergency situations. This capacity may be captured via healthcare facilities, public health initiatives, economic structure, governmental policy, environmental health, etc. Attention is also paid to the organization of communities. Indicators cover culture and social structure as well as the makeup of the built and natural environment. Assessment of the quality of that environment is also seen across models. A comprehensive resilience perspective requires each element because social structures inform the kinds of infrastructure that is prioritized, and the existing built and natural environment shapes social organization, in addition, different kinds of infrastructure and ecosystems provide protection from some disasters and create vulnerability to others. The models are also concerned with the continuity of natural and infrastructural resources when faced with shock. Finally, the models capture knowledge and skills across layers in the community network. Resilient communities learn from the past and take steps to anticipate the future by making sense of the world around them. The knowledge that enables this is held by governmental bodies and institutions, as well as by citizens themselves, perhaps clustered into civil society organizations. What knowledge and skills exists, who holds that knowledge and those skills, and how to ensure those holders are included in decision making, is all critical for building the resilience of a community.

The relationship between violence inducing behaviors such as online hate speech and community resilience is a positive feedback loop. People are taught to hate. Communities with low resilience struggle to maintain their critical functions of keeping citizens happy, healthy, and safe. This creates tensions that can drive the spread of hatred. The exact combination of drivers that are present in one community changes according to what functions are failing or vulnerable. Hatred can spread through online platforms rapidly, causing some groups to be ostracized and discriminated against. Discriminated people are dissuaded from participating in civic life which robs the whole of their perspective and skills and reduces their access to important resources needed to maintain their health and preparedness for emergencies. The separation of different groups degrades social cohesion making it more difficult for knowledge to transfer throughout the system, and inequitably exposes certain groups to dangers while reducing their means to cope with that danger. Resilience relies on initiative and reciprocity (Woods, 2019). People who are antagonistic to others will not engage in reciprocity and those who are discriminated against will have reduced initiative. Thus, new tensions emerge, and existing ones worsen, fostering more hate speech and other violence inducing behaviors as actors in the community stoke tensions for personal, political, or monetary gain. The spread of these behaviors weakens the community further, and sometimes results directly in violence. This makes it even more difficult for the community as a unit to adapt over time, i.e., degrading the resilience of the community, which provides more and more fuel for violence inducing behaviors.

We have compiled a series of focal topics to direct our future research and recommendations for others. First, we recommend that within community resilience research future work focus on better defining and separating the *Social* and *Community Capital* domains and their indicators. We also recommend that the models highlighted in this review be further analyzed and synthesized into a single comprehensive model. Our project will attempt this synthesis as part of our work. Finally, we recommend work be done to better consolidate research on community resilience, social resilience, societal resilience, community disaster resilience, and all other related threads. Research under each of these titles overlaps considerably and is aligned in their focus on sustained adaptability in

complex systems. Specific inquiry into sustained adaptability and other underlying principles of resilience is currently being carried out by researchers in Resilience Engineering along with several other fields (Woods, 2019; Yu et al., 2020; Engle, 2011), which may provide relevant frameworks for such a task. Within online violence prevention and related work, including ours, we recommend that future work directly integrate community resilience models. We will provide a few ideas for how this could be achieved.

Of the models examined in this paper, RESILOC resilience indicators, BRIC, CRIN, the CRI, and CART show the most potential for immediate practical application. The first three (Scherzer et al., 2019; Cutter et al., 2010; Akerkar et al., 2022; City Resilience Index, 2015) provide quantitative measurable proxies for their indicators alongside a comprehensive qualitative structure. These are essentially measures for potential drivers of online violence. Quantifiable measurements could be collected by automated tools and synthesized in different ways to establish a clear baseline level of community functioning. The resulting information could be used to track the health of a community over time and potentially to prevent the spread of violence online by illuminating driving issues before they boil over. Monitoring only the presence of violent behavior online is inherently reactive. Monitoring the drivers creates more opportunity for prevention and a better means of anticipating future occurrences. For example, it is already well understood that periods of economic difficulty (economic strength is a community resilience indicator) can contribute to anti-migrant sentiment (directly related to multiple kinds of hate speech). Efforts to alleviate economic stress on groups of citizens may prevent the spread of hateful rhetoric by directly addressing the tension it aims to co-opt. These measures also provide a means of evaluating interventions. Because these indicators are agnostic to individual instances of online violence, they can be used repeatedly as the community changes and new sources of tension rise and fall. CRI and CART can be used to generate complimentary data sourced directly from community members. This data can be used to evaluate the fitness of the other indicators or to assess citizen awareness regarding vulnerabilities in their community. If it is determined that the measurable proxies are insufficient or poorly tailored to a community, the comprehensive qualitative domains of all these models provide a structure that locally specific indicators could fit into. BRIC and CRIN provide a clear example of this. CRIN is an adaptation of the BRIC model to the context of Norway, though the two models share the same structure, their indicators are noticeably different.

## CONCLUSION AND FUTURE WORK

Community Resilience is a nascent area of research with the potential to prepare groups of people to better cope with the emergence of threats that transcend national borders. Online violence, as an urgent global issue, presents an opportunity for this research to be tested. The natural place to test this research is prevention work because community resilience models provide means to identify and measure where the underlying architecture is weak and thus where the tensions on which online violence relies exist in some communities. Because hate speech begets real world violence and degrades the health and wellness of citizens and communities, it fits well into the described domain of interest of community resilience theory. Yet current research has not explored how well community resilience models map to this specific kind of societal disruption. Such an application would serve to strengthen community resilience models by testing them on a novel type of threat and thereby assessing how domain agnostic they are. The insights gained from adapting and revising existing models to address issues of online violence and hate may provide insights and indicators that are similarly useful for dealing with natural disasters and other man-made emergency events.

Future work is needed within community resilience research and highly related fields to synthesize their findings into a single comprehensive framework and in online violence prevention work to integrate community resilience models. We are currently working on synthesizing the models identified in this paper. We will then connect some of the community resilience indicators from our set to different kinds of hate speech. We hope to establish as many similar connections as possible. Once this work is finished, we will develop tools to collect the measurable proxy data for our resilience indicators and to identify multi-modal data as hate speech. Online violence is destructive and dangerous in and of itself and can lead to instances of horrible violence in the real world. It demands that our communities change to overcome it and create a more accepting, diverse, and safe world for all people.

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