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Dynamics of Online Governance:
Moderating Sense of Virtual Community

By

BERIL BULAT
DISSERTATION

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2024

Acknowledgements

Dear Prof. Jaeho Cho,

You may not remember this, but you were the first to respond to my email in the summer of 2018, when I was contemplating applying to UC Davis as a master's student. Not only did you take the time to meet me, but you also conducted my interview for the PhD program. You opened the door to a world full of opportunities, setting me on a path that has profoundly shaped my academic and personal life. You ignited this spark of possibility, and for that, I am eternally grateful.

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Sincerely.

Dedication

To my mother,
For teaching me to dream big, to believe in myself, and to find strength even in the hardest of times. Your unwavering support has been the foundation of every step I've taken, and for that, I am endlessly grateful.

To Kaan, my best friend and my anchor,
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To my chosen family, my friends,
Who stood by me through thick and thin, showing me the true value of community.

And, to myself...

To the five-year-old me, the curious little girl with big dreams and whimsical scribbles.

To the fifteen-year-old me, the angry but resilient teenager who felt alone but always found strength in her own voice.

To the twenty-five-year-old me, the white-collar professional in Manhattan, wondering if there was more to life than office walls.

To the thirty-five-year-old me, the cancer patient, battling uncertainty with hope, wondering whether she would ever see this day.

And to the future me, in case she ever forgets all the struggles, resilience, and victories that brought her here, a reminder of everything she has overcome in life and all she is capable of.

We did it - together.

Abstract

This dissertation bridges the literatures on Sense of Virtual Community and Online Governance, offering an empirical examination of how governance structures shape the community experience within online contexts. Through an interdisciplinary, multi-method approach, capturing the perspectives of both community members and moderators, these studies provide a nuanced understanding of governance dynamics. Collectively, the series of studies presented in this dissertation underscore the necessity for flexible, context-specific governance strategies that are tailored to meet the unique needs of diverse online community participants.

The first study, presented in chapter 2, introduces the results from an online survey with 1,080 community members, which examined the relationship between social control, formal control, participatory governance and the sense of virtual community. Findings revealed that while participatory governance and social control individually enhanced sense of community, their interaction was negative, suggesting that combining these mechanisms might actually reduce community cohesion, particularly in settings where both are heavily implemented. This study also highlighted that participatory governance is particularly beneficial in larger communities, supporting the idea that inclusive, pluralist governance processes can significantly boost community cohesion, from the perspective of community members.

The second study, presented in chapter 3, shifts the focus on the often overlooked community moderators, utilizing a survey of 605 community leaders from Reddit, to investigate how different governance approaches impact their psychological well-being. Contrary to prevailing assumptions that participatory processes are universally beneficial, this study reveals that more centralized governance structures might better support moderators' feelings of belonging and acceptance. This highlights the complexities and trade-offs associated with various governance approaches, emphasizing the challenges of balancing democratic engagement with the need for effective governance in volunteer-driven platforms.

The third study employs a mixed-method approach, integrating survey responses and digital trace data from Reddit's API to assess the interplay between governance resources, in shaping moderators' sense of community. Findings suggest that while participatory governance and larger moderator teams generally enhance moderators' sense of community, the effectiveness of participatory governance may also depend on the existing regulatory structure, including the number of rules and moderators. This emphasizes the importance of designing governance systems that consider the specific contexts and needs of different online communities.

Taken together, these studies offer important insights into the complex dynamics of online governance, underscoring the importance of balancing the needs of both community members and moderators. This dissertation not only advances our theoretical understanding but also offers practical guidance for developing effective, responsive governance strategies in the evolving landscape of online communities.

Table of Contents

1. Introduction.....	1
1.1. Sense of Community.....	2
1.2. Sense of Community Online.....	3
1.3. Limitations of the Extent Literature on Sense of Virtual Community.....	5
1.4. Governing the Commons.....	7
1.5. Governing the Commons, Online.....	9
1.6. Online Community Governance.....	10
1.6.1. Moderation as Governance.....	11
1.6.2. Rules and Norms as Governance.....	13
1.7. Limitations of the Extent Literature on Online Governance.....	15
1.8. Overview of the Dissertation.....	18
2. Governing a Sense of Community Online.....	21
2.1. Governance Processes.....	22
2.2. Formal Control.....	24
2.3. Social Control.....	25
2.4. Community Size.....	26
2.5. Methods.....	28
2.5.1. Measures.....	28
2.6. Results.....	31
2.7. Discussion.....	34
3. The Psychology of Volunteer Moderators in Online Communities.....	38
3.1 Humanistic Rational Choice Theory (HRCT).....	38
3.2. Applying HRCT to Online Community Moderators.....	40
3.3. Methods.....	43
3.3.1. Participants and Procedures.....	43
3.3.2. Measures.....	44
3.4. Results.....	46
3.5. Discussion.....	49
4. Moderating a Sense of Community Online.....	53
4.1. Governance Configurations in Online Communities.....	54
4.2. Methods.....	58
4.2.1. Participants and Procedures.....	58
4.2.2. Measures.....	59
4.3. Results.....	60
4.4. Discussion.....	62

5. Conclusion.....	69
5.1. Summary of the Dissertation.....	70
5.2. Contributions and Implications.....	70
5.3. Limitations and Future Directions.....	72
5.4. Final word.....	74
7. References.....	75
8. Tables and Figures.....	93

1. Introduction

Contemporary scholars often cite Robert Putnam (2000) for his extensive work on the dying community, though the death of civic America, and the social isolation he documented in the late part of the last century was already in the making for a long time. Alienation, anomie, and isolation were among the most pressing societal problems back in the 1970's according to Sarason, "there was an agreement" among social scientists "that the sense of community had all but vanished and that its reinstatement was the top priority" (1974: 158). Before the birth of community psychology as a separate discipline, Robert Nisbet had extensively written about the lost sense of community in "The Quest for Community" back in 1952, in post-world-war America (Nisbet, 1953). The theme of the lost community can be traced all the way back to the turn of the last century, when Durkheim described "anomie" as the breakdown of social integration that results from reduced social interactions caused by rapid urban population growth (Durkheim, 1897). Neither the loss of community, nor its social, psychological, cultural, or physiological consequences are new problems. But it could be argued that no other generation in history has been as connected, yet felt so alone in their daily lives, as our digital generation.

The alarming levels of reduction in social connections are evident in recent national surveys. Almost half the adult population in the US report they experience loneliness (Bruce et al., 2019; Demarinis, 2020), which is considered a wider health issue than diabetes and obesity (U.S. Surgeon General, 2023). In 2018, only 16% of Americans reported that they felt attached to their local communities (Parker et al., 2018), and the number could be even lower post pandemic. Loneliness and social isolation increase the risk of heart disease (Valtorta et al., 2016), and susceptibility to viruses (Cohen, 2021), while leading to increased anxiety and depression (Valtorta et al., 2016). All of this is happening at a time where nearly all adults under 65 are digitally connected (Pew Research Center, 2024), and 1 in 3 adults report they are online almost all the time (Parker et al., 2018).

Digital connection, however, does not automatically translate into social connection. This would be akin to expecting the residents of a city to establish strong social ties, just because they share the same

location. Just as a random group of individuals cannot be called a community, mere digital connectivity does not ensure meaningful social connections (Blanchard and Markus, 2004a). But recent evidence suggests that it is possible to feel a sense of community in the online context. The critical question highlighted by these alarming trends then becomes, how to enhance the sense of community online?

1.1 Sense of Community

Sense of community theory is rooted in the work social psychologists conducted in community mental health. In his book “The Psychological Sense of Community: Prospects for Community Psychology”, Sarason (1974) called for a discipline that exclusively focused on this concept, which he argued was the solution to many of society’s most pressing problems. Decades of work on communities had already shown that a lack of sense of community was quite widespread, and destructive, both for the individual and society in various ways. Decades of work since then responded to Sarason’s call and provided evidence for the sense of community experienced in different physical settings and its positive outcomes.

The most widely accepted and used theoretical model for the sense of community is from McMillan and Chavis, who defined it as “a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members’ needs will be met through their commitment to be together” (1986: 9). It includes the elements of membership and belonging, influence, fulfillment of needs, and a shared emotional connection (McMillan and Chavis, 1986; Peterson et al., 2008). In this framework, a community can both be location-based, or relation-based in nature. What matters is the success of the community that is under consideration, which is measured by the sense of community its members experience.

Many studies have explored the sense of community in different physical settings, in a variety of contexts, across various cultures. A higher sense of community was found to be related to greater life satisfaction (Prezza and Costantini, 1998), better social connections (Obst and White, 2005), higher levels of social, emotional or instrumental support (Unger and Wandersman, 1982, 1985), and greater psychological well-being in general populations (Davidson and Cotter, 1991). The connection between the psychological sense of community and subjective and social well-being has also been established across

different countries, and populations (Stewart and Townley, 2020). A sense of community also correlates with higher levels of civic engagement and political participation (Chavis and Wandersman, 1990; Davidson and Cotter, 1989) though with an observed variability across countries with different socio-political contexts (Talò et al., 2014). Whether defined as place, or used in reference to social relationships, it is beyond doubt that a sense of community exists, and its existence, or the lack of it, has wide-ranging consequences.

1.2 Sense of Community, Online

The concept of Sense of Virtual Community (SoVC) has garnered increasing attention as researchers have explored the parallels between virtual and physical communities (Blanchard, 2011). Blanchard's foundational work (2007, 2008, 2011; 2003, 2004a) laid the groundwork for understanding SoVC, emphasizing the roles of support exchange, normative influence, identity development, and trust. Her research demonstrated that SoVC in virtual communities shares similarities with the sense of community observed in physical settings, though with distinct characteristics shaped by the digital nature of online interactions. Most of the studies in this work were conducted with newsgroups or listservs, early and significant platforms for computer-mediated communication at the time. These early Internet communities mostly lacked clear, established hierarchies, leading Blanchard and Markus to conclude that virtual communities did not exhibit the same influence on their members as their physical counterparts (Blanchard and Markus, 2003, 2004a).

Subsequent studies have built upon Blanchard's model, focusing on the social and psychological processes that contribute to SoVC and its positive outcomes. For example, Ellonen (2007) examined an online pregnancy community, finding that perceived need, similarity, and trust were antecedents to SoVC. Similarly, Welbourne (2009) observed that social support positively correlated with SoVC in an online health group. Obst and Stafurik (2010) further highlighted the connection between social support, SoVC, and well-being in a disability-specific online community. While these early studies provided valuable insights, they were often limited by small sample sizes and measurement issues, as critiqued by Mamonov

et al. (2016). Nonetheless, later research, such as Gibbs et al. (2019), continued to find positive associations between social support, normative influence, and SoVC in online groups.

The significance of SoVC extends beyond individual well-being, influencing community success and sustainability. For instance, Zhang (2010) found that SoVC both directly and indirectly affected platform usage, through user satisfaction. Chen and Lin (2014) supported this by showing that system and information quality were positively linked to SoVC, alongside social information exchange. On Facebook, Mamonov and colleagues (2016) demonstrated that SoVC significantly impacted information consumption and contribution, while reducing users' intentions to quit. In virtual communities of practice, Penarroja et al. (Peñarroja et al., 2019) identified perceived usability and usefulness as factors that enhanced community effectiveness through SoVC. Lyu et al. (2019) reported that SoVC facilitated knowledge-sharing behaviors in Q&A forums, with trust serving as the mediator. Studies also explored the relationship between SoVC and commitment, showing that commitment mediates the link between SoVC and the intention to continue participating (González-Anta et al., 2021). Similarly, Zhao (Zhao and Shi, 2022) found that SoVC was crucial in fostering commitment on an educational platform, which positively influenced engagement and individual success.

Engagement patterns also play a critical role in shaping SoVC. Tonteri et al. (2011) distinguished between active and passive participation, finding that both positively impacted SoVC but offered different benefits: cognitive for passive engagement (e.g., reading content) and social or personal for active engagement (e.g., posting content). In the context of interest-based Chinese social networks, Li and Chen (2022) observed that both public and private interactions positively influenced SoVC, with public interactions fostering bridging social capital and private interactions strengthening bonding capital. In live-streaming communities like Twitch, Kairam (2022) identified factors such as chat volume, tenure, and peripheral participation as significant predictors of SoVC. Additionally, Smith (2022) explored automated engagement, showing that positive perceptions of bot governance were associated with greater SoVC among subreddit members.

The extensive body of research on SoVC highlights its significance with various positive outcomes across individual, community, and platform levels. From an individual perspective, SoVC is associated with enhanced well-being, increased social support, and stronger trust, offering valuable psychological and emotional resources within digital spaces. At the community level, SoVC correlates with higher levels of participation, commitment, and sustainability, indicating that a strong sense of community often creates thriving virtual communities. Technologically, the quality of system design and engagement is linked to the development of SoVC, underscoring the role of platform features in facilitating meaningful online interactions. Despite these substantial benefits, however, there remain critical gaps in our understanding of how community governance shapes SoVC, particularly in the context of complex, large-scale online communities.

1.3 Limitations of the Extant Literature on Sense of Virtual Community

The literature on sense of community experienced online heavily focuses on social interactions and individual level engagement, often overlooking the context or the environment in which the community under study exists. But online communities are not merely social organizations, they are sociotechnical organizations that exist within, benefit from, and constrained by the structural, institutional and technological features of the digital spaces they inhabit (Ellison et al., 2022; Introne et al., 2020). These features matter because they allow, constrain, and inadvertently shape the behaviors of individuals (Morgan-Thomas et al., 2020), as is the case with Twitch communities, for instance, where streamers broadcast live content to their subscribers (Kairam et al., 2022), or Reddit, where moderators start, establish, grow, and manage their communities, shaping the online experiences of their members on a daily basis (Matias, 2019).

Influence is one of the four original dimensions of the sense of community, as theorized by McMillan and Chavis, alongside membership, belonging, and need fulfillment (1986). But the literature focusing on online communities heavily emphasizes social interactions and exchange of support or information as the primary source of community influence, often neglecting governance-level factors, and arguing that influence is weak to non-existent in online contexts compared to face-to-face communities

(Blanchard, 2011; Blanchard and Markus, 2003, 2004a; Gibbs et al., 2019) This weakness is usually explained by the different nature of online interactions, such as a lack of authority structures and the anonymity observed in online communities. But this narrow focus overlooks the community structure, and the participation aspect of governance, such as involvement in community governance, moderation, rule-making, and behavioral monitoring, that can shape community dynamics and interactions (Kollock and Smith, 1996; Kraut and Resnick, 2012). More importantly, it ignores a significant part of the digital landscape, where thousands of moderators are managing communities with millions of users worldwide.

In the traditional sense of community framework, influence is a bi-directional concept, where “the influence of a member on the community and the influence of the community on a member occur concurrently” (McMillan and Chavis, 1986: 12). It refers to the “perceived influence that a person has over the decisions and actions of the community [...] and the amount of influence the group has over the individual members” (Fisher et al.eds, 2012: 7). From this perspective, community governance can be seen as a source of influence, where established rules, norms, procedures, and the processes through which they are formed shape member behaviors. In return, members can also affect the community, by participating in its governance. McMillan clearly emphasizes this in his later works as well, they argue that in cohesive and cooperative groups “order, authority and justice create the atmosphere for the exchange of power” (McMillan, 1996: 319), which concurrently enables for a sense of community to emerge. But for a long time, the concept of community governance has not been widely recognized even in traditional community psychology (Totikidis et al., 2005). Similarly, the literature on SoVC hasn’t fully explored the relationship between different governance strategies, institutional arrangements and a sense of community, despite the growing evidence on online voluntary governance efforts (Seering, 2020). Therefore, it remains an open and important question, how different governance strategies, such as participatory rule-making, or different control mechanisms relate to the sense of virtual community?

Part of this lack of attention could be attributed to the long-standing view of online groups as horizontal collectives of individuals with rather fluid or leaderless structures (Castells, 2010; Shirky, 2008). This was indeed the case for the early days of the Internet, as evidenced by ethnographic studies from the

late 1970's and 80's (Chesebro, 1985; Hiltz and Turoff, 1978; Kerr, 1986). But as a growing number of recent work on online governance and moderation work shows, the Internet evolved, and so too did the nature and scale of online communities. Today, community governance has become increasingly multifaceted, necessitating structured moderation approaches and institutional arrangements to manage the growing volume of content and the diverse range of user interactions taking place online.

A comparison of different governance strategies requires a dataset with multiple communities that would allow us to examine variations in governance structures, rules, and member participation. This comparative approach is essential for identifying patterns and outcomes associated with different governance strategies (Ostrom, 1990). However, a significant part of the research has been constrained by limited sample sizes, typically focusing on a single community with a small number of participants, restricting their generalizability (Gallagher and Savage, 2013). But behaviors and topics largely vary across communities, even within the same platform (Prinster et al., 2023). And it is not possible to examine or assess the potential influence of governance, without accounting for its variation across communities with different governance structures.

To summarize, while the existing literature on SoVC has extensively explored the social and psychological processes that foster a sense of belonging within online communities, less attention has been paid to the governance mechanisms that shape these dynamics. To fully understand how virtual communities function and thrive, it is essential to consider the formal and informal governance structures that influence community behaviors and member engagement. The next section summarizes the literature on online governance.

1.4 Governing the Commons

The concept of commons governance refers to the community-based institutional arrangements that regulate the use of shared resources (i.e. river, forest) in the absence of centralized control (i.e. state, market) (Ostrom, 1990). Nobel laureate Elinor Ostrom's groundbreaking work demonstrated that small, self-regulating communities can effectively manage common resources, often outperforming top-down governance models with centralized hierarchies. Her research identified a set of design principles that

successful communities tend to follow, which have become foundational in the study of collective action and governance (Janssen and Ostrom, 2006; Ostrom, 1990, 1998, 1999, 2005).

Ostrom's principles include clearly defined boundaries, locally adapted rules, monitoring systems, sanctions for violations, and participatory decision-making (Ostrom, 1990). These principles enable communities to self-organize and manage common resources, fostering collaboration and sustainability. For example, communities with clearly defined boundaries assign membership and access to resources, while participatory rule-making allows for adaptable governance that fits local needs. Successful communities also implement monitoring systems and sanctions to ensure rule adherence, alongside conflict resolution mechanisms to maintain cooperation. These principles have been applied across various contexts, from Swiss mountain meadows to Filipino irrigation systems, demonstrating their versatility and efficacy (Ostrom, 1999).

An important insight from Ostrom's work is that rules do not need to be formalized; both formal rules and unwritten, informal norms can shape behavior in social settings (Janssen and Ostrom, 2006). These factors are dynamic and evolve in response to the community's changing circumstances. Governance systems are context-dependent, and there is no one-size-fits-all approach. Ostrom's research underscores that the success of governance strategies depends on how these elements are configured in relation to the community's specific needs.

While Ostrom's principles of commons governance were originally developed in the context of managing natural resources, the core insights have proven relevant far beyond physical settings. In many ways, online communities increasingly mirror the dynamics of traditional commons, where shared digital spaces are collectively managed by community members. Just as with natural resources, the sustainability of these online communities depends on effective governance structures that balance the needs of individual users with the broader community (Kollock and Smith, 1996). Several scholars have applied Ostrom's principles to online communities, exploring how governance strategies influence sustainability and success in digital settings.

1.5 Governing the Commons Online

With the rise of online communities, many had claimed that the lack of formal hierarchies would democratize social processes and reshape organizational dynamics (Castells, 2010; Shirky, 2008). However, it was also becoming evident that the inherent challenges of social relationships—such as coordination, cooperation, and conflict—persisted, often in amplified forms within digital environments (Kollock and Smith, 1996, 1998). Scholars began to observe the complexities of these new social spaces, seeking to understand the factors that contribute to the success, or failures of online communities. This body of work, rooted primarily in literatures such as Human-Computer Interaction, Computer-Supported Cooperative Work and Information Systems Management, was often motivated by practical concerns: how to design online communities that could effectively manage resource challenges, such as limited bandwidth, attention scarcity, or insufficient participation, while fostering sustainable, successful collectives?

Early research on online communities focused on bulletin board systems or email-based newsgroups such as Usenet or ListServ (Malloy, 2016), and open-source software projects such as Linux Debian Project (Schneider et al., 2021). They were initially small and niche, but they grew over time, necessitating governance structures to manage unwanted behaviors like trolling and spamming (Zuckerman and Rajendra-Nicolucci, 2023). Kollock and Smith (1996, 1998) applied Ostrom's principles of commons governance to Usenet, emphasizing the importance of boundaries, rules, and social control mechanisms. They found that even decentralized communities could develop governance systems through norms and informal sanctions, though at the time, these systems were often inconsistent and lacked formal enforcement.

Butler's resource-based model introduced the idea that community sustainability is influenced by complex interactions between size, communication activity, and engagement (1999, 2001a; 2008). For instance, increased group size is associated with both member gain and member loss, highlighting the dilemma that online communities face. A larger audience means potentially more content, but it also makes it more difficult for people to establish strong ties. Similarly, while communication activity provides benefits, it also imposes costs, and its impact on sustainability is shaped by complex interactions between community size, engagement volume, and the diversity of the audience.

In a more direct application of Ostrom's design principles, Schweik and colleagues examined open-source software (OSS) projects (Schweik, 2005; Schweik and English, 2007; Schweik and Semenov, 2003), with a particular focus on institutional design for project success. They uncovered the different stages of community development, from initiation to institutionalization, leading to project growth and evolution, or failure. Through a series of studies, they showed that most successful software projects incorporated certain institutional features, such as participant involvement in rule-making, adaptable rule systems, and effective monitoring and enforcement of rules, including sanctions. O'Mahony and Ferraro (2007) further demonstrated how Debian communities combined democratic practices with bureaucracy to manage complexity and preserve member autonomy. They found that introducing a limited, meritocratic form of bureaucracy alongside democratic practices allowed communities to develop a governance model that both preserves member autonomy and maintains organizational stability.

Overall, early studies laid the foundation for understanding governance in online communities, showing that a combination of rules, roles, and participatory decision-making were essential for managing shared resources as these communities expanded. With the rise of social networks came the proliferation of modern online communities, transforming the digital landscape with exponential growth of user numbers, introducing new complexities in how these communities are governed.

1.6 Online Community Governance

Grimmelman (2015) defines moderation as "the governance mechanisms that structure participation in a community to facilitate cooperation and prevent abuse" (2015: 42). In his work *Virtues of Moderation*, he highlights the challenges of balancing "the chaos of too much freedom" with "the sterility of too much control" in online spaces (2015: 42). Moderation involves fostering positive, high-quality engagement while curbing noise, abuse, and harmful behaviors, issues that frequently arise in online spaces (Kraut and Resnick, 2012). Yet, despite the central role moderation plays, there are no definitive guidelines for successful online governance (Gorwa, 2019), contributing to growing scholarly interest in understanding how communities govern themselves.

An increasing number of platforms, such as Facebook Groups, Reddit, YouTube, Wikipedia, Twitch, and Discord, rely heavily on community self-governance, facilitated by volunteer moderators (Seering, 2020; Seering et al., 2022). These platforms, which host diverse and often large-scale communities, depend on volunteers to maintain order, enforce rules, and foster a sense of community. Despite their central role in shaping online experiences, however, volunteer moderators have received relatively little attention from scholars (Squirrell, 2019; Wohn, 2019), and only recently researchers began to explore the intricacies of their voluntary labor. Research on online community governance has largely developed along two primary streams. The first one emphasizes moderation approaches, focusing on moderators, their actions, strategies, and experiences. The second focuses on the role of rules, norms or policies as expressions of governance, investigating how formal or informal guidelines define acceptable conduct and influence community success.

1.6.1 Moderation as Governance

Moderation within online communities can be considered as a form of public good, reflecting a classic social dilemma where many benefit but only a few contribute. Many volunteer moderators fulfill a range of duties that are essential to the health and stability of online communities. On platforms like Reddit, for instance, moderators create and enforce rules, monitor content, and ensure the removal of posts or comments that violate community standards (Matias, 2019). On platforms like Discord and Twitch, moderators manage real-time interactions, often dealing with toxic behavior and immediate disruptions (Jiang et al., 2019; Wohn, 2019). Across different platforms, community moderation generally involves a combination of community management (establishing rules and processes, welcoming new members, and facilitating discussions), content moderation (removing posts that violate rules), and user moderation (sanctioning, banning, or silencing disruptive users) (Matias, 2019; Seering et al., 2019; Srinivasan et al., 2019). These moderators not only serve as rule enforcers but also shape the overall tone and culture of the communities they oversee (Seering et al., 2022).

Research highlights the complexity of volunteer moderation, which, while more flexible and responsive than commercial or automated approaches to moderation (Seering, 2020), poses significant

challenges. For instance, Weld (2024) found that moderators who actively participate in their communities tend to be more appreciated by users, especially in trust-driven spaces like news-sharing communities. But Gilbert (2020) shows that when moderation work becomes too visible, through frequent content removals and rule enforcement, it could also be perceived as censorship. Moderators are often tasked with managing overwhelming volumes of content and navigating complex interactions, which can lead to information overload and conflicts in decision-making (Cai et al., 2021; Jiang et al., 2019). With such high levels of content, it becomes difficult to enforce rules consistently, especially in communities with higher levels of engagement (Jhaver et al., 2019). In addition to these logistical challenges, moderation also involves significant emotional labor (Dosono and Semaan, 2019; Matias, 2019; Seering et al., 2019). Moderators frequently encounter abusive or harmful content, placing them in emotionally taxing situations, which can take a toll on their mental well-being (Matias, 2019; Wohn, 2019). As a result, moderation becomes a form of invisible, unpaid work that is vital to the health of online communities but can be personally draining for those involved (Seering et al., 2019).

The governance structures volunteer moderators establish vary across platforms. For instance, on Reddit, moderators operate with significant autonomy, wielding control over rule enforcement, content removal, and the overall governance of their communities (Squirrell, 2019). However, this authority comes with its own unique set of challenges. Matias (2019) describes how moderators must balance user needs with platform guidelines, often operating within obscured hierarchies (Seering et al., 2022). This dynamic, often referred to as implicit feudalism, underscores the hierarchical power structures that emerge in these seemingly egalitarian communities (Seering et al., 2019; Squirrell, 2019). These structures are often not openly acknowledged, yet they dictate power and control within the community over user behaviors.

The balance between democracy and control seems to be a central tension in community governance. While regular users express a desire for greater participatory governance, Weld (2024) reveals that Reddit moderators generally prefer less democracy, favoring structures that allow them to maintain control. Thatch (2022) further shows moderators often make decisions without substantial community input unless necessary or they choose to do so, which can alienate other users and create a sense of imbalance in

power dynamics. Despite these challenges, however, the hierarchical structures established by moderators may also be a necessity for large-scale communities to function effectively. As Grimmelmann (Grimmelmann, 2015) notes, moderators must walk a fine line between maintaining order and stifling community engagement. Striking the right balance between user participation and moderator control is therefore essential to fostering a healthy, thriving online community.

1.6.2 Rules and Norms as Governance

Online community governance is often examined through the community rules and norms that shape behavior. These guidelines, whether formally written or informally developed, play a central role in defining acceptable behavior and fostering shared values within a community. Formal rules are explicit, written guidelines for acceptable behavior, conflict resolution, and governance processes, enforced by moderators (Ens et al., 2023; Ouchi and Price, 1978). In contrast, social norms are unwritten, informal expectations that emerge organically through member interactions (Tompkins and Cheney, 1985).

Formal rules serve as the backbone of governance in many communities, offering clear, codified guidelines that dictate acceptable behavior, participation, and content management. These rules are particularly important in larger, mature communities where consistency and transparency are necessary for managing diverse user bases (Frey et al., 2022; Hwang and Shaw, 2022). Research on platforms such as Wikipedia shows that as communities grow, formal rule systems become increasingly complex and distinct, helping to stabilize governance by creating reliable, standardized institutional procedures (Hwang and Shaw, 2022). Institutional complexity, or the number and the scope of governance rules, is related to community success in Minecraft gaming communities (Frey and Sumner, 2019). When governance systems evolve over time, users either become accustomed, or alternatively, influence governance by leaving communities that do not meet their preferences. However, studies also show that formal rules alone may not be sufficient to regulate behavior. For instance, some scholars suggest that formal rules such as policies and guidelines are rarely effective and more likely to hinder engagement (Jagannath, 2021), while in Reddit communities strict rule enforcement is perceived negatively (Weld et al., 2024).

Unlike formal rules, social norms are abstract, unwritten, and they emerge organically from the interactions between community members. Norms shape how members engage with one another, fostering an internalized sense of appropriate behavior that often operates horizontally, below the surface of formal governance (Fiesler and Bruckman, 2019; Ivaturi and Chua, 2019). Communities where norms closely align with shared identities tend to be more cohesive and resilient to disruptions. For instance, in online forums, the acceptance and longevity of community norms were found to depend on their consistency with the community's identity and values (Ivaturi and Chua, 2019). Communities often self-regulate through social practices such as public shaming, creating an environment where social norms, rather than formal sanctions, guide behavior (Fiesler and Bruckman, 2019). Authors also suggested that it is important to create formal rules that support existing norms, rather than imposing them on users externally (Fiesler and Bruckman, 2019). In general, norms help sustain order, showcasing their importance in fostering long-term engagement and trust among community members.

Online communities can adopt a range of governance approaches depending on their structure, size, and purpose. While some communities rely heavily on formalized rules, others thrive mainly through norm-driven governance. For instance, in OSS communities, the hybrid governance model combines formal policies with informal, community-driven norms that guide technical decision-making (Chakraborti et al., 2024). In contrast, Reddit's governance relies more on top-down enforcement of formal rules, with occasional site-wide bans and quarantines targeting toxic subcultures (Gillett and Suzor, 2022). Other communities like those in the World of Warcraft gaming environment demonstrate how decentralized norms can emerge organically, resulting in distinct server cultures despite identical game mechanics and baseline rules (Strimling and Frey, 2020). Similarly, on Wikipedia, distinct institutional variations emerge, despite the large number of baseline rules they share (Hwang and Shaw, 2022). This diversity highlights the importance of adapting governance styles to the needs of the community, rather than relying solely on a single form of control.

Overall, online communities often blend formal governance with flexible, norm-driven approaches. The dynamic interaction between formal rules and social norms creates systems that support long-term

engagement and growth, yet little is known about how these governance elements interact or how they affect psychological outcomes, such as the sense of community.

1.7. Limitations of the Extent Literature on Online Governance

While research on online governance has advanced significantly over the last decade, several limitations still persist. This is perhaps unsurprising, given that governance is a multifaceted concept with variations, making it challenging to measure comprehensively (Sibai et al., 2015; Weld et al., 2024). This diversity complicates efforts to understand online governance, as its manifestations depend on community size, needs, purposes, and dynamics. Furthermore, many studies tend to focus on a single community or platform (Hwang and Shaw, 2022), often using qualitative or textual data drawn from interviews or digital content. While this offers valuable insights into specific cases, it limits the generalizability of findings, hindering our ability to draw broader conclusions about governance processes across a wider range of communities.

One major gap in the literature is the absence of a comprehensive perspective that integrates the three core dimensions of governance: formal rules, social norms, and the processes and strategies that establish and enforce them (Crawford and Ostrom, 1995; Janssen and Ostrom, 2006; Schlüter and Theesfeld, 2010). Most studies tend to focus narrowly on one of these aspects, be it rules, norms, or the mechanisms through which they are created and upheld. For instance, many examine moderator practices and strategies (Cai et al., 2021; Dosono and Semaan, 2019; Matias, 2019; Seering et al., 2022; Squirrell, 2019; Srinivasan et al., 2019), while others focus primarily on community rules and norms (Chakraborti et al., 2024; Fiesler and Bruckman, 2019; Frey et al., 2022; Frey and Sumner, 2019; Hwang and Shaw, 2022; Ivaturi and Chua, 2019). By concentrating on a dimension of governance, these studies miss the interconnectedness of rules, norms, and the broader governance processes. A more integrated approach would provide a fuller understanding of how these elements interact and collectively shape the community.

Furthermore, the literature mostly suggest that moderators adopt a top-down governance approach, without input from their members when they establish rules or make decisions (Schneider et al., 2021; Seering et al., 2019; Wang et al., 2024; Zhang, 2018), but other studies show that this may not always be the case (Jagannath, 2021; Thach et al., 2022; H. M. Wang et al., 2022). Early work on the emergence of

governance online underlines the importance of balancing hierarchical structures with democratic processes, and potential difficulties that may arise (O'Mahony and Ferraro, 2007), though very little work focuses on participatory processes within online communities. Having the de facto authority to establish rules does not necessarily mean that moderators do not consult their members when they make rules or decisions. Governance processes in online communities may range from democratic to centralized, but it is not clear how these processes interact with other elements such as rules and norms, or how they relate to users, moderators, and community outcomes.

Another key limitation is the frequent conflation of formal rules and social norms in online governance research. Many studies use these terms interchangeably when discussing governance online (Chandrasekharan et al., 2018; Fiesler and Bruckman, 2019; Frey et al., 2022; Jiang et al., 2019; Kiene et al., 2016). However, formal rules and social norms are distinct means of control, with different sources, processes, and implications (Ens et al., 2023; Kreutzer et al., 2016; Ouchi, 1979; Ouchi and Price, 1978; Sitkin and George, 2005). Formal rules are explicit, codified guidelines created and enforced by individuals in positions of authority to enforce them, whereas social norms are implicit, socially agreed-upon behaviors that evolve organically, and are enforced informally. Conflating these processes can lead to misinterpretations about how governance functions in online spaces. A clearer distinction between formal rules and social norms is necessary to understand their separate and interactive effects on community behavior and cohesion.

Most research on online governance measures community success in terms of audience size, engagement levels, or activity metrics (Cunha et al., 2019), often overlooking more nuanced psychological outcomes. Metrics such as user engagement or audience size are important but do not provide a full picture of community well-being. Research has yet to adequately and systematically explore how governance structures, whether rule-based, norm-based, participatory, or centralized, affect the psychological well-being of users and moderators. Psychological constructs such as a sense of community are seldom used as indicators of community success, despite their relevance to community cohesion.

Furthermore, governance processes may have different effects on users versus moderators, with rules, norms and moderation practices potentially impacting these groups in divergent ways (Squirrel, 2019; Weld et al., 2024). But a large part of the studies that focus on user experiences of moderation focus on commercial moderation and not community-based governance (Ma et al., 2023). Future research should incorporate established psychological measures to assess how governance influences these outcomes for community members with different levels of agency and authority.

Lastly, the existing literature on online governance relies on qualitative data sources (Kiene et al., 2019), using interviews, ethnographic methods or computational analysis of digital trace data, like discussion posts, moderator decisions, rules or community guidelines (Dosono and Semaan, 2019; Gilbert, 2020; Jhaver et al., 2019; Juneja et al., 2020). While these methods provide rich, in-depth insights, they often lack the representativeness that survey-based research could offer. Surveys seem to be underutilized, despite their potential to capture broader, more generalizable insights into how users and moderators experience governance. One particular reason could be the difficulties related to reaching community moderators, they are known to be notoriously hard to reach for data collection (Weld et al., 2024). But surveys are necessary for they could provide important insights on attitudes and perceptions, which may not be fully captured by computational analysis of the trace data, such as implicit social norms. The reliance on qualitative data or interviews also limits our ability to systematically compare governance practices and experiences across communities, further narrowing the scope of our understanding of online governance. There is a need for multi-methodological work that takes an integrated, multi-dimensional approach to online governance.

In conclusion, the literature on online community governance has made substantial strides in examining the role of rules, norms, moderation and governance practices across diverse platforms. However, significant limitations remain regarding how these elements interact to foster or undermine community cohesion. The diversity of governance structures across platforms complicates efforts to define and measure governance, while the tendency to focus on a single dimension, be it formal rules, norms, or moderation practices, fails to capture the interconnected nature of them. Furthermore, the frequent conflation of rules

and norms, along with a narrow focus on engagement or size as markers of success, neglects the psychological outcomes that are crucial for both users and moderators. Addressing these gaps will require a more comprehensive, multi-dimensional approach to governance that incorporates psychological constructs, user and moderator perspectives, and diverse data sources to deepen our understanding of how governance affects the sustainability and well-being of online communities.

1.8 Overview of the Dissertation

This dissertation bridges two interrelated yet distinct bodies of literature discussed in this chapter, Sense of Virtual Community and Online Governance, addressing gaps in both by drawing on broader fields including Communication, Community Psychology, Social Psychology, Organizational Control, Human-Computer Interaction, Information Systems Management and Computer-Supported Cooperative Work.

Both online governance and sense of community literature tend to focus on isolated aspects of their respective domains. The SoVC literature has emphasized the social interactions that foster community feelings, often overlooking how governance can influence these dynamics. Conversely, research on online governance has focused primarily on structural and administrative aspects, usually focusing on a single governance mechanism, neglecting how they impact psychological well-being and community attachment. Both fields, as a result, have not adequately explored how participatory governance affects community dynamics. This dissertation contends that a more holistic view is necessary, one that considers how participatory governance and different governance mechanisms interact and shape the sense of community.

The need for a more integrated approach is also methodological. Studies on online governance often rely on qualitative analyses or digital trace data, providing deep but narrow insights. SoVC research, while utilizing broader survey methods, typically concentrates on singular communities without cross-contextual comparisons. There is a notable lack of comparative research that examines governance across different communities, and across different levels of user agency, which could shed light onto how different governance structures impact psychological outcomes. This dissertation employs a mixed-method approach to capture a wider range of perspectives and provide a more comprehensive understanding of governance dynamics in online contexts.

To address these theoretical and methodological gaps, the series of studies presented in this dissertation aim to answer the following research questions:

RQ1: How do different governance mechanisms, such as participatory governance, formal, and social control interact with and relate to the sense of community experienced by members of online communities?

RQ2: How does participatory governance relate to online community moderators' psychological needs and motivations?

RQ3: How do different governance resources interact and relate to the sense of community experienced by moderators of online communities?

Addressing these research questions, this dissertation presents three studies that explore the interplay between governance structures, making a distinction between the perspectives of members and moderators, offering new insights into how online governance shapes the sense of community experienced.

Chapter 2 presents the first study, which investigates the relationship between SoVC, social control, formal control, and participatory governance among members of online communities. Based on an online survey conducted with 1,080 participants, this study reveals that both participatory governance and social control are positively associated with SoVC, while formal control is not. Surprisingly, the interaction between social control and participatory processes is negatively related to SoVC, which contradicts traditional views. The findings also suggest that larger communities can foster a strong SoVC by incorporating participatory decision-making processes, offering new insights into the strategic design of governance systems that promote community cohesion.

Chapter 3 shifts the focus to moderators, exploring how different governance forms affect their psychological needs and motivations. The responses from a survey study with over 600 Reddit moderators challenge traditional assumptions that democratic processes are beneficial for all those involved. Instead, the findings indicate that more centralized governance forms may be more effective in fostering feelings of institutional acceptance and belonging among moderators. These results provide important implications for understanding the trade-offs associated with different governance structures in online communities.

Chapter 4 presents the third study, which combines digital trace data from the Reddit API with survey responses from 418 moderators. This study examines how governance resources, such as the number of moderators, the number of rules, participatory processes, and administrative load, relate to moderators' SoVC. The results reveal a complex dynamic, where the effectiveness of governance structures in fostering SoVC is highly context dependent. While larger moderation teams enhance SoVC, the relationship between participatory processes and SoVC varies depending on the number of rules and moderators within the community. This study builds on previous work by highlighting the importance of understanding how governance elements interact to shape the experiences of online community moderators.

Lastly, Chapter 5 concludes the dissertation by summarizing the major contributions of the research studies, discussing their practical implications, acknowledging their limitations, and suggesting future directions for further exploration

2. Governing a Sense of Community Online

Despite the emphasis on leadership, governance and participation in traditional perspectives (Kollock and Smith, 1996; Lazar and Preece, 2002a; McMillan and Chavis, 1986; Ostrom, 1998), early work on online communities suggested that virtual groups differ from their offline counterparts in terms of social, peer-based influence, which was found to be weaker (Blanchard, 2008; Blanchard and Markus, 2004a). However, these studies often overlooked governance processes as a potential influence on SoVC, echoing the conventional perspective that online communities lack formal structures for governance (Rheingold, 2000). This is because most online communities that were at the focus of early research did in fact commonly lack a hierarchical or formal governance structure. However, the landscape of online communities has evolved significantly since then, challenging earlier assumptions, and highlighting the need to reconsider how governance influences the social dynamics and the sense of virtual community.

The core argument of this study is that governance, particularly how it is structured and implemented within online communities, can profoundly influence the quality of interactions among members. Effective governance can enhance quality engagement, foster a stronger sense of community, thereby elevating the overall community experience. But what constitutes effective governance in online communities? Traditional perspectives, such as the theory of commons governance (Ostrom, 1990), organizational control theory (Ouchi, 1979; Ouchi and Price, 1978), self-determination theory (Deci and Ryan, 1985), suggest an inherent paradox of governance that requires a careful balance between autonomy and control. Autonomy in an organization, where members self-govern, can foster engagement and sense of ownership (Ostrom, 1990), but it may also lead to disorder and conflict (Kollock and Smith, 1996). Control is essential to maintain order and prevent misconduct (Daft and Macintosh, 1984; Ouchi, 1979), but too much control can also stifle dialogue and engagement (Deci and Ryan, 1985). The challenge, therefore, lies in balancing these dynamics: autonomy and control, participation, and regulation (Grimmelmann, 2015). Additionally, there are different control modes that operate through different mechanisms (Eisenhardt, 1985; Ouchi and Price, 1978), and they can be implemented in combination

(Kirsch, 1997; Kreutzer et al., 2016; Ouchi, 1979; Sitkin et al., 2020), though it is not clear how they interact with participatory processes, and how they collectively shape the sense of community in the online context.

To address these gaps, this study explores the interactions between formal control, social control and participatory governance within online communities, specifically examining how these relationships influence the sense of virtual community experienced by their members. While previous research has often analyzed online governance and SoVC in isolation, this investigation integrates these perspectives, utilizing a representative sample, pioneering an empirical examination of the complex interplay between different governance mechanisms and SoVC.

2.1 Governance processes

Control mechanisms such as rules and norms are needed in every community to ensure stability and avoid misconduct (Butler, 1999; Butler et al., 2007; Kollock and Smith, 1996; Lazar and Preece, 2002a). The substance of these rules, along with their creation and enforcement are critical in shaping the community experience (Butler et al., 2008; Kiesler et al., 2011; Ren et al., 2012; Shen and Khalifa, 2013). The extent to which community members participate in rule-making processes should carry a lot of weight for building cohesion, but the role of governance in shaping the SoVC can be rather multifaceted and complex. McMillan and Chavis (1986) highlight how power, control, and influence are crucial for community cohesion in physical settings, noting that member influence is key to any community's appeal. However, this influence need not be limited to social interactions; member influence can also occur at the governance level. For instance, communities with a participatory governance structure are more adept at empowering their members and meeting their needs (Dosono and Semaan, 2019; Seering et al., 2017; Shen and Khalifa, 2013; Thach et al., 2022). Prior studies highlight the importance of policies and leadership that incorporate member input as a characteristic of successful communities (Frey et al., 2019; Kollock and Smith, 1996; Ostrom, 1998; Schneider et al., 2021; Seering et al., 2019; Strimling and Frey, 2020). Though, pluralist, inclusive approaches to governance may also have their downsides in the online context.

Emotional safety is traditionally considered an important aspect of sense of community (McMillan and Chavis, 1986), but it can be threatened by online anonymity. Participatory governance promotes open

debate in decision-making, which could also lead to a large number of competing viewpoints and disruptive behaviors, causing challenges (Gilbert, 2020; Juneja et al., 2020; Schöpke-Gonzalez et al., 2022; Squirrel, 2019). The openness in discussion may inadvertently facilitate the spread of harmful content (Massanari, 2017; Topinka, 2018), which may explain why some community leaders avoid democratic governance (Weld G, Zhang AX, Althoff T, 2022). Such dynamics underscore the challenges of managing pluralistic online spaces effectively (Chakraborti et al., 2022; Frey et al., 2022; Frey and Schneider, 2023), where centralized governance may offer distinct advantages. For instance, strong leadership was suggested to play an important role in community cohesion and survival (Ho and Huang, 2009; McEwan and Gutwin, 2017). It could be that centralized governance provides a more structured environment, where clear rules and enforcement can quickly address disruptive behaviors, thereby enhancing cohesion.

The literature presents conflicting viewpoints on how community governance might affect members' SoVC. Previous work explored factors such as perceived normative influence (Blanchard, 2008), being sanctioned or sanctioning others (Blanchard et al., 2011), perceived leader enthusiasm (Koh et al., 2003), leader involvement in community activities (Ho and Huang, 2009) and leader withdrawal (McEwan and Gutwin, 2017). But it is still not clear how different forms of community governance, such as participatory governance or centralized governance might affect members' SoVC. Therefore, I ask the following research question:

RQ1: How does participatory governance relate to community members' SoVC?

2.2 Formal Control

Whether participatory or centralized, any type of governance structure rests on a foundation of authority, granted by rules and policies that define limits and regulate behaviors. The traditional view in organizational theory makes a distinction about how behaviors are regulated through different modes of control within organizational structures (Daft and Macintosh, 1984; Jaworski, 1988; Ouchi, 1979; Sitkin et al., 2020). In this view, formal control refers to the hierarchical application of official tools that objectively guide behavior, (i.e. written rules, procedures, and policies), and involves monitoring the extent to which individuals follow these practices (Daft and Macintosh, 1984; Jaworski, 1988; Kreutzer et al., 2016; Ouchi,

1979). Social control, on the other hand, refers to the horizontal exercise of informal, unofficial, unwritten standards (i.e. norms) that arise from social interactions and guide behavior through socialization (Daft and Macintosh, 1984; Ellickson, 1987; Gilliland and Manning, 2002; Kreutzer et al., 2016; Ouchi, 1979). These two modes of control complement each other in organizational settings across different contexts (Kreutzer et al., 2016). The literature on online communities also highlights the importance not only of establishing rules and norms but also the extent of their enforcement, in the mode of formal and more informal control (Kirsch, 1997; Kollock and Smith, 1996; Lazar and Preece, 2002a).

Traditionally, rigid enforcement mechanisms are believed to negatively impact group cohesion (Deci and Ryan, 2000; Markus et al., 2000). Previous work shows that sanctions or other disciplinary actions can lead to conflicts online, increasing feelings of frustration and burnout among moderators (Dosono and Semaan, 2019; Schöpke-Gonzalez et al., 2022; Squirrell, 2019). When enforcement becomes too constrictive, it can stifle dialogue and discourage participation, ultimately weakening the fabric of the community. For instance, in a bulletin board for parents, Blanchard (2011) found that being sanctioned, or sanctioning others might decrease SoVC and called for additional research. But authors used a measuring tool that was not established in prior research, and neither specified the source of sanction (i.e. social norms or institutionalized rules) or the role of the sanctioning agent (i.e. peer or moderator) in their measuring items, which could affect the outcome.

The key difference between formal and social control lies in their source; formal control is rule-based and enforced by legitimate authority, with immediate consequences for deviations (Daft and Macintosh, 1984; Gilliland and Manning, 2002; Ouchi, 1979). From this perspective, community control measures like user bans or post removals employed by moderators often fall under formal control (Gilbert, 2020; Jhaver et al., 2019). Recent work on formal control shows that it can play an important role in managing tensions (Skousen et al., 2019), and can positively influence performance (Ahlfänger et al., 2022). Clear and consistent rule enforcement from community leaders can also increase an individual's perceived procedural fairness, which enhances rule compliance (Kiesler et al., 2011; Walters and Bolger, 2019), and cooperation (Tyler and Degoe, 1995). Therefore, it is predicted:

H1a: There is a positive significant relationship between formal control and users' SoVC.

One factor that could impact this relationship is the extent to which community members participate in rule-making processes. Aside from being inclusive, actively participating in shaping the direction and policies of the community could lead individuals to perceive the procedure as legitimate, which enhances compliance and cooperation with the group (DeCaro et al., 2021; Deci and Ryan, 1985). Transparency in governance promotes greater internalization of rules, while the lack of it can cause skepticism or hostility (Kiesler et al., 2011; Lazar and Preece, 2002b). A pluralist approach would also ensure that rules are reflective of collective interests and values (Weibel, 2007), further solidifying cohesion. The effectiveness of formal control in enhancing SoVC might therefore be contingent upon the involvement of community members in rule-making processes that lays the foundation for that control to be exercised. Therefore, the prediction:

H1b: The interaction between formal control and participatory governance positively and significantly relates to users' SoVC.

2.3 Social Control

The very concept of control suggests that a behavioral standard has been set, but this standard need not to be formally written (Janssen and Ostrom, 2006; Jaworski, 1988). Control can also be horizontally exercised through peer enforcement. Different scholars refer to informal, peer-enforced control by different terms (Jaworski, 1988), including clan control (Ouchi, 1979), social control (Markus et al., 2000; O'Reilly and Chatman, 1996), community control (Gossett and Tompkins, 2000), peer control (De Jong et al., 2014), and concertive control (Barker, 1993; Tompkins and Cheney, 1985). The common theme in this framework is horizontal peer enforcement processes (Barker, 1993), while the emphasis is on social connections and implicit normative standards of behavior (Tompkins and Cheney, 1985). In this study, I follow Markus and colleagues (2000) and adopt the term social control to emphasize the informal, horizontal nature of the regulative process.

While early work on online communities suggests that peer influence is weaker in online settings compared to physical communities (Blanchard et al., 2011), more recent work shows that enforcing

behavioral standards among peers can enhance SoVC through normative influence and social control (Gibbs et al., 2019). Though this study examined a single community that is characterized by its homogeneity, longevity, and tight relationships between members, which could make them more susceptible to normative standards (Gibbs et al., 2019). To test the generalizability of authors' findings across different online community settings, it is predicted:

H2a: There is a positive significant relationship between social control and users' SoVC

The effectiveness of peer-based control on SoVC may also depend on the extent of member participation in governance processes. Classic work highlights the importance of mutually developed values and norms (Barker, 1993; Gossett and Tompkins, 2000; Tompkins and Cheney, 1985), and a shared basis of authority (Coleman, 1980). Participation in governance can enhance the legitimacy and internalization of social norms (Deci and Ryan, 1985; Ryan, 1982), leading to greater compliance. This participation strengthens the alignment of individual and collective values, fostering a sense of collective identity, which is crucial for peer-based control. Therefore, it is predicted:

H2b: The interaction between social control and participatory governance positively and significantly relates to users' SoVC.

2.4 Community Size and Participatory Governance

All communities rely on continuous user engagement (Blanchard and Markus, 2004a), and the size of a community is important for their survival (Kraut and Resnick, 2012). It is therefore considered as an indicator of community success and employed as a success metric (Cunha et al., 2019; Kairam et al., 2012; Tan, 2018). But previous work presents a nuanced view on the impact of community size. While increased size leads to more resources and higher benefits for individuals, it also makes it more difficult for members to receive them (Butler, 2001a; Kollock and Smith, 1996; Ren et al., 2012). Previous work highlights the challenges larger communities face, such as reduced personal interaction, unequal participation, and informational overload, which leads to low retention and high turnover (Butler, 2001a; Cunha et al., 2019; Kollock and Smith, 1996; Panek et al., 2018; Ren et al., 2012). These findings suggest that as communities grow, the intensity of individual connections and sense of belonging diminish. In this light, it is predicted

that:

H3a: There is a significant negative relationship between community size and users' SoVC.

It could also be the case that the extent to which members participate in rule-making processes mitigates the negative impact of increasing size on SoVC. Specifically, while larger communities might experience challenges, effective governance can potentially counteract these issues. The question is, which approach would constitute an effective form of governance? On the one hand, in large communities where governance encourages member participation, the dilution of SoVC could potentially be lessened (Kollock and Smith, 1996; Lazar and Preece, 2002a), making members feel more connected and engaged despite the increase in size. On the other hand, a centralized governance approach could be especially beneficial for larger communities, balancing the need for member input with community harmony and stability.

The literature on online communities does not clearly address how community size and governance forms interact to affect SoVC, but traditional perspectives have long debated this interaction. Large social structures are often associated with weak social connections (Durkheim, 1897; Fischer, 1972), where participation tends to be costly (Black, 1974), while smaller communities provide more resources and opportunities for engagement (Dahl and Tufte, 1973; Olson, 1971; Verba and Nie, 1987). Recent studies indicate that larger community size can harm cohesion (Graddy and Wang, 2009), though its impact on the sense of community remains uncertain (Anderson, 2010). In contrast to their physical counterparts, online communities lower participation barriers, making engagement less costly (Boulianne, 2015), which can enhance participation. Furthermore, online communities can leverage technology to implement participatory governance at scale, using modern tools such as polls, forums, and real-time feedback systems (Auray, 2012; Goldberg and Schär, 2023; Zhang et al., 2020). These features can help maintain a sense of belonging by ensuring members feel heard and valued, regardless of the community size. Thus, the interaction between community size and participatory governance in online settings may positively influence SoVC. Therefore, I ask the following question:

RQ2: How does the interaction between community size and participatory governance relate to users' SoVC?

2.5. Methods

To investigate the proposed relationships an online survey was administered via Qualtrics to a demographically representative sample of US Internet users, totaling 4800 participants. Participants were recruited through Qualtrics survey panels, and informed that the study was designed to explore Internet user's online experiences. All participants were required to provide their consent before taking the survey. The data cleaning process involved several steps to ensure data quality and validity. First, participants who did not explicitly self-identify as members of an online community were excluded. This determination was based on a survey question where participants were specifically asked if they considered themselves as members of an online community. Second, responses were excluded if participants completed the survey in less than one-third of the average completion time. Third, three attention check questions were randomly placed throughout the survey, and participants who failed any of these checks were removed from the dataset. Lastly, responses where participants selected the same scale point for at least 11 out of 12 consecutive items, were also excluded. After these exclusions, the refined sample consisted of 1,080 individuals who identified themselves as members of an online community.

The average participant age was 40, with 52% aged between 18 and 44 ($n = 561$). Majority identified as female (70%, $n = 753$), with some or more college education (81.3%, $n = 878$). Most participants reported membership of either an interest-based community (24.8%, $n = 267$), a local neighborhood community (21.8%, $n = 235$), a professional community (20.5%, $n = 221$), or a support community that focus on health or individual well-being (19.4%, $n = 209$), and almost half of these communities were reported to have more than 500 participants (45%, $n = 485$). Most participants visited their communities a few times a week (22.2%, $n = 240$), spent an hour or less per visit (83.4%, $n = 901$) and had been members for over 2 years (47.9%, $n = 517$).

2.5.1 Measures

We measured items with 7-point Likert scales that ranged from “strongly disagree” to “strongly agree” unless otherwise indicated. All measures were taken from prior literature, with slight adaptations as needed to emphasize the online community context (Table 1).

The dependent variable, SoVC is defined as the extent to which users identify with an online community and feel a sense of belonging and togetherness (González-Anta et al., 2021). This construct was measured with 8 items from the “Brief Sense of Community Scale” developed by Peterson and colleagues (2008) and validated in a number of community contexts (Cocco et al., 2024; Hilvert-Bruce et al., 2018; Mamonov et al., 2016; Peñarroja et al., 2019; Poor, 2014; Rosen et al., 2011). The local neighborhood emphasis in the original scale was slightly adapted to reflect the virtual community context (e.g., “*I feel connected to this online community*” instead of “*I feel connected to this neighborhood*”, $\alpha = .894$, $M = 4.64$, $SD = 1.14$).

To identify the governance structure, the respondents were asked to choose the option that best describes the process that is employed to make community rules (Seering et al., 2019). Items ranged from most hierarchical (e.g., “*Moderators enact new rules on their own without consulting members*”) to most democratic (e.g., “*Moderators work with the entire group of community members to enact new rules*”). Participants were also given the option to select “*I don’t know*” in the case they were unsure about the governance procedures employed. A total of 210 participants selected this option, their responses were excluded from further analysis ($M = 2.93$, $SD = 1.42$).

Formal control can be defined as the extent to which an online community has established mechanisms for monitoring rule compliance and procedures for addressing rule violations, which may involve sanctions or bans, based on explicit guidelines (Gilliland and Manning, 2002; Jaworski, 1988). Three items were used to measure formal control (Carbonell and Rodriguez-Escudero, 2013; Jaworski, 1988), slightly adapted to emphasize the online context (e.g., “*Moderators actively monitor the extent to which other members follow the established rules and policies*”, instead of “*During the project, upper management monitored the extent team members followed the established procedures*”, $\alpha = .852$, $M = 4.94$, $SD = 1.38$).

Social control refers to the extent of peer enforced behavioral regulation within a group, based on shared values and behavioral standards (Barker, 1993; Kirsch, 1997). Four items were adopted from previous work to measure this construct (Gearhart, 2022; Gearhart and Joseph, 2019; Gibbs et al., 2019).

The emphasis on the community environment were slightly adapted to emphasize the online context (e.g., *“Other users in this online community would intervene, if they see someone engage in disruptive behaviors”* instead of *“My neighbors would intervene, if a fight broke out in the street”*, $\alpha = .811$, $M = 4.14$, $SD = 1.04$).

We also controlled several constructs that were shown to be associated with SoVC in previous work, such as community participation, active engagement, social connectedness of the community and the number of strong ties. To address the previous gaps in the literature in terms of measuring participation (Malinen, 2015), and to capture community participation as accurately as possible, I measured the intensity, length and frequency of use separately. To measure frequency, I asked participants how often they visited their community, the answers ranged from “less than once a month” (1) to “more than 3 times a day” (7) ($M = 4.52$, $SD = 1.87$). To measure intensity, I asked participants how much time they spent in their community on average per visit, answers ranged from “less than 15 minutes” (1) to “more than 5 hours” (7) ($M = 2.44$, $SD = 1.25$). And to measure the length of use, I asked participants how long they have been members, with answers ranging from “less than six months” (1) to “more than five years” (5) ($M = 3.09$, $SD = 1.65$).

When measuring engagement, a distinction was made between active and passive forms of engagement to control for both factors (Tonteri et al., 2011). Active engagement was measured with two items: “I often post and share content in this community”, “I often like or comment on other’s posts and shares” ($M = 4.36$, $SD = 1.45$). Passive engagement was measured with three items (e.g., “I rarely interact with others in the community”, “I often browse the shared content but don’t share anything myself”) ($M = 3.17$, $SD = 1.30$). To measure community connectedness, participants were asked to select all the mediums through which they socialize with other members. The options included in-person, SMS or phone calls, social media platforms, instant messaging applications, gaming platforms, or other services. The responses were then combined into an index ($M = 1.55$, $SD = 0.98$). Lastly, I controlled the number of strong ties, by asking the number of people participants consider friends ($M = 3.51$, $SD = 1.61$).

2.6. Results

A hierarchical regression analysis was conducted to examine the relationship between participatory governance, formal and social control, community size and SoVC. All predictors were mean-centered before the analysis. I checked for multicollinearity between variables by examining their zero-order correlations and VIF statistics (Table 1.1). The accompanying statistics were all found to be acceptable ($VIF < 5$), indicating limited collinearity (Akinwande et al., 2015).

Table 1.1

Zero-order correlations with variance inflation factor statistics

	1	2	3	4	5	6	7	8	9	10	11	12	VIF
SoVC	1.00												
Participatory Governance	0.17	1.00											1.22
Formal Control	0.30	0.29	1.00										1.83
Social Control	0.49	-0.14	0.54	1.00									1.77
Community Size	-0.19	-0.05	0.16	0.07	1.00								1.25
Use Frequency	0.13	0.11	0.22	0.11	0.20	1.00							1.21
Use Length	0.08	0.06	0.02	0.01	0.18	0.12	1.00						1.16
Use Intensity	0.41	0.03	0.15	0.27	0.08	0.17	0.16	1.00					1.31
Active Use	0.59	0.00	0.31	0.48	-0.14	0.29	0.03	0.45	1.00				1.63
Passive Use	-0.28	-0.13	0.04	-0.08	0.16	-0.13	-0.12	-0.28	-0.32	1.00			1.22
Connectedness	0.29	0.08	0.02	0.17	0.06	0.12	0.11	0.18	0.28	-0.16	1.00		1.21
Number of friends	0.41	0.17	0.02	0.20	0.04	0.14	0.27	0.22	0.35	-0.31	0.38	1.00	1.41

Compared to the baseline model that only includes control variables ($F(7, 1055) = 178, p < 0.001, R^2 = .503$), adding the main effects in the model ($F(11, 830) = 114.4, p < 0.001, R^2 = .597$) resulted in an additional 9.4% of the explained variance (Table 1.2). The final model with the interaction terms further

improved the model fit ($F(14, 827) = 93.01, p < 0.001, R^2 = .605$), slightly reducing the standard error and explaining an additional 0.78% of the variance. An ANOVA comparing the main effects model with the added interactions confirmed that the interactions significantly enhanced model fit ($F = 6.453, p = 0.00025$). These results highlight the substantial contribution of the main effects in explaining SoVC and highlight the nuanced insights gained by incorporating interaction effects.

Table 1.2
Hierarchical Regression Results with SoVC as the Dependent Variable

	<i>Model 1</i>		<i>Model 2</i>		<i>Model 3</i>	
	β	<i>SE</i>	β	<i>SE</i>	β	<i>SE</i>
(Intercept)	0.046	0.026	0.033	0.024	0.039	0.025
Use length	0.008	0.028	0.001	0.026	0.001	0.027
Use frequency	0.055**	0.013	0.023	0.014	0.023	0.010
Use intensity	0.122***	0.021	0.094***	0.021	0.083***	0.021
Connectedness	0.068*	0.026	0.049*	0.026	0.052*	0.026
Number of friends	0.144***	0.019	0.131***	0.018	0.126***	0.018
Passive Use	0.066**	0.022	0.030	0.020	0.024	0.20
Active Use	0.471***	0.024	0.307***	0.024	0.306***	0.024
Community size (CS)			-0.033**	0.012	-0.040***	0.012
Participatory governance (PG)			0.037**	0.018	0.052**	0.018
Social control (SC)			0.359***	0.030	0.358***	0.030
Formal control (FC)			0.001	0.022	0.005	0.022
CS * PG					0.028***	0.007
SC * PG					-0.037*	0.019
FC * PG					0.007	0.014
<i>F</i>	178***		114.4***		93.01***	
<i>df</i>	1055		830		827	
<i>SE</i>	0.773		0.697		0.691	

Adjusted R2	0.503	0.590	0.605
R2		0.102	

* $p < .05$; ** $p < .01$; *** $p < .001$

Results showed that, after controlling for use frequency, length, and intensity, together with active use, passive use, community connectedness and number of friends, SoVC is significantly associated with participatory governance, social control and community size. I found both the level of participatory governance ($\beta = 0.052$, $p = 0.0049$) and social control ($\beta = 0.358$, $p < 0.001$) have significant positive correlations with SoVC, independently. This suggests that communities that employ participatory governance can enhance the sense of community among their members. Additionally, communities that utilize social control, where actions are regulated through peer-interactions, can also significantly enhance the sense of community among their members, supporting H2a. The negative interaction between participatory governance and social control ($\beta = -0.037$, $p = 0.005$) is a surprising finding, rejecting H2b. This suggests that while both factors may independently strengthen SoVC, their combined influence may not be so straightforward and decrease cohesion among members.

Among the control variables, self-reported time spent in the community ($\beta = 0.083$, $p < 0.001$), community connectedness ($\beta = 0.052$, $p = 0.048$), number of friends ($\beta = 0.126$, $p < 0.001$), and active use ($\beta = 0.306$, $p < 0.001$) all positively predicted SoVC. The more time individuals spent with the community, the more they actively engaged and the stronger the relationships they form within it, the stronger was their sense of community. There were no significant associations between formal control and SoVC. Similarly, remaining control variables, such as the length of membership, frequency of participation or passive use did not exert a significant influence on SoVC.

2.7. Discussion

This study explored the complex interplay between different community governance mechanisms and their impact on the SoVC in online communities. The findings reveal a nuanced landscape where community governance significantly shapes community experiences and perceptions of belonging. Participatory

processes, characterized by member involvement and shared decision-making, exhibited a significantly positive relationship with SoVC. Results also showed that social control was the strongest predictor of SoVC, highlighting the critical role of social bonds and peer enforced behavioral standards in fostering community unity. Interestingly, formal control mechanisms did not significantly impact SoVC, even when members participated in establishing the rules themselves, indicating that mere presence of rules and enforcement may not automatically translate into a stronger sense of community. The study further uncovered the interaction between community size and participatory governance positively influences SoVC, suggesting that democratic governance can mitigate some of the challenges posed by larger community sizes. However, a surprising finding was the negative interaction between participatory governance and social control on SoVC, indicating that in communities with high participatory governance, the influence of peer-based norm enforcement and social control on fostering a sense of community may be diminished. These findings highlight the complexity of governance in online communities and underscore the importance of balancing different governance approaches. The nuanced interplay findings reveal valuable insights for all stakeholders seeking to enhance community cohesion and member satisfaction online.

Early work on online communities had suggested that influence, one of the four original dimensions of sense of community, was weak to non-existent in virtual settings, compared to their physical counterparts (Blanchard, 2008; Blanchard and Markus, 2004a; Obst et al., 2002). However, McMillan and Chavis intended influence to be a bi-directional concept, where “the influence of a member on the community and the influence of the community on a member occur concurrently” (1986: 12). In this light, governance mechanisms can be considered a source of influence within online communities, where communities exert influence on member behaviors. And participatory governance can be considered as a source of influence for the members, who, while being affected by the community rules and norms, can themselves influence the community by voicing their opinions (Ostrom, 1998).

Results reveal that participatory governance significantly enhances SoVC, validating the hypothesis that democratic involvement is crucial for fostering community cohesion in online spaces. The

statistical effect size indicates that participation adds about 17% of the effect of active community involvement to participants' sense of community. This effect underscores the importance of member involvement in decision-making processes, reflecting a community dynamic where individuals feel valued and influential. This aligns with McMillan and Chavis's (1986) concept of influence as a bi-directional dynamic, wherein community members not only are influenced by but also significantly impact the governance of the community.

Moreover, despite the limited attention it received in the earlier work (Gibbs et al., 2019), findings highlight social control as the strongest predictor of SoVC, emphasizing the importance of social bonds and horizontal regulation. This underscores the essential role of peer enforced behavioral standards in building community unity. The strong positive relationship with SoVC shows that well-integrated social norms and peer accountability are crucial for fostering a robust sense of community.

A particularly intriguing aspect of the findings was the negative interaction between participatory governance and social control on SoVC. In physical organizations, social control is argued to emerge among horizontal, self-managing groups, facilitating the development and enforcement of shared norms and values (Barker, 1993; Gossett and Tompkins, 2000; Ouchi, 1979). This form of control relies heavily on mutual agreements among members to adhere to collectively established standards, usually in environments where individuals have significant autonomy (Barker, 1993; Wright and Barker, 2000). In contrast to the traditional perspective, however, findings reveal a surprising negative interaction between participatory governance and social control, suggesting that when translating the concept of social control to online spaces, the dynamics may shift. This could be due to a potential overlap in the roles of formal participatory processes and informal peer enforcement, where increased participation in governance might reduce the need or opportunity for social control to act as a cohesive force.

Interestingly, the analysis also indicates that formal control does not significantly impact SoVC. In contrast to previous work that considered the role of sanctions and found negative associations (Blanchard et al., 2011), and governance studies that found a positive relation between community rules and success (Frey and Sumner, 2019), this study showed that rule enforcement does not significantly impact sense of

belonging. While rules are necessary for community governance and order (Kollock and Smith, 1996; Ostrom, 1998), the mere existence and enforcement of rules does not automatically translate into enhanced or decreased community feelings.

Like participatory governance, community size is often considered a critical factor for community success, with assumptions that smaller communities foster closer, more meaningful interactions while larger ones might struggle with maintaining a cohesive sense of community (Butler, 2001a; Kraut and Resnick, 2012; Ren et al., 2007). The positive interaction found between community size and participatory governance is an insightful finding in this regard, suggesting that, contrary to expectations, larger communities can foster a strong SoVC, provided they involve members in decision-making processes. This finding emphasizes the importance of adaptive and inclusive governance models in online community management, challenging the traditional view on community size. The strategic design of governance structures and inclusive processes can significantly enhance the sense of belonging online, irrespective of community size.

This study controlled for the length, frequency, and intensity of engagement, revealing that only the intensity of community engagement significantly predicted SoVC. This finding suggests that the quality of interactions within the community is more crucial than the frequency or duration of participation. The effects of active and passive use were also separately examined. The significant positive effect of active use on SoVC highlights the critical role of active participation in fostering a sense of belonging and engagement, contrasting some earlier findings (Gibbs et al., 2019). Additionally, the fact that passive use did not show a significant effect suggests that, in contrast to previous work (Edelmann, 2013; Gibbs et al., 2019; Tonteri et al., 2011), merely consuming content without active contribution may not be sufficient to enhance individuals' sense of community.

Overall, these findings emphasize the need for a balanced approach to governance in online communities, leveraging both participatory processes and social control to enhance community cohesion and user engagement.

2.8 Conclusion

This study highlights the significant impact of governance on the sense of virtual community (SoVC) in online settings. The findings reveal that independently, member-driven decision-making and peer-based social regulation significantly enhance SoVC, above and beyond the effects of continued, active participation. However, a notable complexity arises with high levels of member involvement potentially diminishing the effectiveness of peer enforced norms. Moreover, despite the attention it receives from governance scholars, formal rule enforcement appears insufficient on its own to foster a strong community bond. These findings expand prior theory, challenging long-lasting assumptions, while highlighting the inherently contradictory nature of autonomy and control, in the online contexts. Importantly, inclusive governance practices show promise in overcoming the challenges of larger community sizes, promoting cohesion even in expansive online networks. These findings emphasize the need for a balanced approach to governance in online communities, leveraging both participatory processes and social control to enhance community cohesion and user engagement.

One limitation in this study, however, is that there is no distinction between different roles community users may play within their communities. A promising direction for future research involves examining the impact of governance mechanisms with a particular focus on community leaders. Understanding how these mechanisms influence leaders' perceptions could provide deeper insights into the nuances of community management and member interaction dynamics. Previous work shows that regular users could differ from community leaders in terms of their attitudes and motivations towards democratic governance (Weld G, Zhang AX, Althoff T, 2022). However, moderators are paid very little attention in the literature, for they represent a group that is known to be particularly difficult to reach for data collection, and hence it is not clear how participatory governance may affect community moderators. The next chapter will attempt to fill this important gap in the literature by examining how participatory governance relates to social and psychological needs of online community moderators.

3. The Psychology of Volunteer Moderators in Online Communities

Moderators are essential for the governance of online communities, serving simultaneously as their founders and as enforcers of authority. They are tasked with developing and implementing policies, and they directly witness the outcomes of these governance actions. This dual role gives moderators a significant stake in designing effective governance systems that enhance community well-being. However, defining what constitutes an effective governance system from the perspective of moderators remains unclear. Conventional approaches to governance assume that the advantages of democratic processes are meant to be shared by all (Ostrom, 1990), yet the rewards of online community governance are primarily and most directly realized by those who govern. Despite their integral function, however, our current knowledge about the interplay between different community governance approaches and moderators' psychological experiences remains limited.

To fill this gap, this study relies on Humanistic Rational Choice Theory (HRCT) (Decaro, 2019), which expands on Elinor Ostrom's theory of commons governance (Ostrom, 1998). The premise of this framework is that governance structures, when aligned with fundamental human needs such as security and belonging, foster legitimacy and group cohesion, thereby facilitating enhanced collaborative efforts. Applying this framework to Reddit's online communities, this study examines the relationship between different governance processes and moderators' psychological needs and motivations.

3.1 Humanistic Rational Choice Theory

HRCT provides the psychological prerequisites of effective self-rule in resource systems such as online communities. The core argument of this theory is that co-operative governance arises from three core psychosocial processes: fundamental need satisfaction, institutional acceptance, and in-group cohesion. Governance systems that satisfy these basic needs of individuals are perceived as legitimate; this legitimacy then provides a ground for institutional acceptance to develop among individuals, which facilitates group cohesion and further collaboration within the group (DeCaro et al., 2021).

Social-psychological needs are shown to be universal across different cultures (Chen et al., 2015), and influential across a variety of domains (Lian et al., 2012; Park and Rainey, 2008; Rosen et al., 2014;

Sheldon et al., 2013). Within the domain of cooperative governance, De Caro has conducted several lab experiments that replicated ecological social dilemmas, to observe how the organizational aspects of governance structures influence a set of five social-psychological needs: procedural justice, self-determination, security, belonging, and competence (DeCaro et al., 2021). The HRCT suggests that satisfaction of these needs facilitate cooperation among individuals through development of legitimacy, in the form of internalization and institutional acceptance (DeCaro et al., 2021). Once a governing mechanism is perceived as legitimate by individuals, they are more likely to comply and cooperate in achieving common goals. When norms or rules are internalized, norm-related behaviors become self-sustaining, and maintained without external enforcement. Institutional arrangements that fulfill an individual's fundamental needs for procedural justice and self-determination, such as democratic decision-making, tend to promote greater internalization of the established norms and decisions (Kiesler et al., 2011). Individuals become more likely to comply when their needs for autonomy are met, which results in increased stability and cooperation.

While there has been increased attention to voluntary moderation, a large part of the previous work has mostly relied on either content analysis (Dosono and Semaan, 2018; Gibson, 2019; Juneja et al., 2020; Srinivasan et al., 2019; Topinka, 2018; Trujillo and Cresci, 2022) or interviews with a limited number of participants (Bozarth et al., 2023; Dosono and Semaan, 2019; Gilbert, 2020; Hwang and Foote, 2021; Jhaver et al., 2019; Seering et al., 2019, 2022; Squirrell, 2019). Diverging from this approach, Seering and Kairam (2022) surveyed moderators of live streaming communities on Twitch, focusing on their motivations, tasks and roles, but this study did not consider the variations in rule-making processes and their potential impact on suggested relationships. Surveying a large group of Reddit users, Weld and colleagues (Weld G, Zhang AX, Althoff T, 2022) examined community values such as diversity and inclusion, and found that moderators and users differed in terms of their attitudes towards democracy. Although this study did not consider the different governance processes employed within communities, it suggests that democratic participation may not be perceived by moderators as an efficient governance approach. Lately, a partial application of the HRCT framework on Reddit moderators provided survey

evidence for an inverse relationship between democratic governance and moderator's attitudes of procedural justice and self determination (Wang et al., 2022). Accordingly, the more control moderators had over their communities, the higher perceived procedural justice and self-determination they reported. However, this study considered only two of the specific fundamental needs proposed in the HRCT framework and further research is warranted to draw more robust conclusions about the relationship between different governance strategies and Reddit moderator's needs and motivations.

3.2 Applying Humanistic Rational Choice Theory to Online Community Moderators

This study aims to address the gap in understanding the relationship between the level of community involvement in the rule development processes, and moderators' underlying psychological needs and motivations. As direct stakeholders in governance outcomes, the focus of this work is on community moderators, recognizing their role in shaping community dynamics and their unique perspective over governance processes. The sampling choice is grounded in the premise that the primary beneficiaries of an online community governance approach are the individuals who voluntarily invest the effort to govern and manage the community itself. Moderators occupy a distinct position within online communities, serving as both the enforcers and implementers of their own policies, shaping the community culture in which they also take part as users. It is therefore important to understand how different governance structures affect moderator experiences and community outcomes. Reddit provides the ideal grounds for this purpose, for it allows users to create and rule their own communities through established governance mechanisms, offering a unique opportunity to study moderator attitudes towards their governance strategies.

While building upon previous work on cooperative self-governance, this study recognizes that subreddits and social-ecological dilemmas differ in significant ways. While both scenarios involve shared, limited resources (e.g. water or forest resources vs user time, energy, and attention) (Butler, 2001b; Kiesler et al., 2011; Kollock and Smith, 1996), subreddit moderators operate within a distinct context. Anyone can start new subreddits and exercise control without interference (Juneja et al., 2020). However, the anonymity and vast volume of interactions present both opportunities and challenges for fostering engagement, a critical factor in community success (Butler, 2001b; Lazar and Preece, 2002b; Lin and Lee, 2006).

Moderators play a key role in promoting engagement by setting norms, enforcing rules, and removing disruptive content or users (Gilbert, 2020; Lazar and Preece, 2002b; Seering et al., 2022). Nonetheless, their efforts can often lead to conflicts with other users and moderators, causing stress and burnout (Schöpke-Gonzalez et al., 2022). Although moderators highly value their communities and get fulfillment out of what they voluntarily do, moderation seems to also involve a lot of invisible work (Gilbert, 2020; Thach et al., 2022), accompanied by tensions. Considering the limited governance tools available to moderators due to the platform's reliance on their voluntary labor (Schneider, 2022; Thach et al., 2022), it may not be surprising that moderators seem to favor hierarchical governance structures (Weld G, Zhang AX, Althoff T, 2022).

Democratic decision-making, or in other words, participatory rule processes in online communities can be inclusive and empowering, allowing members to actively participate in shaping the direction and policies of the community (Dosono and Semaan, 2018; Seering, 2020; Thach et al., 2022). This would provide legitimacy to the governing authority, helping other members comply with moderator decisions (Kiesler et al., 2011; Lazar and Preece, 2002b). But participatory governance may also lead to a large number of competing viewpoints, uninformed opinions, or even symptoms of mob rule, resulting in difficulties for moderators when reaching a consensus, enforcing a rule, or defending a decision (Gilbert, 2020; Juneja et al., 2020; Schöpke-Gonzalez et al., 2022; Squirrell, 2019). This may cause a perceived lack of procedural justice, as moderators can feel that their opinions are not adequately considered, or respected, which leaves very little room for anything but asserting more control over the community. Since challenging user behaviors can become serious obstacles to effective management, they could prompt moderators to give precedence to their own understanding of procedural fairness rather than concerns related to democratic involvement. Therefore, it is hypothesized:

H1: Participatory rule processes negatively correlate with moderators' feelings of procedural justice.

Early work on communities suggests that when members are given a chance to argue their viewpoints, their commitment to the social group and willingness to comply with group decisions greatly enhances (Colquitt, 2001; Kiesler et al., 2011). But previous work also indicates that online communities

that prioritize free speech frequently become breeding grounds for the dissemination of discriminatory, racist and sexist content (Gilbert, 2020; Massanari, 2017; Topinka, 2018). These communities, while promoting open dialogue and deliberation, can inadvertently create an environment where harmful and offensive viewpoints flourish unchecked. This suggests that in communities with hierarchical governance structures, where power is more centralized, moderators would have greater control over decision-making processes and user behaviors (Dosono and Semaan, 2018; Juneja et al., 2020; Weld G, Zhang AX, Althoff T, 2022), potentially resulting in an increased sense of autonomy for them. Therefore, the prediction:

H2: Participatory rule processes negatively correlate with moderators' feelings of self-determination.

Most community leaders look for the recognition and acknowledgment of their voluntary labor, which enhances their commitment and feelings of belonging towards the community (Burke and Kraut, 2008; Kim, 2006). But the inherent inclusiveness of participatory governance within online communities can sometimes give rise to conflicts among community members (Lazar and Preece, 2002b), which in turn has the potential to diminish the overall sense of cohesion and camaraderie within the community (Gilbert, 2020; Juneja et al., 2020). This intricate dynamic has been explored in prior studies, where the management of recurring conflicts was found to contribute to feelings of frustration and burnout among community moderators (Dosono and Semaan, 2019; Schöpke-Gonzalez et al., 2022; Squirrell, 2019). It is plausible that engagement with these communities might inadvertently lead moderators to perceive a lack of recognition and appreciation for their knowledge and experience from fellow community members (Juneja et al., 2020). Consequently, this perception could erode their sense of belonging to the community (Tausczik et al., 2014), and result in a decline in their perceived competence and effectiveness as moderators.

H3: Participatory rule processes negatively correlate with moderators' feelings of sense of belonging.

H4: Participatory rule processes negatively correlate with moderators' feelings of competence.

Security is a critical issue for moderators, it enhances collaborative efforts, ensures healthy and free communication among community members, which is essential to any community's success (Larson and DeChurch, 2020; Lazar and Preece, 2002b; Preece, 2000). Prior studies underscore that moderators often grapple with toxic dynamics within their communities, confronting racism, sexism and even death threats,

ultimately leading to psychological distress (Dosono and Semaan, 2019; Gilbert, 2020). The implementation of participatory decision-making processes may be exposing moderators to a wider array of intricate challenges (Juneja et al., 2020), potentially resulting in a diminished sense of security. In contrast, communities featuring a more hierarchical decision-making structure, where moderators exercise greater assertiveness without accountability, might be experiencing fewer security concerns. Therefore, it is hypothesized:

H5: Participatory rule processes negatively correlate with moderators' feelings of security.

In a participatory decision-making structure, moderator opinions may not always align with the majority viewpoints, or the decisions reached by the community (Lazar and Preece, 2002b). A hierarchical governance mechanism, on the other hand, can ensure an organized, stable decision-making structure, promoting a sense of safety and order in the community (Dosono and Semaan, 2018; Gibson, 2019), which may potentially lead moderators to feel a higher sense of authority and fairness. Therefore, the prediction:

H6: Participatory rule processes negatively correlate with moderators' feelings of institutional acceptance.

In hierarchical structures, the concentration of authority within a limited group of individuals often facilitates moderators' internalization of the established rules and norms. Conversely, with the distribution of power in participatory systems, conflicting viewpoints might lead moderators to feel as if they do not have enough influence on the direction the community is following, making it more difficult for them to internalize the community standards and values. Therefore, the hypothesis:

H7: Participatory rule processes negatively correlate with moderators' feelings of internalization.

3.3. Methods

3.3.1 Participants and Procedures

To understand the relationship between different community governance modes on Reddit, and moderators' psychological needs and motivations, a survey was conducted with a total of 2269 respondents on Qualtrics. However, a large part of the responses were excluded from further analysis due to either incomplete questionnaires or failure to pass the two attention checks included in the study. Ultimately, the analysis is based on a sample of 605 respondents who completed the questionnaire and passed the two attention checks.

To recruit participants both public and private messages were utilized, sent through Modmail, Reddit's internal messaging system for moderators. Participants were informed that the study was designed to explore the interplay between Reddit use, leadership and community participation, and were required to provide their consent before taking the survey. The compensation for completing the survey was the option to enter a raffle, and an Amazon gift card valued at \$50 was offered as the raffle prize. Participants in the sample had a mean age of 31, with 69.2% of participants between the ages 18 and 34 years old ($n = 438$). Majority of the sample was identified as male (70.9%, $n = 450$), with some or more college education (74.6%, $n = 472$). Most moderators in the sample were experienced, with 37% having 3 years of experience or more ($n = 234$), and 54.4% of the sample reported spending more than 5 hours moderating their community on a weekly basis ($n = 344$).

3.3.2 Measures

All measures employed were adapted from previous work, and all respondents were asked to respond to each item using a 7-point Likert scale that ranged from "strongly agree" to "strongly disagree".

To identify the governance structure employed in each community the respondents were asked to select the option that best described the process they use to make community rules (Seering et al., 2019). Items of this construct were arranged from most hierarchical (e.g., "*Moderators enact new rules on their own without consulting members*") to most democratic (e.g., "*Moderators work with the entire group of community members to enact new rules*") ($M = 2.60$, $SD = 1.13$).

Procedural justice refers to the perceived fairness or "justice of the processes that lead to decision outcomes" (Colquitt, 2001: 386). The perceived fairness of rule making procedures were assessed with four items (DeCaro et al., 2015; van Prooijen, 2009)(e.g., "*The procedures used to create rules make me feel as if I am able to exercise my views and desires.*", $\alpha = .84$, $M = 2.11$, $SD = 1.01$).

Self-determination refers to the extent to which individuals feel they have self-agency and act in accordance with their personal values and goals (Ryan and Deci, 2006). Perceptions of self-determination were assessed using four items, where two measured the dimension of self-concordance (Sheldon and Houser-Marko, 2001)(e.g., "*The procedures used to create rules make me feel as if I am free to do things*

that express, or exercise, my “true self.”) and two measured sense of choice (DeCaro et al., 2015)(e.g., *“The procedures used to create rules make me feel as if I have a genuine sense of choice.”*, $\alpha = .91$, $M = 2.86$, $SD = 1.19$).

Belonging is described as perceived acceptance from a social group or community (Baumeister and Leary, 1995). Sense of belonging was measured with six items that targeted two dimensions (DeCaro et al., 2015). Both perceived social standing (Leary et al., 2013)(e.g., *I feel like I’m seen as a valuable person*”), and social connectedness was measured with three items (Sheldon and Houser-Marko, 2001) (e.g., *“I feel close and connected with other users who are important to me.”*, $\alpha = .80$, $M = 3.09$, $SD = 1.15$)

Competence denotes the perceived ability to exercise control and effect change in one’s environment (Deci and Ryan, 2000). Perceived competence of moderators were measured with four items (DeCaro et al., 2015), where two measured the intelligence dimension (Ryan, 1982)(e.g., *“I feel intelligent”*) and another two measured the mastery (Sheldon and Houser-Marko, 2001) (e.g., *“I feel as if I am meeting the challenge of making valuable contributions to my community.”*, $\alpha = .85$, $M = 2.87$, $SD = 1.16$)

Security denotes the perceptions of structure and safety that stems from predictability (Sheldon et al., 2001). This construct was measured with two items (DeCaro et al., 2015)(e.g., *“I feel that the rules we have make the community more structured and predictable.”*, $\alpha = .85$ $M: 2.24$, $SD: 1.35$)

Institutional Acceptance is described as “the extent to which individuals endorse a set of rights, rules and decision-making procedures” (DeCaro and Stokes, 2013: 6). Moderator’s institutional acceptance was measured using three items (Colquitt, 2001; DeCaro et al., 2015) (e.g., *“I support the procedures used to create rules in the community.”*, $\alpha = .93$, $M: 2.06$, $SD: 1.08$).

Internalization refers to the process by which individuals adopt the rules and norms that govern their behaviors as part of their own values and belief systems (DeCaro and Stokes, 2013). Moderators’ level of internalization was measured with two items (DeCaro et al., 2015)(e.g., *“I feel that the rules match with my own desires and values.”*, $\alpha = .89$, $M: 2.39$, $SD: 1.14$)

3.4. Results

A multiple regression analysis was conducted to examine the relationship between rule making processes and Reddit moderators perceptions of procedural justice, self determination, belonging, competence, security, institutional acceptance and internalization. All predictor variables were mean-centered prior to the regression analysis. I checked for multicollinearity by assessing zero order correlations among variables and their variance inflation factor statistics (Table 2.1). While the zero-order correlation matrix revealed that some of the independent variables were moderately correlated, the accompanying VIF statistics were all found to be within an acceptable range ($VIF < 5$), indicating limited collinearity (Akinwande, 2015).

Table 2.1

Zero-order correlations with tolerance and variance inflation factor statistics

	1	2	3	4	5	6	7	8	Tolerance	VIF
Rule Process	1.00									
Procedural Justice	0.19	1.00							0.41	2.44
Self Determination	-0.05	0.40	1.00						0.51	1.96
Community Belonging	-0.23	0.43	0.60	1.00					0.50	2.02
Competence	0.02	0.47	0.56	0.53	1.00				0.51	1.96
Security	0.08	0.44	0.33	0.28	0.36	1.00			0.66	1.51
Institutional Acceptance	-0.10	0.53	0.36	0.37	0.39	0.38	1.00		0.45	2.23
Internalization	0.04	0.54	0.50	0.44	0.46	0.53	0.43	1.00	0.53	1.89

Overall, the model was significant $F(7, 597) = 8.86, p < 0.001, R^2 = .093$. The findings suggest that moderators who utilize participatory decision making procedures for community governance perceive greater levels of procedural justice towards the governance processes. However, participatory decision making also seems to have its own drawbacks, as moderators also reported lower levels of community

belonging and institutional acceptance when members are involved with community governance (Table 2.2).

Table 2.2

Multinomial Regression Results with Participatory Process as the Dependent Variable

	β	SE
(intercept)	2.49***	0.04
Procedural Justice	0.32***	0.07
Self Determination	-0.02	0.05
Community Belonging	-0.30***	0.05
Competence	0.08	0.05
Security	0.04	0.04
Institutional Acceptance	-0.14*	0.06
Internalization	0.02	0.05

* $p < .05$; ** $p < .01$; *** $p < .001$

Results showed a significant positive correlation between participatory governance and procedural justice ($\beta = 0.32, p < 0.001$). Moderators who reported higher feelings of procedural justice were more likely to use democratic processes in their communities. Hypothesis 1 was not supported. However, the correlation between sense of belonging and participatory governance was significant in the negative direction ($\beta = -0.30, p < 0.001$), supporting hypothesis 3. This suggests that fostering an inclusive decision-making environment might inadvertently reduce feelings of belonging, making it difficult to maintain a strong sense of community cohesion. Similarly, the relationship between participatory rule processes and institutional acceptance were found to be negatively correlated with significance ($\beta = -0.14, p < 0.01$). Hypothesis 6 was supported: moderators who governed their communities with more participatory processes reported lower levels of acceptance towards their governance structures.

There was also a negative association between feelings of self determination and participatory rule processes, however, this relationship lacked significance ($\beta = -0.02, p = 0.659$). Hypothesis 2 was not supported. Results also showed a non-significant positive association between participatory governance and feelings of competence ($\beta = 0.08, p = 0.115$) and feelings of security ($\beta = 0.04, p = 0.245$). Hypotheses 4 and 5 were therefore not supported. The participatory rule processes and internalization was positively correlated, but lacked significance ($\beta = 0.022, p = 0.677$). Hypothesis 7 was not supported.

Additionally, I conducted an analysis to explore potential interaction effects among procedural justice, institutional acceptance, belonging and rule processes. However, findings revealed that these interactions did not yield statistically significant effects in their respective domains. The interaction between procedural justice and institutional acceptance did not have a significant effect on participatory processes ($\beta = -0.061, p = 0.104$). The interaction between community belonging and institutional acceptance lacked a significant effect on rule processes ($\beta = -0.015, p = 0.684$). Similarly, the interaction between procedural justice and belonging was found to be non-significant ($\beta = -0.041, p = 0.193$). I tested the effects of gender by adding a covariate to the regression model, and found the effect to be positive but insignificant, with little impact on other model coefficients ($\beta = 0.019, p = 0.846$). As a further robustness check, I assessed the individual relationships by performing a series of regression models, each with a psychological construct as the dependent and participatory governance as the independent variable. Results revealed a significant positive relationship between procedural justice and participatory governance ($\beta = 0.108, p = 0.003$), consistent with the findings from the full model. A significant negative relationship was observed between community belonging and participatory governance ($\beta = -0.189, p < 0.001$), aligning with the full model results. In contrast, institutional acceptance showed no significant relationship ($\beta = 0.103, p = 0.731$), suggesting that this construct may not independently influence participatory governance when assessed in isolation. Other variables included in the full model also did not show any significant associations in this additional analysis. The lack of significance for institutional acceptance in isolation suggests that its predictive power depends on broader governance or community contexts. Institutional

acceptance may require interaction with other predictors to influence participatory governance, reflecting the interdependent nature of governance dynamics.

3.5. Discussion

This study explored the relationship between community governance processes and the psychological needs and motivations of community moderators through the lens of humanistic rational choice theory (HRCT). The focus is on moderators rather than users out of a perspective that their substantial investment in building, leading, and taking responsibility for their community may concentrate in them the civic skills and psychological benefits that online engagement can bring, regardless of the form of government they impose. Traditionally, in physical communities, increased democratic participation is often correlated with higher perceptions of fairness, a greater sense of belonging and increased institutional acceptance, all considered to be crucial elements for effective co-operation (DeCaro et al., 2021; Ostrom, 1990). However, findings suggest a contrasting pattern for online communities. While moderators who employ democratic rule-making procedures report higher levels of procedural justice, supporting previous research (Kiesler et al., 2011), participatory approaches to online governance do not necessarily translate into a stronger sense of community or acceptance. Contrary to traditional perspectives, I found that more centralized forms of governance may be facilitating group cohesion and institutional acceptance in the context of Reddit communities. The study findings shed light on the unique challenges and the inherently conflicting nature of volunteer moderation on Reddit, and the difficult task of balancing between democratic participation, community cohesion, limited volunteer energy, and effective governance.

At first glance, it seems counterintuitive that more hierarchical, centralized governance on Reddit is associated with greater feelings of community belonging and acceptance among moderators. This is because democratic processes are often associated with inclusivity and equality (Kiesler et al., 2011; Ren et al., 2012), while centralized authority can at times feel oppressive and divisive (Lazar and Preece, 2002b). However, it is important to recognize that online communities are strikingly different from their offline counterparts, i.e. civic organizations, as the former provide greater anonymity for members, lack physical presence, and therefore have lower barriers to entry and participation than the latter. Moreover, online

communities, like Reddit, provide opportunities for members to take on leadership roles and contribute to decision-making processes. Anyone can start their own community and shape it to their liking without much intervention, which makes it difficult to ensure that moderators have the necessary skills to effectively govern their community while promoting an inclusive, participatory environment for all their members.

On the one hand, participatory governance processes in online communities meet the moderator's needs for procedural justice; a critical component for cooperation in organizational behavior and psychology (Colquitt et al., 2001; Lind and Tyler, 1988; Tyler and Degoe, 1995). The importance of perceived fairness in rule compliance (Kiesler et al., 2011; Walters and Bolger, 2019), cooperation (Tyler and Degoe, 1995) and individual well-being (Moliner et al., 2013) has been established in previous work. On the other hand, participatory governance seems to be at odds with moderator's feelings of community cohesion and institutional acceptance, which are crucial for maintaining a successful community (Blanchard and Markus, 2004b; Frey and Sumner, 2019; Kiesler et al., 2011; Lin and Lee, 2006).

Previous research has shown that a higher sense of belonging positively correlates with increased time and effort spent in online community participation and greater intentions to continue participating in the future (Roberts, 1998; Teo et al., 2003; Zhao et al., 2012). This highlights the importance of establishing a sense of togetherness and reciprocity in communities, particularly for moderators. The results showed that shared decision-making is inversely related to the moderator's feelings of community belonging. Those who adopt more centralized governance structures in their communities reported greater feelings of community belonging. I also found evidence of an inverse relationship between participatory governance and institutional acceptance. Moderators who share their decision-making powers reported lower levels of approval for the procedures they employ. This suggests that community moderators might be feeling greater institutional acceptance when they have more control over their communities and are able to make decisions without having to consult with a larger group of people.

As I have shown in chapter 2, participatory governance can be beneficial for users, but it seems to be presenting a multitude of challenges for Reddit moderators, despite all its potential benefits. While involving community members in decision-making can increase perceptions of procedural justice, it can

also be a demanding and time-consuming task for moderators who already provide their services voluntarily. Democratic participation promotes open debate and discussion in decision-making, but it can also result in dissenting views and conflict that may hinder group cohesion and engagement quality (Gilbert, 2020). Reddit is known to be a fertile ground for harassment (Dosono and Semaan, 2019; Schöpke-Gonzalez et al., 2022), misogyny, and racism (Topinka, 2018), adding to the difficulty of managing and dealing with unwarranted behaviors. These factors are potentially contributing to the reasons why moderators are hesitant to implement democratic governance on Reddit (Weld et al., 2021), as it is likely to increase the existing challenges and issues.

It is important to note that even though volunteer moderators hold a unique position in the Reddit ecosystem, their powers are not absolute, and their ability to influence governance is shaped by the power dynamics at play. While moderators play a crucial role in maintaining the quality of the content and fostering user engagement, their authority is constrained by the broader platform structure and guidelines set by the platform administrators (Gilbert, 2020). Although Reddit administrators aim to create a consistent and cohesive platform experience, instances of platform-wide modifications that disregard the specific needs of individual subreddits can create friction between administrators and moderators (Schneider, 2022). As a result, power struggles emerge, highlighting the discord between top-down decision making and bottom-up community-driven governance.

The effectiveness of volunteer moderators is also impeded by the scarcity of available tools for efficient governance, making democratic participation perhaps too challenging to implement. This deficiency places an undue burden on moderators, hindering their ability to effectively uphold community standards. Without adequate resources to monitor and moderate content and interactions, moderators struggle to ensure the visibility of their decision-making processes, and at times opt for non-disclosure to mitigate potential conflicts (Gilbert, 2020; Juneja et al., 2020; Seering et al., 2019; Weld G, Zhang AX, Althoff T, 2022). This lack of transparency can fuel suspicions among community members, as the mechanisms behind content removals, rule enforcement and other governance decisions remain obscure (Jhaver et al., 2019; Juneja et al., 2020; Kiesler et al., 2011; Lazar and Preece, 2002b; Squirrell, 2019). The

absence of clear visibility into these processes undermines the credibility of moderators and creates tensions between them and the community they voluntarily serve.

To address these challenges, it is imperative for platforms to invest in developing user-friendly tools that empower moderators to create vibrant, safe and well-governed online communities. But it is still not clear how different governance resources available to moderators, such as the number of rules, the number of other moderators, or the workload they face in their communities affect them, hence, it is still not clear what constitutes an effective governance approach, from the perspective of community moderators. Next study will attempt to fill this gap by combining moderators' survey responses with digital trace data collected from their respective communities, to answer the question: how do different governance elements relate to and interact with the sense of community experienced by moderators.

4. Moderating a Sense of Community Online

This chapter focuses on the governance resources available to moderators within Reddit communities, considering elements such as rule count, moderator count, administrative load (the ratio of users to moderators), and member participation in governance processes. Drawing on foundational work on commons governance (Janssen and Ostrom, 2006; Ostrom, 1990, 1999), this study recognizes the importance of flexible, context-specific governance configurations for managing shared resources. Ostrom emphasized that successful governance requires balancing various formal and informal mechanisms, in ways that adapt to and address the unique needs of each community. Building on this, this study explores how different governance elements interact and relate to the sense of community experienced by moderators.

The success of online communities is often associated with their capacity to provide their members with high quality content, which requires effective moderation (Hercheui, 2011; Squirrell, 2019). Grimmelman defines moderation as "the governance mechanisms that structure participation in a community to facilitate cooperation and prevent abuse (2015: 42). Naturally, moderation work varies significantly across platforms, and different communities adopt different forms of governance, influenced by their size, platform infrastructure, organizational goals and cultural values. A comparative approach, using a dataset with multiple communities, is therefore essential for identifying patterns and outcomes associated with different governance strategies. However, much of the existing research has been constrained by limited sample sizes, typically focusing on a single community with a small number of participants, thus restricting their generalizability. But it is difficult to make a healthy assessment about the potential influence of governance without accounting for its variation across different governance structures.

In Reddit communities, moderators operate within a system that provides limited control mechanisms by design, where platforms' reliance on volunteer moderators introduces unique governance challenges (Matias, 2019; Seering et al., 2019; Thach et al., 2022; Wang et al., 2024). While moderators play a central role in maintaining order and fostering a positive community experience, the governance configurations they operate within have significant implications for their own experience of community.

Given the evidence from Chapter 2 that participatory processes can enhance users' sense of community, and the findings from Chapter 3 suggesting that the same processes can also undermine moderators' perceptions of belonging and acceptance, it is crucial to investigate how these governance resources interact with participatory processes to affect moderators' sense of community.

This study seeks to address this gap by combining survey data from Reddit moderators with trace data from their respective communities to compute the governance elements available to them, such as the number of rules, moderators, and their administrative load. This allows for a consideration of psychological outcomes, which cannot be derived directly from trace data, in terms of their relationship with governance resources, which may not be accurately assessed through self-reported survey responses. By doing so, this research contributes to a more nuanced understanding of the interplay between governance and community dynamics, while highlighting the critical role that moderators and the governance resources available to them play in sustaining online communities.

4.1 Governance Configurations in Online Communities

The number of moderators within a community plays an important role in distributing governance responsibilities, which may directly influence moderators' sense of virtual community. Drawing on Ostrom's emphasis on the importance of collective management in governance systems (Ostrom, 1990), having more moderators to distribute the responsibility can spread the burden of enforcing rules, managing content, and handling disputes, thus reducing individual strain. Previous research on online governance suggests that while there is a tendency to centralize authority as communities grow (Shaw and Hill, 2014), when responsibilities are shared, solidarity can help moderators experience less stress and burnout (Dosono and Semaan, 2019; Matias, 2019), which can contribute to stronger feelings of connection and belonging within the community. When governance tasks are shared among more people, moderators may feel less isolated, experience less burnout, and have more opportunities for collaboration. Therefore it is hypothesized:

H1: The number of moderators in a community positively correlates with moderators' SoVC

Traditional perspectives in commons governance and organizational theory places a heavy emphasis on formal governance structures (Ostrom, 1990; Ouchi, 1979). But more recent work shows that while formal rules play a vital role in providing consistency and stability, especially in large, diverse communities (Frey et al., 2022; Hwang and Shaw, 2022), a higher number of rules may also impose unique challenges for moderators. Previous work suggests that institutional complexity can contribute to community success by establishing clear governance systems that help manage large user bases (Frey and Sumner, 2019; Hwang and Shaw, 2022). But from the moderator's perspective, extensive rule systems may lead to an overwhelming amount of enforcement work for moderators, increasing the administrative burden and emotional load (Gilbert, 2020; Matias, 2019; Seering et al., 2019). Chapter 2 showed that there is no relationship between formal control through established rules and regular users' sense of community. Though a high rule count can still create tensions within the moderation team and between moderators and users, as enforcing a large set of rules often involves navigating conflicts and may be perceived as overreach (Gilbert, 2020; Jhaver et al., 2019; Weld G, Zhang AX, Althoff T, 2022). Therefore, while rules are necessary for community stability, a higher rule count may reduce moderators' sense of belonging and community, contributing to feelings of burden and isolation. Based on this it is hypothesized:

H2a: The number of rules in a community negatively correlates with moderators' SoVC

Rules and their adaptability are as important as their enforcement (Preece, 2001), for rules can only work when they are effectively enforced (Schweik, 2005), but this could be difficult for moderators with limited resources. A higher number of moderators could help mitigate this burden by sharing the enforcement and administrative duties, allowing moderators to feel more connected and less isolated. Therefore, it is predicted that the interaction between the number of rules and moderators will positively impact SoVC, for an increase in moderator count might absorb the pressures associated with enforcing more rules, ultimately enhancing the moderators' sense of community.

H2b: The interaction between the number of rules and moderators positively relates to moderators' SoVC.

A higher administrative load, defined as the ratio of users to moderators, represents an imbalance between the number of moderators and the size of the community they oversee. This imbalance can place a significant burden on moderators, as they are tasked with managing a larger user base with limited resources. Previous research suggests that when the demands of moderation become too great, moderators are at increased risk of burnout (Matias, 2019; Schöpke-Gonzalez et al., 2022), which is linked to emotional exhaustion and decreased satisfaction, which can undermine moderators' sense of connection to the community. As moderators struggle to keep up with the demands of maintaining order, and managing user behavior, their capacity to foster a sense of community cohesion may decrease. Consequently, it is hypothesized:

H3: A higher administrative load negatively correlates with moderators' SoVC.

Participatory governance, generally perceived as beneficial for strengthening inclusivity and democratic involvement (Deci and Ryan, 1985; Hardin, 1982; Ostrom, 1990), may have unintended negative consequences for moderators. Chapter 2 found a strong positive relationship between users' SoVC and their involvement in participatory decision-making processes. This aligns with previous research, which suggests that democratic governance structures enhance a community's sense of cohesion and fairness (Kiesler et al., 2011; Ren et al., 2012). But previous work also notes a discrepancy between regular users and moderators regarding their willingness to implement democratic processes (Weld G, Zhang AX, Althoff T, 2022). Supporting these findings, in chapter 3, I found evidence that participatory governance was related to reduced feelings of justice and belonging among moderators. This suggests that while democratic processes may benefit regular users by promoting engagement and a sense of fairness, the same mechanisms can undermine moderators' experiences. Moderators may feel their authority is being challenged, leading to dissatisfaction and a reduced sense of connection. Therefore it is hypothesized:

H4a: Participatory governance negatively correlates with moderators' SoVC

While early work on online communities emphasize the importance of inclusive processes that involves communities as a whole (Kraut and Resnick, 2012), others suggest that democratic forms of

participation, such as participatory governance, may not scale well in the online contexts and at times lead to difficulties managing the arising complexity (O'Mahony and Ferraro, 2007). This might especially be the case when there are limited resources. For instance, a combination of high administrative load and member participation in governance could place additional burdens on moderators. Involving users in decision-making could feel like an additional, unnecessary layer of complication, further diminishing their SoVC. Therefore, it is hypothesized:

H4b: The interaction between administrative load and participatory governance negatively relates to moderators' SoVC

A larger moderator team may help mitigate the potential negative effects of participatory governance by distributing the responsibilities and emotional burden. This may reduce the strain on individual moderators and promote a sense of collaboration and support within the moderation team. As a result, the potential for participatory governance to undermine moderators' SoVC, as observed in Chapter 3, may be decreased. Therefore, it is hypothesized that there will be a positive interaction effect between the number of moderators and participatory governance on their SoVC.

H4c: The interaction between the number of moderators and participatory governance positively relates to moderators' SoVC

While rules provide structure and guidance, especially as communities grow in size (Frey and Sumner, 2019), an excessive number of formalized rules combined with participatory governance may lead to inefficiencies. It can complicate rule enforcement by introducing multiple viewpoints and increasing the likelihood of disagreement. In such cases, moderators may find it challenging to uphold or implement the rules consistently, leading to frustration and diminished authority. As a result, this interaction may undermine moderators' SoVC, as they struggle to balance the demands of participatory processes with the burden of enforcing a complex rule system. Therefore, it is hypothesized that:

H4d: The interaction between the number of rules and participatory governance negatively relates to moderators' SoVC

The interaction between moderator count, rule count, and participatory governance presents a complex dynamic that warrants further investigation and will therefore be framed as a research question. While individually, these elements play distinct roles in governance (i.e. moderators provide oversight, rules create structure, and participatory governance fosters inclusivity) their combined effects are not well understood. A larger moderator team might help manage the burden of enforcing a high rule count, but when paired with participatory processes, it may create challenges in balancing authority and decision-making among moderators and community members. This complex interplay could either mitigate or exacerbate the difficulties of maintaining a cohesive community, depending on how these governance elements interact. As previous chapters have shown mixed effects of participatory governance on sense of community, it remains unclear how the combination of these factors might influence moderators' SoVC. Therefore, framing this as a research question allows for a more exploratory approach, acknowledging the potential for both positive and negative outcomes depending on how these governance resources are configured.

RQ1: How does the number of rules, moderators, and participatory governance interact and relate to moderators' SoVC?

4.2 Methods

4.2.1 Participants and procedures

To test the suggested relationships, two distinct datasets were employed. The first dataset comprised survey data employed in chapter 3, collected from Reddit moderators, while the second dataset consisted of their digital traces gathered from three different datasets collected through the Reddit API. I matched the subreddit names provided by the survey respondents with the communities I managed to find within the trace data. Using these datasets, I was able to retrieve community-level information for 418 subreddits, which were then integrated with the survey data.

From the survey dataset, four measures are utilized. The primary variables of interest were the sense of virtual community and participatory governance, which captures the level of regular user involvement moderators reported in community decision-making. Additionally, two control variables were included: length of moderation experience and frequency of moderation engagement. These controls account for potential variations in moderators' experience and engagement levels and help isolate the effects of governance mechanisms on their sense of virtual community. From the digital trace data, I derived community metrics for rule count, moderator count, and administrative load, defined and computed as the number of moderators divided by the total number of subscribers in the community. This approach enabled a comprehensive analysis by combining self-reported and objective data to examine how different governance resources shape and interact with moderators' sense of community.

4.2.2. Measures

The dependent variable, SoVC, is defined as the extent to which users identify with an online community and feel a sense of belonging and togetherness (González-Anta et al., 2021). This construct was measured with the same instrument employed in chapter 2, with 8 items from the “Brief Sense of Community Scale” developed by Peterson and colleagues (2008) and validated in a number of community contexts (Cocco et al., 2024; Hilvert-Bruce et al., 2018; Mamonov et al., 2016; Peñarroja et al., 2019; Poor, 2014; Rosen et al., 2011). The local neighborhood emphasis in the original scale was slightly adapted to reflect the virtual community context (e.g., *“I feel connected to this online community”* instead of *“I feel connected to this neighborhood”*, $\alpha = .903$, $M = 4.79$, $SD = 1.19$).

Independent variables include rule count, which is defined as the total number of formal, written rules within a given online community, in this case, a subreddit ($M = 4.78$, $SD = 3.24$). Moderator count is the total number of moderators tasked with managing an online community, ($M = 6.93$, $SD = 2.17$). Administrative load was defined as the ratio of the number of community members to the number of moderators tasked with managing the community. To compute this variable, the total number of subscribers in each community was divided by the total number of moderators ($M = 9.14$, $SD = 3.19$).

To assess the governance process and measure the extent communities employ participatory

governance, the respondents were asked to choose the option that best describes the process they use to make community rules (Seering et al., 2019). Items ranged from most hierarchical (e.g., “*Moderators enact new rules on their own without consulting members*”) to most democratic (e.g., “*Moderators work with the entire group of community members to enact new rules*”, $M = 2.64$, $SD = 1.12$).

Two variables were employed to control for the differences between the experience and engagement levels of moderators. Specifically, these variables measured the length of experience in moderation ($M = 4.30$, $SD = 1.19$), and the frequency of weekly moderator engagement ($M = 2.96$, $SD = 1.24$).

To account for differences in scale and the skewness of the data, all predictors were log-transformed prior to running the regression analysis. This transformation helps to normalize the data and reduce the impact of extreme values. A multiple regression analysis was then conducted to assess the hypothesized relationships.

4.3. Results

Overall, the model was significant ($F(11, 413) = 5.17$, $p < 0.001$, $R^2 = .12$), explaining a modest 12% of the variance in moderators' SoVC by the governance resources considered in the model. Findings reveal several important insights into how governance resources within online communities relate to their moderators' sense of virtual community. Results show that a higher number of moderators correlates with a stronger sense of community among them, and moderators of communities with higher participatory governance, where members have a say in decision-making processes, report a stronger sense of community. However, results also show that the relationships between these governance elements are not so straightforward, and rather more complex and multi-faceted. I found that the positive effects of participatory governance on SoVC might depend on the number of rules, and the number of moderators. Furthermore, the results from the three-way interaction uncovered a complex dynamic, where the combined effects of the number of moderators, the number of rules, and participatory governance significantly relate to SoVC (Table 3).

Table 3*Regression Results with Sense of Virtual Community as the Dependent Variable*

	β	<i>SE</i>
(intercept)	3.05***	0.72
Moderation Frequency	0.21***	0.05
Moderation Length	-0.09	0.05
Moderator Count (MC)	0.76**	0.17
Rule Count (RC)	0.14	0.11
Administrative Load (AL)	0.02	0.07
Participatory Gov (PG)	0.85**	0.16
Moderator Count * Rule Count	-0.12*	0.06
Moderator Count * Participatory Governance	-0.27**	0.10
Rule Count * Participatory Governance	-0.10*	0.04
Administrative Load * Participatory Governance	-0.04	0.03
Moderator Count * Rule Count * Participatory Governance	0.06**	0.02

p < .05*; p < .01**; p < .001***

First, the main effect from moderator count is significant and positive ($\beta = 0.76, p = 0.005^{**}$). A larger number of moderators correlates with a stronger sense of community among them, supporting H1. Moreover, while the number of rules did not exhibit a significant relationship with SoVC ($\beta = 0.14, p = 0.19$), rejecting H2a, the interaction between the number of rules and the number of moderators turned out to be significant but negative ($\beta = -0.12, p = 0.036^{*}$), partially supporting H2b. This might indicate that while having more moderators may increase moderators SoVC, this effect may be weakened if the community also has a higher number of rules to enforce, suggesting a more complex and rigid governance

system, indicating a higher workload. However, testing the negative effects of having a higher administrative load on SoVC, defined as the ratio of moderators to community subscribers, there were no significant main effects ($\beta = 0.02, p = 0.78$), hypothesis H3 was therefore rejected.

Based on the findings from chapter 3, I hypothesized a significant and negative relationship between participatory governance and moderators' SoVC. This relationship was found to be significant but in the positive direction ($\beta = 0.85, p = 0.002^{**}$), partially supporting H4a. The effect size is strong, suggesting that higher levels of member involvement in decision-making can substantially boost moderators' sense of community.

Moreover, this relationship was found to be influenced by both the number of rules, and the number of moderators. While both moderator count and participatory governance have positive individual effects, their interaction was negative ($\beta = -0.27, p = 0.007^{**}$), partially supporting H4c. Similarly, the interaction of high rule count and participatory governance was related to a decrease in moderator SoVC ($\beta = -0.10, p = 0.03^{*}$), supporting H4d. There was no interaction effects observed between administrative load and participatory governance variables ($\beta = -0.04, p = 0.11$), H4b was therefore rejected.

Additionally, in response to the research question, the three-way interaction tested between the number of rules, number of moderators and participatory governance turned out to be positive and significant, with a comparatively smaller effect size ($\beta = 0.065, p = 0.005^{**}$). This result is important nonetheless for it shows that the effect of participatory governance on SoVC varies depending on the interaction between moderator and rule counts. This suggests that the role of governance resources in fostering a sense of community among moderators can be highly context-dependent.

Lastly, from the two control variables employed, only engagement frequency was positively and significantly correlated with moderators' SoVC ($\beta = 0.21, p < 0.001^{***}$). And while the length of experience was negatively correlated with SoVC ($\beta = -0.09, p = 0.06$), this relationship lacked significance.

4.4 Discussion

This study offers important insights into the complex dynamics that govern the sense of virtual community (SoVC) among Reddit moderators, highlighting how various governance resources interact within online

communities. While the results confirm several hypotheses, they also present nuanced interactions, which suggest that governance in online communities can be highly context-dependent.

First, the strong positive relationship between moderator count and SoVC suggests that having more moderators to collaborate with may enhance the sense of community among moderators themselves. This aligns with previous research showing that distributed governance responsibilities can alleviate individual burden and increase community cohesion (Seering et al., 2022) When there are more moderators, the workload being shared, it may be increasing the capacity for moderators to engage more meaningfully with their communities. However, an alternative explanation could be that communities with a stronger sense of community attract more moderators. Communities that have a stronger camaraderie may be of interest to other individuals to take on moderator roles, suggesting a reverse causation where community strength drives participation.

Participatory governance, often praised for its inclusivity (Hardin, 1982; Olson, 1971; Ostrom, 1990), was the strongest predictor of the model, though with a nuanced effect on moderators. Contrary to expectations from chapter 3 that suggested participatory processes would undermine moderators' sense of fairness and belonging, I found a positive relationship between participatory governance and SoVC. This suggests that, involving other community members in decision-making may enhance moderators' connection to their communities, aligning with foundational work in commons governance and democratic engagement. However, findings also add nuance, showing that this positive relationship may be depending on the number of rules and the number of moderators within communities.

For instance, the negative interaction between moderator count and participatory governance suggests that, while both factors may positively affect SoVC individually, when combined, they may not promote moderators' sense of community. When community governance is already highly participatory, adding more moderators may not enhance the sense of community, possibly because of overlapping roles or diluted responsibilities. A higher number of moderators in an already inclusive context may be leading the personal influence of each moderator over community decisions to be lessened, as more voices in decision-making can decrease efficiency.

Despite the lack of a main effect from rule count, its significant negative interaction with participatory governance may also be suggesting that when communities are bogged down by too many rules, the benefits of participatory governance may be diluted. High rule counts can make communities feel overly regulated, which might stifle open dialogue and engagement, key components of a strong SoVC. As the number of rules increases, the complexity of navigating and enforcing these rules may also increase, potentially overwhelming the moderators in participatory, inclusive communities. The strictness required to enforce a high number of rules therefore might be in conflict with the open and inclusive ethos of participatory governance, from the perspective of moderators.

The three-way interaction between moderator count, rule count, and participatory governance, though much smaller in effect size and much more difficult to interpret, further highlights the complexity of online community governance. This interaction suggests a nuanced scenario where the combined influences of these variables may be less detrimental to SoVC, than might be expected from the two-way interactions alone. Under certain configurations, these governance resources can maintain or even enhance SoVC, contrary to the redundancy or other potential negative effects of over-governance, as suggested by their two-way interactions.

While these interactions provide nuanced insights, they also complicate the interpretation and application of these findings. To better understand this complicated three-way interaction and visually represent the underlying relationships, I categorized the continuous variables based on their median values, and created an interaction plot (Figure 3.1). The goal was to explore and visualize the interaction effects by looking at how the slope of the lines, indicating the relationship between moderator count and SoVC, changes across different levels of rule count and participatory governance.

The plot illustrates the three-way interaction where the two main panels represent member involvement in decision-making; low participation on the left, and high participation on the right. While

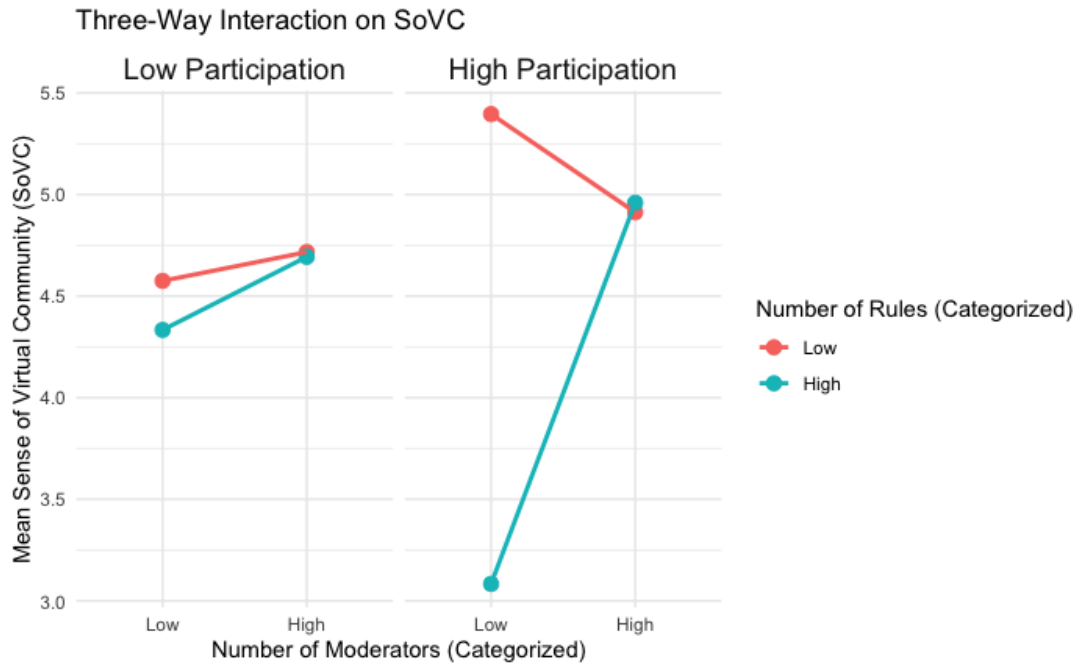


Figure 3.1. Visualization of the three-way interaction between the number of rules, the number of moderators and the level of participatory governance. Continuous variables are categorized based on their median values to represent low/high levels. The two main panels represent member involvement in decision-making, low participation on the left, and high participation on the right. Within each panel, the different colored lines represent low or high numbers of rules. In communities with low levels of participatory governance, there seems to be a relatively small difference in SoVC across different levels of rule and moderator count. Conversely, in the high participatory governance category, communities with only a few moderators but a higher number of rules to enforce, exhibit a sharp drop in SoVC.

there seems to be a small difference in SoVC when there is low participation from members in decision-making processes, in the high participation category, communities with only a few moderators but a higher number of rules to enforce exhibit a sharp drop in SoVC. This might indicate that when only a few moderators are tasked with governing a highly participatory community, especially one with a large number of rules to enforce, they may struggle to maintain a strong sense of community. But when both the number of moderators and participation are high, communities with more rules show the strongest SoVC. Generally, when moderators employ participatory governance, a higher level of resources available seem to help them feel a higher sense of community. Though these interactions are difficult to interpret, results still highlight

the importance of governance configurations and their interactions. While different governance mechanisms may seem beneficial independently, their interactions can yield complex dynamics that shape moderators' sense of community in unexpected ways. In short, context matters (Ostrom, 1990, 1998).

A surprising finding was the lack of a significant relationship between administrative load and SoVC. Intuitively, one might expect that when moderators have to manage more users, they would feel more overwhelmed and less connected to their community (Butler, 2001a). The absence of this relationship could be pointing to a limitation in the measurement of administrative load, which might have failed to capture the full range of challenges moderators face in managing communities with different characteristics. Among the control variables, engagement frequency emerged as a significant positive predictor of SoVC, indicating that more frequent interactions can enhance moderators' sense of community. Conversely, the length of moderation experience did not significantly impact SoVC, suggesting that tenure alone does not necessarily enhance community cohesion among moderators.

Altogether, results reinforce the idea that governance structures in online communities must be flexible and tailored to the specific needs of each community. Within the unique context of Reddit communities, this study showed that, despite the results from chapter 3 about the potential of participatory processes to undermine fairness and belonging among moderators, there is a significant, positive relationship between participatory governance and SoVC. However, findings also demonstrate that while individual governance elements such as moderator count and participatory governance each contribute positively to a moderator's sense of virtual community (SoVC), their interactions moderate these effects in small but significant ways. For instance, the beneficial impact of participatory governance can be diluted by an excessive number of rules or an overly large moderator team, which may introduce redundancy to governance efforts. However, depending on the context and needs, in specific configurations, the combined governance resources may have the potential to mitigate these negative effects, maintaining or even enhancing SoVC.

This aligns with Ostrom's views on commons governance (Janssen and Ostrom, 2006; Ostrom, 1990), where successful governance depends on adapting regulatory systems to local conditions. Findings

also align with previous work that emphasized the role of contextual differences in community outcomes (Hwang and Shaw, 2022; Weld, 2024). Contrary to earlier theorizing on sense of virtual community (Blanchard and Markus, 2003, 2004a), participatory governance was found to be related to a higher sense of community online, which aligns with foundational work on physical communal contexts (McMillan and Chavis, 1986). Similarly, contrary to the theoretical expectation that clearer guidelines and more rules would facilitate better governance and community cohesion (Kollock and Smith, 1996; Ostrom, 1998), the results show that an excessive number of rules may also undermine the relationship between participatory governance and sense of community. These contradictions could be indicative of potential limitations in how traditional theories are applied online, where the dynamics of autonomy and control can substantially differ.

Overall, results indicate that governance in online communities is highly context-dependent. This study, however, did not account for potentially important variables such as the focus of the community or the nature of its content, both of which could drive contextual differences in governance needs. For instance, communities centered around polarizing or divisive topics, or those experiencing high levels of toxicity and incivility, might require more rules. Conversely, such environments might deter individuals from taking on moderator roles due to the challenging nature of the content. Further research is necessary to examine how the specific focus and content of a community relate to its governance structures and strategies. This exploration can be important to address the nuances that emerge from the findings of this study and to understand how different community characteristics relate to different governance mechanisms.

Future work should also assess these relationships in other contexts and consider other potentially important variables that could affect them. One major limitation of the study is that I focused exclusively on Reddit communities and their moderators. There could be other factors, different governance resources or mechanisms, that could be affecting moderator perceptions differently on other platforms. Another major limitation is that this study doesn't include informal governance mechanisms such as social control, or peer influence, which, results from chapter 2 found, could affect community members' SoVC. While this study has focused on moderators, social norms developed among regular users might still potentially influence

them. Additionally, the quantitative metrics I used in the model did not capture the quality or effectiveness of different governance structures, for instance, some rules may be more extensive, and some moderators more effective than others. Future research could expand on this work by considering the influence of different control mechanisms and the quality of different governance measures. Findings of this study also highlight that governance elements interact in complex ways that may not be well understood independently. Future research should explore these interactions more deeply, particularly in terms of how technological interventions might alleviate some of the burdens moderators face in participatory contexts. Ultimately, this study shows that it is possible to cultivate more resilient and cohesive online communities, by strategically enhancing governance structures and supporting moderator efforts, thereby empowering volunteer community leaders.

5. Conclusion

This dissertation bridges the literatures on Sense of Virtual Community and Online Governance, offering an empirical examination of how governance structures shape the community experience. Through an interdisciplinary, multi-level approach, capturing the perspectives of both community members and moderators, these studies provide a nuanced understanding of governance dynamics. Collectively, the findings emphasize the need for flexible, context-specific approaches that address the unique needs of both community members and moderators.

5.1 Summary of the Dissertation

The first study, presented in chapter 2, employed an online survey, conducted with 1080 online community members, to investigate the relationship between SoVC, social control, formal control, and participatory governance. Findings highlight that both participatory governance and social control independently enhance SoVC, while formal control shows no significant effect. Surprisingly, however, the interaction between participatory governance and social control is negative, suggesting that when these mechanisms are combined, they may undermine cohesion by weakening the positive impact of participatory processes. Findings also suggest that participatory decision-making can be especially beneficial in larger communities, where engaging users in governance processes may enhance cohesion. Overall, results highlight the importance of balanced, adaptive governance from the perspective of community members.

Building on this, Chapter 3 shifts the focus to community moderators, a critical yet under-researched group, examining how governance structures affect their psychological needs. Using an online survey with 605 moderators from Reddit communities, this study challenges traditional assumptions that participatory processes are generally beneficial for all involved, by showing that more centralized governance structures may foster stronger feelings of belonging and institutional acceptance among moderators. These findings highlight the tension between inclusive, democratic governance and the need for regulation and control among moderators, illustrating the trade-offs inherent in different governance approaches. Findings shed light on the unique challenges and the inherently conflicting nature of volunteer

moderation on Reddit, particularly the difficulties in balancing democratic participation, community cohesion, limited volunteer energy, and effective governance.

The third study of this dissertation, presented in chapter 4, applied a multi-method approach, using a combination of moderator survey responses with digital trace data from Reddit API to explore how governance resources, such as moderator count, rule count and administrative load, interact with participatory governance to shape moderators' sense of community. The results reveal that while both participatory processes and larger moderation teams enhance SoVC, the impact of participatory processes on SoVC may also be contingent upon the number of rules and moderators within the community. These results further emphasize the importance of context-specific configurations and demonstrate the need to understand how governance elements interact to shape community outcomes.

Together, these studies offer important insights into the complex dynamics of online governance, underscoring the importance of balancing the needs of both community members and moderators.

5.2 Contributions and Implications

This dissertation offers multi-disciplinary, multi-perspective, and multi-method contributions to the online community literature, extending knowledge across several domains.

First, this dissertation builds upon and extends traditional perspectives on governance and sense of community (Blanchard, 2011; Blanchard and Markus, 2004a; Schweik and Semenov, 2003; Seering, 2020), making significant advances in our understanding of the dynamics of online governance. Adopting a holistic approach by integrating SoVC with online governance, this work provides a nuanced perspective on how governance mechanisms relate to the community's psychological climate, thus expanding the theoretical boundaries. For instance, the finding that participatory governance may enhance SoVC, both among moderators and regular users, aligns with the traditional sense of community theory (McMillan, 1996; McMillan and Chavis, 1986), which posits that involvement and influence within a community bolster members' sense of cohesion. The same findings contradict later applications of this theory to online contexts (Blanchard, 2011; Blanchard and Markus, 2004a; Welbourne et al., 2009), by showing that community governance mechanisms can enhance the sense of community experienced online.

Another significant advancement is the emphasis on the complexity and variability of governance practices. The insights offered by this dissertation challenge simplistic, reductionist views of governance in digital spaces, revealing that governance and moderation is not a one-size-fits-all process. Instead, governance requires an understanding of local needs, contextual variations, and the interplay between different governance elements. These elements are not just additive but interact in complex ways that can either enhance or undermine community outcomes, depending on the contextual needs. This advances a more nuanced view of governance as a multi-dimensional factor that may shape user and moderator experiences in distinct ways and highlights the importance of considering psychological constructs as a measure of community success.

Moreover, findings also call into question some foundational assumptions of organizational control theory. Traditionally, social control is considered to be an important element of self-governing collectives, enhancing collaborative efforts (De Jong et al., 2014; Gossett and Tompkins, 2000; Markus et al., 2000; Ouchi, 1979). The unexpected negative interaction of social control with participatory governance on SoVC, from chapter 2, contradicts this perspective, providing empirical evidence for the tensions between autonomy and control in the online contexts. This contradiction highlights the potential limits of traditional control theories in online settings, suggesting that increased oversight or peer enforcement, when combined with participatory processes, might stifle the community cohesion that these platforms strive to build.

Additionally, through the use of mixed methods, this dissertation provides empirical evidence that provides new theoretical insights into how governance practices are perceived in online settings. For instance, the discovery that participatory governance may impact users and moderators differently, or the observation that the benefits of participatory processes can vary depending on the number of moderators, challenges the prevailing notion that such inclusive practices are universally beneficial for all those involved (Hardin, 1982; Olson, 1971; Ostrom, 1990). These findings collectively advance our theoretical understanding of how governance mechanisms, particularly in the realm of online communities, interact with traditional concepts of community and organizational behavior. They prompt a reevaluation of how theories of collective action and organizational control are applied in increasingly digital and participatory

contexts, where traditional boundaries and methods of governance are continually being tested and redefined.

Moreover, this dissertation offers practical recommendations in online community management, which is crucial for developing effective strategies that are informed by a deep understanding of their potential psychological impacts. For online community leaders and moderators, results suggest that a thoughtful, balanced combination of governance elements can be important for fostering a cohesive sense of community, while maintaining order. Overly participatory processes, without adequate support, may lead to unwanted, negative outcomes like burnout or dissatisfaction. However, effectively managed inclusive governance processes, where participation levels align with community size and available resources, can enhance cohesion and engagement. These findings offer practical insights for crafting governance strategies that balance participation with effective regulation and sustainability.

Findings also offer actionable insights for platforms that rely on volunteer moderators. Currently, moderators are expected to manage large communities with relatively scarce resources, and with limited support from the platforms they inhabit. Social media platforms can enhance community well-being by investing in support mechanisms, such as training tools, automated assistance, and recruitment systems, that reduce the burden on volunteer moderators. Additionally, encouraging larger moderator teams and providing scalable tools for governance customization can help platforms foster a sense of community while ensuring effective governance. These findings highlight the importance of designing governance solutions tailored to the diversity of communities and their unique needs. Overall, the implication for online community health is clear: long-term success requires a careful balance between democratic participation and adaptive governance.

5.3 Limitations and Future Directions

While this dissertation offers important insights, several limitations must be acknowledged. First, the reliance on self-reported survey data may have presented potential biases, such as social desirability bias or self-selection bias. Participants may have responded in ways that reflect favorable or expected answers rather than their genuine experiences. While I attempted to overcome this limitation by incorporating

behavioral tracking data to the third study, all three studies in this dissertation were cross-sectional designs, limiting my ability to make causal inferences. Therefore, temporal dynamics and changes in governance practices were not observed, overlooking how these factors interact and evolve over time. Future research could address these limitations by incorporating both longitudinal data and behavioral tracking data in their studies, to complement survey responses and establish causal pathways.

Additionally, although the first study relied on a representative sample of Internet users in the U.S., the rest of the chapters in this dissertation focused specifically on Reddit moderators, potentially limiting the generalizability of these findings. While Reddit offers an ideal setting to explore governance structures and moderator experiences, other platforms, such as Discord or Twitch, may feature distinct models or approaches that may lead to different outcomes. For instance, participatory processes may be especially difficult in such communities that relies on real-time engagement. Comparative studies across platforms would offer broader insights into governance dynamics in diverse online settings. Future research should compare a more inclusive set of governance mechanisms across multiple platforms to identify generalizable patterns and platform-specific differences.

Moreover, although the first study considered both formal and informal governance structures from the perspective of community participants, the remaining two studies focused mainly on moderators and formal governance mechanisms provided by the platform. Social norms and informal control mechanisms, which might also play a critical role in shaping community dynamics, were not examined from the perspective of moderators. Future studies could consider how both formal and informal governance mechanisms interact and shape community outcomes from the perspectives of both users and moderators.

Finally, several factors that could have affected the suggested relationships were not considered. For instance, the quality or the nature of the content shared within communities could have an impact on the governance strategies employed. Future research can incorporate aspects such as content incivility or polarization to provide a fuller picture of online governance dynamics. Moreover, it is not clear how platform-level policy changes affect the governance dynamics, thereby affecting community outcomes. Future work could explore how broader platform dynamics, including policy shifts or external events, shape

governance strategies at the community-level and experiences at the individual-level. Additionally, the series of studies did not explore the potential emotional toll and burnout associated with volunteer moderation in detail. Future research could dive deeper into the psychological well-being of different stakeholders, considering factors like emotional toll, stress, and burnout in greater detail, as potential negative psychological outcomes that might interact with governance dynamics.

Findings of this dissertation also raises important questions such as how to better support governance efforts and enhance moderators' well-being while balancing efficiency with inclusive practices. Future research can consider the role of new technologies, specifically of AI in this regard, exploring how automated moderation can better support volunteer efforts in a way that enhances positive community outcomes while diminishing unwanted, negative side effects. By addressing these questions, future research can build upon this dissertation's findings, providing a more comprehensive and nuanced understanding of online community governance and the well-being of both moderators and community members.

5.4 Final word

In conclusion, this dissertation provides a detailed examination of online governance by exploring how varied governance structures influence community experience. It represents the first effort to synthesize insights from the literature on Online Governance and Sense of Virtual Community, revealing critical interdependencies that shape communal interactions. The findings highlight a tension between inclusive governance approaches and attempts at maintaining order, emphasizing the importance of tailoring governance strategies to the specific needs and contexts of online communities. These insights not only advance our theoretical understanding of online community dynamics but also offer practical guidance for different stakeholders, especially the platform administrators and community leaders seeking to foster healthy, cohesive, sustainable online communities. Given the dynamic nature of online interactions and the continual technological advancements across digital platforms, ongoing research is essential. Future studies should extend this work by applying its findings across diverse platforms and contexts, refining governance strategies to meet the challenges of an ever evolving, increasingly complex online world.

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Tables and Figures

Table 1.1

Zero-order correlations with variance inflation factor statistics among study 1 variables

	1	2	3	4	5	6	7	8	9	10	11	12	VIF
SoVC	1.00												
Participatory Governance	0.17	1.00											1.22
Formal Control	0.30	0.29	1.00										1.83
Social Control	0.49	-0.14	0.54	1.00									1.77
Community Size	-0.19	-0.05	0.16	0.07	1.00								1.25
Use Frequency	0.13	0.11	0.22	0.11	0.20	1.00							1.21
Use Length	0.08	0.06	0.02	0.01	0.18	0.12	1.00						1.16
Use Intensity	0.41	0.03	0.15	0.27	0.08	0.17	0.16	1.00					1.31
Active Use	0.59	0.00	0.31	0.48	-0.14	0.29	0.03	0.45	1.00				1.63
Passive Use	-0.28	-0.13	0.04	-0.08	0.16	-0.13	-0.12	-0.28	-0.32	1.00			1.22
Connectedness	0.29	0.08	0.02	0.17	0.06	0.12	0.11	0.18	0.28	-0.16	1.00		1.21
Number of friends	0.41	0.17	0.02	0.20	0.04	0.14	0.27	0.22	0.35	-0.31	0.38	1.00	1.41

Table 2.1*Zero-order correlations with tolerance and variance inflation factor statistics among study 2 variables*

	1	2	3	4	5	6	7	8	Tolerance	VIF
Rule Process	1.00									
Procedural Justice	0.19	1.00							0.41	2.44
Self Determination	-0.05	0.40	1.00						0.51	1.96
Community Belonging	-0.23	0.43	0.60	1.00					0.50	2.02
Competence	0.02	0.47	0.56	0.53	1.00				0.51	1.96
Security	0.08	0.44	0.33	0.28	0.36	1.00			0.66	1.51
Institutional Acceptance	-0.10	0.53	0.36	0.37	0.39	0.38	1.00		0.45	2.23
Internalization	0.04	0.54	0.50	0.44	0.46	0.53	0.43	1.00	0.53	1.89

Table 2.2*Multinomial regression results from study 2 with participatory process as the dependent variable*

		<i>SE</i>
(intercept)	2.49***	0.04
Procedural Justice	0.32***	0.07
Self Determination	-0.02	0.05
Community Belonging	-0.30***	0.05
Competence	0.08	0.05
Security	0.04	0.04
Institutional Acceptance	-0.14*	0.06
Internalization	0.02	0.05

*p < .05; **p < .01; ***p < .001

Table 3*Regression results from study 3 with sense of virtual community as the dependent variable*

		<i>SE</i>
(intercept)	3.05***	0.72
Moderation Frequency	0.21***	0.05
Moderation Length	-0.09	0.05
Moderator Count (MC)	0.76**	0.17
Rule Count (RC)	0.14	0.11
Administrative Load (AL)	0.02	0.07
Participatory Gov (PG)	0.85**	0.16
Moderator Count * Rule Count	-0.12*	0.06
Moderator Count * Participatory Governance	-0.27**	0.10
Rule Count * Participatory Governance	-0.10*	0.04
Administrative Load * Participatory Governance	-0.04	0.03
Moderator Count * Rule Count * Participatory Governance	0.06**	0.02

p < .05*; p < .01**; p < .001***

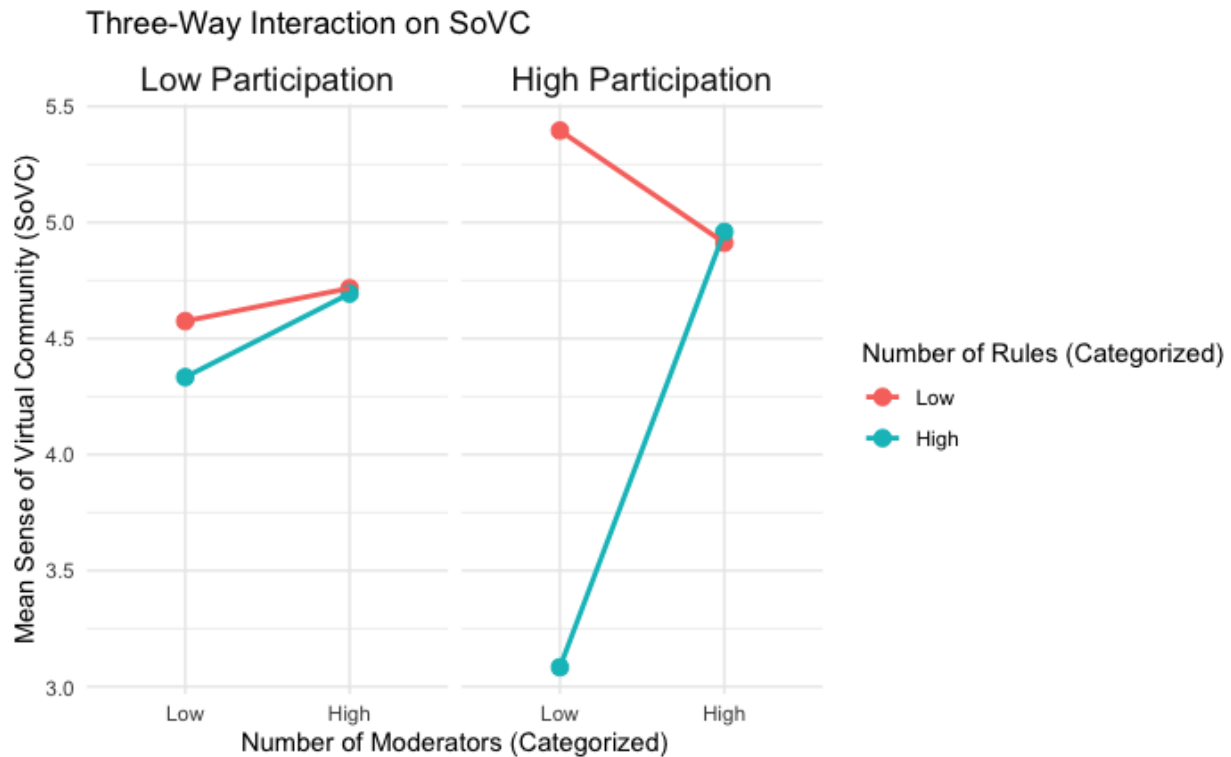


Figure 3.1. Visualization of the three way interaction between the number of rules, the number of moderators and the level of participatory governance. Continuous variables are categorized based on their median values to represent low/high levels. The two main panels represent member involvement in decision-making, low participation on the left, and high participation on the right. Within each panel, the different colored lines represent low or high numbers of rules. In communities with low levels of participatory governance, there seems to be a relatively small difference in SoVC across different levels of rule and moderator count. Conversely, in the high participatory governance category, communities with only a few moderators but a higher number of rules to enforce, exhibit a sharp drop in SoVC.