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DOI: <https://doi.org/10.31979/etd.fm25-9gpx>  
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EXAMINING THE ROLE OF ECHO-CHAMBERS WITHIN ONLINE INCEL  
COMMUNITIES USING SENTIMENT ANALYSIS AND GROUP BASED  
TRAJECTORY MODELING

A Thesis

Presented to

the Faculty of the Department of Justice Studies

San José State University

In Partial Fulfilment

of the Requirements for the Degree

San José State University

Master of Science

by

Francesca Florine Fanucchi

August 2023

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The Designated Thesis Committee Approves the Thesis Titled

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TRAJECTORY MODELING

by

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## ABSTRACT

### EXAMINING THE ROLE OF ECHO-CHAMBERS WITHIN ONLINE INCEL COMMUNITIES USING SENTIMENT ANALYSIS AND GROUP BASED TRAJECTORY MODELING

by

Francesca Florine Fanucchi

Technological advancements within the last decade have created new opportunities for social movements to meet and communicate online with like-minded individuals. Under this notion, these online communities generate an echo-chamber of information, to which certain individuals only surround themselves with people sharing similar values and opinions. As a result, online platforms (e.g., forums, blogs, websites) form as safe spaces for members to express their views seen as unacceptable offline. Research examining the role of echo-chambers in facilitating extremist rhetoric within online incel communities is limited, despite real-world acts of violence perpetrated by self-proclaimed incels. Therefore, the objective of this thesis was to address this limitation within cybercrime research. To determine over time the progression of negative sentiment present within online incel communities, this thesis performed an automated language analysis and group-based trajectory modelling of user posts from the popular online forum, incel.co. This thesis found prolonged exposure to incel.co forums can impact negative sentiment relating to aggrieved entitlement and violence, mental health and suicide, and idealization of violent perpetrators. While incel ideology is not inherently dangerous, prior cases of incel-related violence highlight the importance of identifying patterns of extremist rhetoric online before it leads to offline violent outcomes.

## DEDICATION

This thesis is dedicated to my family,  
friends, Dr. Bryce Westlake, and Rory.

Thank you for believing in me, this achievement would  
not have been imaginable without your support.

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## Chapter 1: Introduction

Technological advancement via the Internet has broadened accessibility to online platforms for users to communicate and form communities with like-minded individuals surrounding any number of ideologies or topics (Mansour, 2018). This phenomenon has created opportunities for *echo-chambers* to form within these online communities, whereby users only surround themselves with individuals sharing similar values and opinions (Salojärvi et al., 2020). Combined with the accessibility and anonymity of the Internet, this can enable, encourage, and normalise communities with extremist ideologies to disseminate hateful or violent content via online platforms deemed unacceptable offline (Alfano et al., 2018; Ging, 2019; Moskalenko et al., 2022).

In 1997, a Canadian woman in her mid-twenties created an online support group called Alana's Involuntary Celibacy Project, to vent about her own personal struggles with forming an intimate relationship (Van de Veer, 2020). Through this group she coined the term *incel*, meaning involuntary celibate, to identify individuals desiring an intimate relationship but struggling to obtain one. However, within the last decade the term has evolved from its non-violent origins. Largely due to its affiliation with high-profile incidents of violence and extreme misogyny at the hands of "incel" perpetrators, most notably Elliot Rodger's 2014 Isla Vista shooting (Vito et al., 2018) and Alex Minassian's 2018 Toronto van attack (Baele et al., 2021). Nagle (2017) describes these newly proclaimed incels as "the nastier corners of the internet, filled with involuntary celibacy-obsessed, hate-filled, resentment-fueled cultures of quite chilling levels of misogyny" (p. 86).

Research has attempted to analyse the extent to which online incel forums promote and reinforce misogynistic ideologies (Helm et al., 2022; Jaki et al., 2019; Pelzer et al., 2021). Using automated language detection tools, this work has focused on analysing the negative sentiment found within user posts at one point in time. However, it is unclear whether this negative sentiment is facilitated by participating in the online forum over time, suggesting the influence of echo-chambers on negative sentiment, or whether users begin participating already with a disposition towards negative sentiment. This thesis seeks to address this gap in literature by longitudinally analysing user posts from the popular online forum, *incel.co*. for shifts in negative sentiment. Through automated language analysis and group-based trajectory modelling, this thesis will determine whether participation in echo-chambers, in this case within online incel communities, leads to increases in negative sentiment for users during their first six-months on the website. A composite score for each user's posts per month, consisting of sentiment percentile, volume, severity, and duration, will be investigated for three topics: (1) aggrieved entitlement and violence; (2) mental health and suicide; (3) idealization of violent perpetrators.

### **Thesis Chapter Overview**

Chapter One of this thesis introduces the Internet's role in facilitating echo-chambers and the origins of incels and their subculture. Chapter Two begins with a summary of digital misogyny through a brief history of the manosphere and its impacts on perceptions of feminism and gender, and hegemonic masculinity. Next, the chapter details the threat of incel violence, examining how the core ideologies of the subculture facilitate echo-chambers and perceptions of aggrieved entitlement, suicide, and idealization of violent perpetrators. Chapter Three, describes the methods of automated data collection, the steps

of language processing conducted on user posts, and the group-based trajectory modelling procedures employed. Chapter Four summarizes the findings, focusing on the topics of aggrieved entitlement and violence, mental health and suicide, and idealization of violent perpetrators. Chapter Five discusses the implications of these findings in regard to the impact of online forums in facilitating echo-chambers and escalating to real-world acts of violence. Additionally, it notes the limitations of this thesis and recommendations for future research. Chapter Six concludes the thesis by summarizing the impact of this research on contemporary cybercrime research.

## Chapter 2: Literature Review

### Digital Misogyny

#### *The Manosphere*

At the beginning of second-wave feminism in the 1970s, pro- and anti-feminist factions began to form as a result of emerging discourses on gender relations and male privilege in society (Ging, 2019). Pro-feminists, such as the Men's Liberation Movement, aimed to end traditional interpretations of masculinity and institutional violence against women (Ging, 2019; Messner, 2016). While anti-feminist factions promoted traditional gender roles, as opposed to the institutionalization of women in the workplace, to prevent destabilization of the labor market, wage stagnation, and the under-employment of men (Ging, 2019; Messner, 2016). As pro-feminist factions expanded, and women acquired more rights, public support for sexual and female empowerment became increasingly popular despite anti-feminist factions condemning it as the destruction of societal norms (Nagle, 2017). However, by the 2010s, the anonymity of the Internet evolved these factions into a new type of transnational anti-feminism, known as the *manosphere*, an online network of blogs and forums formed by various men's interest and anti-feminist communities (Høiland, 2019).

The term *manosphere* originates from the United States, first appearing on Blogpost in 2009 (Høiland, 2019). Expanding accessibility to technology and the Internet within the last decade transformed the phrase into a transnational phenomenon. Ging (2019) expertly analyses the shift in online communication and social organisation, known as the digital revolution, in relation to creation of the manosphere. Popular online forum platforms *4chan*, founded in 2003, and *Reddit*, founded in 2005, were instrumental in the formulation of the modern online manosphere, as these sites encouraged user-submitted

and user-created content (Hoffman et al., 2020; Høiland, 2019). Various scholars accredit these sites to the global expansion of the manosphere (Baele et al., 2021; Massanari, 2017). Within the manosphere, users often share personal concerns related to gender, sex, physical appearance, social marginalization, and mental health. As a result, hate speech is highly apparent on these websites and forums, and often used as a means to demonize select groups and justify beliefs deemed socially unacceptable (Nagle, 2017).

In relation to online incel communities, the techno-social landscape of the manosphere promotes the production, propagation, and consumption of misogynistic rhetoric within the digital sphere (Hassan et al., 2018; Venkatesh et al., 2016). As a result, incels can descend further into incelism as online communities within the manosphere reinforce the vilification of women and societal structures these individuals deem responsible for their perceived subjugation and marginalisation (O'Malley et al., 2022). While incel ideology is not inherently linked to radicalization or terrorism, the rise in incel-related violent attacks highlights the importance of identifying patterns of extremist rhetoric on social media platforms before it leads to offline violent outcomes (Baele et al., 2021; Jaki et al., 2019; Vito et al., 2018).

### ***Perceptions of Feminism and Gender***

Incel subcultures of the manosphere are deeply rooted in misogynistic ideology, whereby feminism has destroyed societal norms and the natural order of mating through sexual and female empowerment (Nagle, 2017; Zimmerman et al., 2018). Central to the incel identity are perceptions of feminism as manipulative, distrustful, and oppressive (Hoffman et al., 2020). The basis of these beliefs stems from the *red pill/blue pill* philosophy, which originated from a subreddit thread, known as “*The Red Pill*” or r/TRP (Ging, 2019). According to Nagle (2017), this subreddit has been central to the

emergence and propagation of anti-feminist sentiments on the internet. Regarding incel ideology, the analogy portrays either acceptance, “taking the red pill”, or rejection, “taking the blue pill”, to the harsh truths of oppression by females in society (Hoffman et al., 2020). The philosophy derives from the 1999 science fiction film, *The Matrix*, as the main protagonist, Neo, must choose between a blue or red pill – blue leads to a life of deception while the red enlightens him to the ugly truths of reality (Hoffman et al., 2020; Ging, 2019). In his analysis of the *Red Pill* subreddit, Van Valkenburgh (2021) found the ideology to be an antidote for men who feel exploited by feminism, which allows women to pursue only wealthy and attractive partners.

An extension of the ideology is the concept of *taking the black pill*, which asserts that men are at the sexual, economic, and social discretion of women (Høiland, 2019). In her narrative analysis of incel subreddits, Høiland (2019) found self-identified *black pill* incels contributed three factors to their inability to obtain romantic relationships: wealth, physical attractiveness, and social status. While incredibly nihilistic, incels whom take the black pill acknowledge a harsher reality base. In this reality, women are biased against men lacking specific physical attributes and men no longer have systemic power or privilege over women. Additionally, oppression of females is a myth, fabricated by feminists to enable women to act as victims and exploit men for their money and status (Van Valkenburgh, 2021). These men accept their inability to obtain a romantic relationship and acceptance in society as a result of not fulfilling these requirements (Hoffman et al., 2020). Since many incels subscribe to this mindset of biological determinism, whereby human physical and mental characteristics are determined by hereditary factors, incelism is perceived as a predetermined and permanent condition (Moskalenko et al., 2022). Hence, the black pill rhetoric found online can serve as a



potential gateway to a *beta uprising*, whereby select incels deem violence as the answer to changing society (Ging, 2019).

Scholarly interpretations of gender relations range from biological essentialism to social construction. In social science, gender theory has evolved from biological explanations largely due to feminist scholars. According to early feminists, patterns of gender relations were dependent on positional interactions within the patriarchy, therefore, society functions within a gender hierarchy (Connell & Messerschmidt, 2005). However, within the manosphere, men who identify as incels propagate biological constructions of gender as a means to reclaim their perceived loss of masculine and patriarchal power over women. These beliefs are known as *lookism*, a subcategory of black pill ideology within the incel community, whereby a women's choice of sexual partners is based solely on physical appearance (Moskalenko et al., 2022). Jones (2020) found users within online incel forums justify their perceived discrimination due to physical appearance, masculine entitlement over women and their bodies, ideologies of anti-feminism, and share their experiences of marginalised masculinity through the narrative of lookism. These notions of women as sexual objects, as well as their perceived devalued masculinity, are at the core of incel identity and grievances, and used to justify their anti-feminist political position (Segalewitz, 2020). Consequently, incels associate hegemonic masculine traits to sexual success and worth in society, which can translate into violent misogyny (Høiland, 2019).

### ***Hegemonic Masculinity***

The concept of hegemonic masculinity stems from various academic fields; however, this research focuses on interpretations from sociological theory and social science. Hegemonic masculinity originated from the concept of hegemony from Marxist theorist

Antonio Gramsci (Lull, 1995), who argued politics and philosophy cannot be separated in society. Therefore, philosophical ideals function as a cultural means to solidly order and maintain power within certain groups who control the narrative. While the foundation of hegemonic masculinity originates from Gramsci's theory, the term was officially coined by Connell (2005) to define "the configuration of gender practice which embodies the currently accepted answer to the problem of the legitimacy of patriarchy" (p.77).

Therefore, hegemonic masculinity is the accepted presentations, beliefs, and behaviors associated with maleness to warrant the establishment of patriarchy, which guarantees the subordination of women and dominant position of men. According to Connell, hegemonic masculinity operates through three processes of legitimation: power, production, and cathexis. Through a gendered social hierarchy and division of labor under capitalism, power and production relations reinforce the patriarchy. Lastly, cathexis highlights the relationship between the social construction of gender and the patriarchy, suggesting gender order and sexual desire cannot be separated.

Messerschmidt (2018) later amended Connell's (2005) definition of hegemonic masculinity to incorporate findings from his own research. He argued dominance does not inherently legitimize the patriarchy, thus biological factors and natural order are not inherently masculine and alone do not constitute hegemony. However, heterosexuality is an important aspect of hegemonic masculinity, as men who display characteristics associated with heterosexual bravado are perceived as more dominant and sexually desirable within society (Segalewitz, 2020). In relation to incels, their position within the gender hierarchy is inherently linked to heterosexual desire and the realm of cathexis (Jones, 2020). Therefore, incels are seen in the realm of marginalised or protest masculinities. Messerschmidt states marginalised masculinities occur when men

experience discrimination within the gender hierarchy due to their ethnicity, race, sexuality, and physical appearance. On the other hand, men who display protest masculinities adopt hypermasculine characteristics in order to reclaim their power within hierarchy. Ultimately, Connell and Messerschmidt highlight the prevalence of multiple masculinities rather than one normative type, as opposed to previous interpretations of gender relations through biological essentialism and sex role theories.

### **The Threat of Incel Violence**

The incel movement began as an online platform for men to share and bond over shared personal struggles in relation to their inability to achieve societal norms related to physical appearance, romantic relationships, and masculinity. However, the hateful and misogynistic rhetoric found within the manosphere has evolved from online to real-life acts of violence (Jones, 2020). Within the last decade there has been a surge in incel-related attacks perpetrated by men who justify mass violence as a means to express their anger and assert male dominance (Salojärvi et al., 2020). Since the first incel-related attack occurred in 2014, perpetrated by Elliot Rodger on the University of California Santa Barbara campus and the surrounding neighborhood of Isla Vista, resulting in the death of six people, several other incidents have been noted as incel-related acts of violence (Vito et al., 2018). Notably, the van attack perpetrated by Alek Minassian, a self-ascribed incel, in April 2018, which resulted in the death of ten people in Toronto, Canada (Zimmerman et al., 2018). Upon further investigation, law enforcement determined Minassian had announced his intentions online beforehand, whereby he actively shared his support for Elliot Rodger and the misogynistic doctrine found within online incel communities. Only a few minutes prior to driving his van into the crowd, Minassian posted on Facebook, “The Incel rebellion has already begun! We will

overthrow all Chads and Stacys! All hail the supreme gentleman Elliot Rodger" (p. 1). The term “*Chad*” represents the men in society, as perceived by incels, which embody characteristics commonly associated to hegemonic masculinity, such as being physically strong, attractive, and sexually active; the term “*Stacy*” is used by incels to describe an attractive woman (Segalewitz, 2020). While the majority of incels found online do not condone these ideologies and acts of violence, recent research has discovered a troubling minority of incels whom embrace violent manifestation within the subculture and glorify incel perpetrators, such as Rodger and Minassian (Moskalenko et al., 2022).

### ***Echo-Chamber Theory***

Since the 1990s, the internet has fundamentally transformed social interactions and evolved theoretical perceptions of communication within society (Labbaf, 2019). According to Sunstein (2017), the internet has definitively changed social dynamics through the exchange of information online, known as *echo-chambers*. The concept of echo-chambers stems from critical mass theory, whereby the formation and expansion of social movements are dependent on the critical mass of people (Salojärvi et al., 2020). In the past, these collaborations were difficult to achieve, however, technological advancements within the last decade have created new opportunities for social movements to meet and communicate online with like-minded individuals (Mansour, 2018). The digital revolution, especially the emergence of social media platforms, allows individuals to generate and collaborate within content-based online communities on shared personal interests and ideologies (Mansour, 2018).

Under this notion, these online communities generate an echo-chamber of information, to which certain individuals only surround themselves with people sharing similar values and opinions (Salojärvi et al., 2020). Therefore, select incels often perceive

these online platforms as safe spaces for members to find camaraderie by communicating directly or indirectly with each other, in order to reinforce and normalise their predilections often viewed as unacceptable offline (Alfano et al., 2018; Ging, 2019). Baele et al. (2021) highlight the formation and polarisation of online incel communities through echo-chamber dynamics. Their research suggests through various internet platforms, certain individuals were able to identify themselves as incels and learn the fundamental features of the culture, such as terminology and core ideologies. Massanari (2017) addresses the manifestation of echo-chambers in the manosphere, and the role of Reddit in the emergence of toxic spaces online due to its user-submitted content and platform structure. In 2017, Reddit banned the subreddit *r/incels* for repeatedly violating the website's prohibitions on violent incitement, which at the time had over 40,000 members (Zimmerman et al., 2018). However, this simply moved the place of online congregation to websites specifically devoted to incel discussion, such as *incels.co* and *incels.net* (Hoffman et al., 2020).

### ***Aggrieved Entitlement and Violence***

According to Ging (2019), the anonymity and interconnectedness of the Internet provides the platform necessary for online incel communities to campaign hatred and revenge against women who deprived them of their sexual rights and challenged their masculine ideals. Incels perceive themselves as victims of systemic oppression by women, known as *masculine victimhood*, due to their inability to meet the sexual and physical expectations of hegemonic masculinity seen as desirable by the feminist agenda and society (Conley, 2020; Segalewitz, 2020). These sentiments of social inadequacy can lead to feelings of unworthiness, inferiority, psychological distress, and suicidal ideations in young men, which poses dangerous and violent consequences (Hong et al., 2011). In

relation to the manosphere, the concept of aggrieved entitlement legitimizes the rhetoric of misogyny and hate found within online incel communities to justify violence as means to restore their masculinity, identity, and self-esteem. Kimmel and Mahler (2003) argue “shame, inadequacy, vulnerability, all threaten the self” (p.1452), and violence in this situation can be compensatory and restorative. The term *aggrieved entitlement* was originally introduced by Kalish and Kimmel (2010) in their analysis of rampage school shootings after the tragedies committed at Columbine High School in 1999 and the increasing number of mass shooting in the US within the last decade, to understand commonalities among these types of violent perpetrators.

Expanding from Kalish and Kimmel’s (2010) research, Kimmel (2017) addresses the culture of hegemonic masculinity within the United States, which condones physical aggression and violence due to a sense of aggrieved entitlement. Kimmel describes aggrieved entitlement as the various manifestations of anger and rage from men, which feel their masculinity has been threatened due to economic and social changes, to reclaim their power. While Kimmel highlights the role of male masculine victimhood within acts of violence and extremism, Vito et al. (2018) adapted the framework to understand cases of incel violence specifically. These scholars examined the relationship between perceptions of masculinity and violence by analysing the online manifesto of infamous incel Elliot Rodger. Arguably, Rodger justified mass murder and suicide as a means of protecting his entitlement and retribution by perpetrating the ultimate act of manhood and male violence. As stated by Kalish and Kimmel, the “culture of hegemonic masculinity in the US creates a sense of aggrieved entitlement conducive to violence” (p. 451), which highlights the cultural acceptance of violence as an expression of masculinity. Therefore,

incel perpetrators legitimise the use of violence as a means of revenge and reclamation for their marginalised masculinities.

### ***Mental Health and Suicide***

While the incel subculture includes extremists and narratives of mass violence, the majority of its members are young males who struggle with depression, anxiety, learning difficulties, self-loathing, social impairment, and suicidal ideation (Moskalenko et al., 2022). Prior research has shown self-identified incels blame their inability to achieve societal standards of masculinity due to lookism, genetic determinism, and female empowerment for exacerbating their experiences of depression, anxiety, and social isolation (Jones, 2020). Since social and emotional marginalisation are seen as a permanent condition of incelhood, incels often perceive suicide as the only means to escape these issues. Within online incel communities, various coded responses are exchanged between users to conceal these narratives of suicidal ideation, for example (IncelWiki, 2022, March 25): *rope* (suicide by hanging), *LDAR* (lay down and rot), and *suifuel* (suicide fuel).

Notable cases of incel violence resulting in the perpetrator committing suicide, such as Elliott Rodger, highlight the extent masculine ideals, mental health issues, and glorification of suicide lead to violent outcomes. Prior to the university campus shooting, Rodger published an online manifesto outlining his reasons behind the attack, which included his hatred for women, the inability to find a girlfriend, and anger towards men he deemed more sexually active than himself (Vito et al., 2018). Arguably, as Rodger descended into his crisis of masculinity, he directed his feelings of anger and isolation towards ideals of aggrieved entitlement, whereby masculinity can be reclaimed and asserted through violence to women and oneself (Vito et al., 2018). Members of online

incel forums often encourage suicidal users to *go ER*, a term used online to reference Rodger as motivation to commit mass murder before killing themselves (Hoffman et al., 2020). An online survey administered to *incel.co* forum users examined their personal beliefs, attitudes, violent intentions, history of trauma, and mental health issues in order to comprehend the link between these factors and incel-related violence (Moskalenko et al., 2022). The findings indicated a correlation between incel ideology, specifically *black pill* rhetoric, and online incel discourse surrounding mental health and violent ideations.

### ***Idealization of Violent Perpetrators***

The 137-page manifesto written by Rodger and his series of YouTube videos on inceldom has lionised him online as a hero within the incel subculture for his actions (Labba, 2019). Known as the first self-identified incel to commit an act of mass violence, Rodger has come to be regarded as the “patron saint” of incel ideology, especially among more extremist incels who perceive his manifesto as a guide to commit and justify similar acts of violence (Hoffman et al., 2020). Rodger has been canonized for his violent acts against women, referring to him as the “Supreme Gentlemen”, or forefather of the incel movement (Vito et al., 2018). For example, prior to the 2018 mass shooting at Stoneman Douglass High School in Parkland, which resulted in the death of seventeen people, the perpetrator Nikolas Cruz praised Rodger online by writing “Elliot Rodger will not be forgotten” (Rouda & Siegel, 2020).

Rodger is only one individual in a group of incel perpetrators, known as the “line-up of saints” (e.g., Alex Minassian), praised within online incel communities for their acts of violence in the name of incel ideology (Baele et al., 2021). Within online incel forums, Moskalenko et al., (2022) have shown evidence of a minority sub-group who idealised infamous incel perpetrators and fantasied about inflicting similar acts of violence



themselves. The idealization of incel perpetrators indicates the amount of incels whom relate to the anger and struggles of these offenders due to inceldom. While the majority of incels found online do not condone the sentiments of violence propagated by more radical incels, the portion of incels promoting these ideals continue to pose a threat (Salojärvi et al., 2020).

### ***Misogynistic Terrorism***

The U.S. Department of State (2019) defines terrorism as “premeditated, politically motivated violence” (p.303) perpetrated against civilians. Arguably, the incel subculture within the manosphere meets this definition and its expanding membership through online platforms poses a threat to national security (Scrivens, Gill & Conway, 2019). Gentry (2022) explores the concept of *misogynistic terrorism*, which defines incel violence as form of terrorism related to misogyny. Originally referred to as patriarchal terrorism, Michael Johnson (1995) formulated the term to highlight the political and ideological role of misogyny in acts of terrorism. In order to establish incel violence as a type of terrorism, Gentry (2022) examines these offences as an act of ideologically-driven social justice. In relation to Elliott Rodger, the Isla Vista shooter stated in his manifesto the desire to overthrow social order through violence to reclaim the power and status he had previously been denied by women and society (Van der Veer, 2020). Additionally, the Toronto van attacker, Alek Minassian, referred to his own crime as a continuation of the “incel rebellion” instigated by Rodger (Van der Veer, 2020). Therefore, Gentry (2022) argues these cases of incel violence aimed at instigating an overthrow of social order qualify as terrorism relating to political violence.

Hoffman et al. (2020) address the skepticism of scholars to include incel violence within the scope of terrorism research. To determine whether incel violence qualifies as

terrorism driven by political ideology, they categorised fourteen cases of incel-related violence into one of four groups: (1) clear incel-motivated terrorist attacks; (2) attacks with mixed motives evident to incel ideological influences; (3) acts of targeted violence perpetrated by self-professed involuntary celibates; (4) ex post-facto inceldom. Only a small number of incidents were deemed to be clearly driven by incel ideology (i.e., Elliot Rodger, Alex Minassian) and thus could be categorised as terrorism. Therefore, they concluded the nature of discourse found within online incel communities makes it difficult to distinguish between posts as threats or “cathartic satire/false bravado” (p.24). While their research effectively discusses the misogyny dominating incel ideology, these scholars failed to recognise misogyny as inherently political within incel-related acts of violence.

## Chapter 3: Methodology

### Sample

#### *Automated Data Collection*

The large amounts of data found online has necessitated the use of automated tools to increase the efficiency of data collection. In the last decade, researchers in terrorism and extremism began to develop these custom-written computer programs to collect high volumes of information online (Scrivens, Gaudette, et al., 2019). These programs, known as web-crawlers or web scrapers, are used to automatically map and collect information from each website and webpage navigated through the computer program (Scrivens, Gaudette, et al., 2019). First, the software user must select a website or link for the web-crawler to follow until user-specified conditions are completed. During this process, the software tracks the webpage, plus all the links or websites between, to retrieve and save the content onto a hard-drive or database for future analysis. In order to collect specific types of content, the user can set defined keywords or parameters to simultaneously collect information and determine whether each webpage contains extremist content. To prevent the web-crawler from perpetually searching the internet and different websites or webpages unrelated to extremist content, the user can set four kinds of parameters for each task, which are as follows: number of webpages, number of domains, trusted domains, and keywords (Scrivens, Gaudette, et al., 2019).

This research method has been used to collect, classify, and interpret large-scale data analyses of extremist content online (Scrivens et al., 2018). Therefore, it was deemed an applicable methodology to comprehend the rhetoric of online incel communities. The data was previously collected by Associate Professor Dr. Richard Frank using a customized web-crawler developed at Simon Fraser University's International Cyber

Crime Research Centre. The web-crawler collected all user posts from the largest incel discussion forum *incel.co* since the website's inception in April 2014 until May 2020. This resulted in a dataset of 5,224,307 posts from 23,434 users.

### ***Coding User Post Language***

A custom-designed natural language processing (NLP) program was used to further analyse the data collected from *incel.co* by providing a frequency list of each type of word used within the forum posts (nouns, proper nouns, verbs, adjectives, etc.). Artificial intelligence software for NLP techniques are useful tools for retrieving information within incel comments online and interpreting the semantic aspects of the posts (Jelodar & Frank, 2021). Forty different text files were created through the NLP for the varying word frequency lists. The text files were uploaded to Excel to form a single word frequency list for easier analysis, consisting of more than a million different words (n=1,031,996). Due to the high volume of words, all text symbols and any words with a frequency less than one hundred were removed from the list.

Various coded terminologies (e.g., slang and neologism) are employed by members of online incel communities to conceal explicit or derogatory content deemed offensive and controversial offline (Labfaf, 2019; Wasniewska, 2020). As a result, each word from the dataset was analysed in alphabetical order and cross-referenced with definitions of incel terminologies outlined in the IncelWiki (2020, March 25) online glossary, such as *Stacy*, an attractive woman; *Becky*, a women who is not attractive enough to be considered a Stacy; *looksmax*, the “process of improving one's physical appearance”; *red pill*, the philosophy of confronting the belief that “exchanges of material value largely drive someone's mating success”, as opposed to abstract concepts, such as love; *blue pill*, the preference of “believing in a convenient or comforting lie”, especially when it refers to

“attitudes that minimize the role of individual differences, such as physical attractiveness”; *supreme gentleman*, the nickname used by incels when referring to the Isla Vista shooter, Elliott Rodger. Furthermore, select terms were used to categorize social hierarchies within the incel community, with the lowest faction consisting of “*incels*”, “*normies*” in the middle, and “*Chads*” at the top (Baele et al., 2021). This process filtered out irrelevant words, which do not manifest any sentiments, resulting in a reduction of the frequency list of words to 2,515.

Select keywords obtained from the NLP frequency list were allocated into one of three lists: aggrieved entitlement and violence, mental health and suicide, and idealization of violent perpetrators. These categories were selected for implementation into the sentiment analysis program as perpetrators of real-world occurrences of incel violence often demonstrate and share attributes within these topics (Helm et al., 2022; Jones, 2020). The first list contained one-hundred and fifty keywords (n= 150) related to aggrieved entitlement and violence (e.g., *kill, victim, assault, gun, retribution*). The second list contained ninety-five keywords (n= 95) related to mental health and suicide (e.g., *depression, anxiety, hopeless, suicidal, loner*). The third list contained eighty-four keywords (n= 84) related to idealization of violent perpetrators (e.g., *rodgers, worship, martyr, columbine, parkland*).

## **Analytical Procedure**

### ***Sentiment Analysis***

To determine the progression of negative sentiment within content posted by members of online incel communities over time, a quantitative method known as sentiment analysis was employed. Sentiment analysis, or *opinion mining*, evaluates the opinions found in a piece of text by assigning positive or negative to any given keywords.

Sentiment analysis is a useful method of analysis for the identification and classification of opinionated content posted online, such as social media, blogs, and forums (Scrivens, Gaudette, et al., 2019). When identifying large-scale patterns in extremist content online, sentiment analysis is the most commonly used analytical method within NLP (Liu, 2012).

The sentiment analysis program, *SentiStrength*, was implemented into the current study to determine the extent of extremist sentiment within the keywords obtained from the NLP (Thelwall & Buckley, 2013). *SentiStrength* uses a ‘lexical approach’ to classify sentiment polarity into positive, negative, or neutral: positive when positive emotion score + negative emotion score > 0; negative when positive emotion score + negative emotion score < 0; neutral when positive emotion score = negative emotion score and positive emotion (Thelwall, 2017). The “polarity value” is produced through a two-step process: one score represents positive emotion ranging from 1 to 5, whereby 1 indicates not positive and 5 indicates extremely positive; the second score represents negative emotion ranging from -1 to -5, whereby -1 indicates not negative and -5 indicates extremely negative. For *SentiStrength* to analyse a selected piece of text for multiple keywords, it is necessary to input each form of the words selected for analysis, and all other derivatives of the words; for example, the words *murders*, *murdered*, and *murdering* are included to analyse the sentiment around the word *murder* (Scrivens, Gaudette, et al., 2019). Thus, the multiple iterations of *SentiStrength* are applied to each keyword and their derivatives and links each text to multiple sentiment values. At the end of this process, these values are averaged to generate a single sentiment score for any given piece of text (Scrivens, Gaudette, et al., 2019).

Compared to other machine learning tools, the sentiment analysis software *SentiStrength* has the highest human-level average accuracy for detecting sentiment

polarity and can operate independently without any other software or hardware (Thelwall, 2017). Additionally, this software can detect emoticons, emotions, negating words, booster words, idioms, and slangs, which is beneficial for this research as most of the rhetoric found within online incel communities is coded language (Mei & Frank, 2015; Thelwall, 2017; Wasniewska, 2020). Although, this tool can be less accurate when the texts contain sarcasm, accuracy can be enhanced by extending its lexicon and altering the mood setting to account for sets of texts with a narrow topic focus (Thelwall, 2017). Since *SentiStrength* has been widely used in criminological research to examine terrorism and radicalization within online platforms, it was deemed a suitable sentiment analysis program for this study (Scrivens & Frank, 2016; Scrivens et al., 2018).

### ***SIRA Algorithm***

The “polarity values” obtained through *SentiStrength* were then implemented into the Sentiment-cased Identification of Radical Authors (SIRA) algorithm to identify radical content online (Scrivens & Frank, 2016). The algorithm computes an average ‘radical score’, out of forty points, for any given forum user’s online activity by analysing the following components: a user’s online average sentiment score percentile, duration of negative posts, severity of negative posts, and volume of negative posts (Scrivens et al., 2018). Therefore, the higher a user’s ‘radical score’, it can be assumed their online posts contain profoundly negative content. The SIRA algorithm has been used in a number of online contexts to identify radical users, determine levels of radical content posted by users, and measure the evolution of radical posting behaviors over time (Jelodar & Frank, 2021; Scrivens & Frank, 2016; Scrivens, 2021).

For each component, the default weightings formulated by Scrivens, Davies, et al. (2018) were used to compute the radical score of users observed each month. The first

component, *average sentiment score percentile*, computed 25% (10 points) of the radical score by measuring the average sentiment percentiles for each individual observed in a given forum. The second component, *volume of negative posts*, consisted of two parts: (1) the number of negative posts for each individual, 12.5% (5 points), and (2) the proportion of posts for each individual that were negative, 12.5% (5 points). The third component, *severity of negative posts*, consisted of two parts; (1) the number of very negative posts for each individual, 12.5% (5 points), and (2) the proportion of posts for each individual that were very negative, 12.5% (5 points). The final component, *duration of negative posts*, computed 25% (10 points) of the radical score by calculating the first and last dates negative posts were made by individual members for each month, and converting the difference between these dates into percentile scores.

## **Data Analysis**

### ***Group Based Trajectory Modelling***

Designed by Nagin (2010), the group-based approach uses a finite mixture of modelling to predict the trajectory of each group and form of each trajectory, in order to identify and profile distinctive clusters of individual trajectories within the observed population. Rather than categorizing trajectory groups on the basis of traits, this statistical method uses the maximum likelihood estimation to evaluate the probability of group membership for each individual (Jones & Nagin, 2012). As a result, the polynomial distributions of age or time measured by the maximum likelihood estimation in GBTM predict the form and number of groups that best fit the data (Nagin, 1999; 2010). These models adhere to a continuous rather than a discrete distribution; therefore, the models produced from GBTM should be interpreted as a statistical device, rather than an exact



representation, for summarizing distinctive trajectories within the data (Nagin & Odgers, 2010).

As a “person-based” method, GBTM has the ability to identify the characteristics and behaviors of individuals following a distinctive developmental pathway (Nagin, 2010). As a result, numerous applications of GBTM can be found in clinical psychology and medicine research to create these types of profiles (Nagin & Odgers, 2010). However, the statistical method originates from developmental criminology, also known as life-course theory, which demonstrates a change or stability in antisocial and criminal behavior over time due to the social bonds individuals form in young adulthood (Hirschi, 2017; Sampson and Laub, 1990). Drawn from the traditional criminal career measures formulated by Sampson and Laub (1990), GBTM has been used in life-course criminological research to identify clusters of individuals, called trajectory groups, following a similar development pattern in offending (Verbruggen et al., 2022).

The data acquired from the sentiment analysis software SentiStrength and SIRA algorithm for each of the three keyword categories were implemented into group-based trajectory modelling (GBTM) to identify groups of users on statistically similar development trajectories in the first six-months of posting to the site, i.e., the course of an outcome over age and time, based on their online sentiment for each category. As a result of varying start dates for each username, the data collected was right-censored in order to be observed concurrently. Segmenting the data obtained from *SentiStrength* and the SIRA algorithm into trajectory groups provided an empirical means of summarizing the large amounts of time-based data to determine the duration, longevity, and severity of user posting behaviors from *incel.co* forums over a period six months.

Users with posts in only one month were removed from the analysis, as they did not display the developmental trajectory needed to perform GBTM. That is, any user with a message count of zero in the second month of posting was removed. For the first keyword list (i.e., Aggrieved Entitlement & Violence) a total of 8,694 usernames posted content related to the topic. Of these, 41.2% (3,585 users) had a posting of less than one month, thus were excluded; this left a sample size of 5,109 usernames, which was 58.8% of the topic users. For the second keyword list (i.e., Mental Health & Suicide), a total of 8,292 usernames posted content related to the topic. Of these, 40.4% (3,352 users) had a posting of less than one month, thus were excluded from the GBTM analysis; this left a sample size of 4,940 usernames, which was 59.6% of the topic users. Lastly, the third keyword list (i.e., Idealization of Violent Perpetrators) had a total of 6,448 usernames who posted content related to the topics. Of these, 40.3% (2,600 users) had a posting of less than one month, thus were excluded; this left a sample size of 3,848 usernames, which was 59.7% of the topic users. Therefore, in total 40.7% (9,537 users) of 23,434 usernames were excluded from the GBTM analysis.

After users with one data point were eliminated, the dataset was ready to be imported to *Stata BE Statistical Software* for Mac, the statistical software employed to execute group-based trajectory modelling (StataCorp, 2021). The Stata Plugin, *traj*, was used, as it calculates the GBTM by generating parameter estimates for the following categories: the probability of group membership, the predicted trajectory for each group, and the subsequent probabilities of group membership (Jones & Nagin, 2012). The plugin software provided three different types of probability models to determine trajectories: *censored normal distribution*, *zero-inflated Poisson distribution*, and *binary logistic distribution* (Jones & Nagin, 2013). Since the censored normal distribution (cnorm) was

designed for the analysis of continuous scale values, such as longitudinal data, it was selected to model the mean *SIRA\_FinalScore* collected within the observed time period (*Month\_1* to *Month\_6*) (Jones & Nagin, 2013). In order to perform the cnorm model, censors were set for any data values exceeding the selected scale minimum,  $\min(SIRA\_FinalScore = 0)$ , and maximum,  $\max(SIRA\_FinalScore = 1000)$ .

An important feature of GBTM is selecting the number of groups to include within the model (Jones & Nagin, 2012). Therefore, for each of the three keyword categories the model began with 2-groups, and extra groups were added (3-, 4-, 5-groups) until the best fitting model was identified. Following the guidelines of Jones et al., (2001), the Bayesian information criterion (BIC), a posterior model designed to analyse large sample properties of the marginal likelihood, was used as the criterion for model selection (Drton & Plummer, 2017). The lowest BIC generated between models determined the optimal number of groups, however, BIC values are approximations, and a lower BIC does not necessarily indicate one model is better than the other (Jones et al., 2001). Four types of curves were tested to identify the trajectory shapes within each model: intercept (0), linear (1), quadratic (2), or cubic (3). Like the selection process for group numbers, the best fitting trajectory shapes for each model were concluded by the lowest BIC generated between models. Lastly, in addition to obtaining the lowest BIC, group membership for each trajectory in the best-fit model must be over 5% to ensure assignment accuracy (Jones & Nagin, 2012).

## Chapter 4: Findings

The automated language and group-based methods employed in this thesis concluded prolonged exposure to the site over a period of six months can either increase or decrease negative sentiment relating to aggrieved entitlement and violence, mental health and suicide, and idealization of violent perpetrators. Therefore, evidence suggest for a subset of the population observed in this thesis these forums operate as echo-chambers and impact negative sentiments surrounding these topics.

### Aggrieved Entitlement and Violence

A 4-group model with one linear and three quadratic trajectories (2 2 2 1) generated the lowest BIC and was therefore selected as the best fit model (e.g., Table 1).

**Table 1**

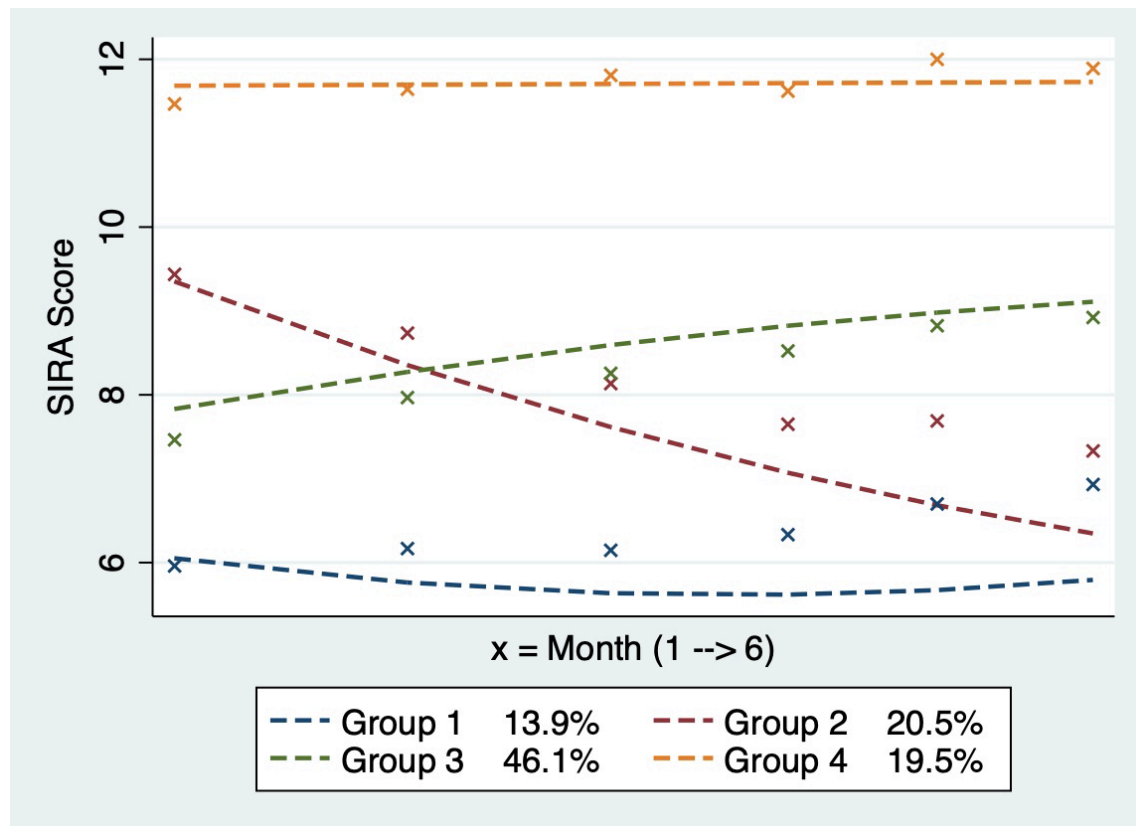
*Number of Trajectories, Trajectory Shapes, and Corresponding BIC for Aggrieved Entitlement and Violence*

Number of trajectories	Trajectory shapes	BIC (N = 5109)
2	3 3	-61152.15
3	3 3 3	-61135.16
4	1 1 1 1	-61132.79
4	1 2 2 2	-61114.77
4	1 2 1 1	-61131.05
4	2 1 2 1	-61119.99
4	2 2 2 1	<b>-61106.36</b>
4	2 2 2 2	-61123.89
4	3 3 3 3	-61111.69
5	3 3 3 3 3	-61114.52

The model performed well in terms of assignment accuracy as the odds of correct classification based on the posterior of group membership were over 5% for all four groups. The four trajectories for aggrieved entitlement and violence are presented in Figure 1.

**Figure 1**

*Four Trajectories of incel.co Users Relating to Aggrieved Entitlement and Violence*



For most users (60.0%), exposure to incel.co led to an increase in aggrieved entitlement and violence negative sentiment over the first six months of posting. Users in Group 1 (13.9%) began with a, relatively, low negative sentiment which continued to increase slightly over time. This pattern was repeated for users in Group 3 (46.1%), with users starting at a moderate level and likewise slightly increasing over time. For 20.5% of users (Group 2), exposure to incel.co led to a reduction in negative sentiment over time. These users began at a moderately high level, above Group 3, but became in-line with users in Group 1 after six months. Finally, users in Group 4 (19.5%) began, and remained, at a very high level of negative sentiment relating to aggrieved entitlement and violence. Thus, for one-fifth of users the severity, volume, duration, and percentile of negative sentiment *all* remained extremely high throughout the six months of posts.

## Mental Health and Suicide

A 3-group model with three quadratic trajectories (2 2 2) generated the lowest BIC, thus it was selected as the best-fit model for analysis (e.g., Table 2).

**Table 2**

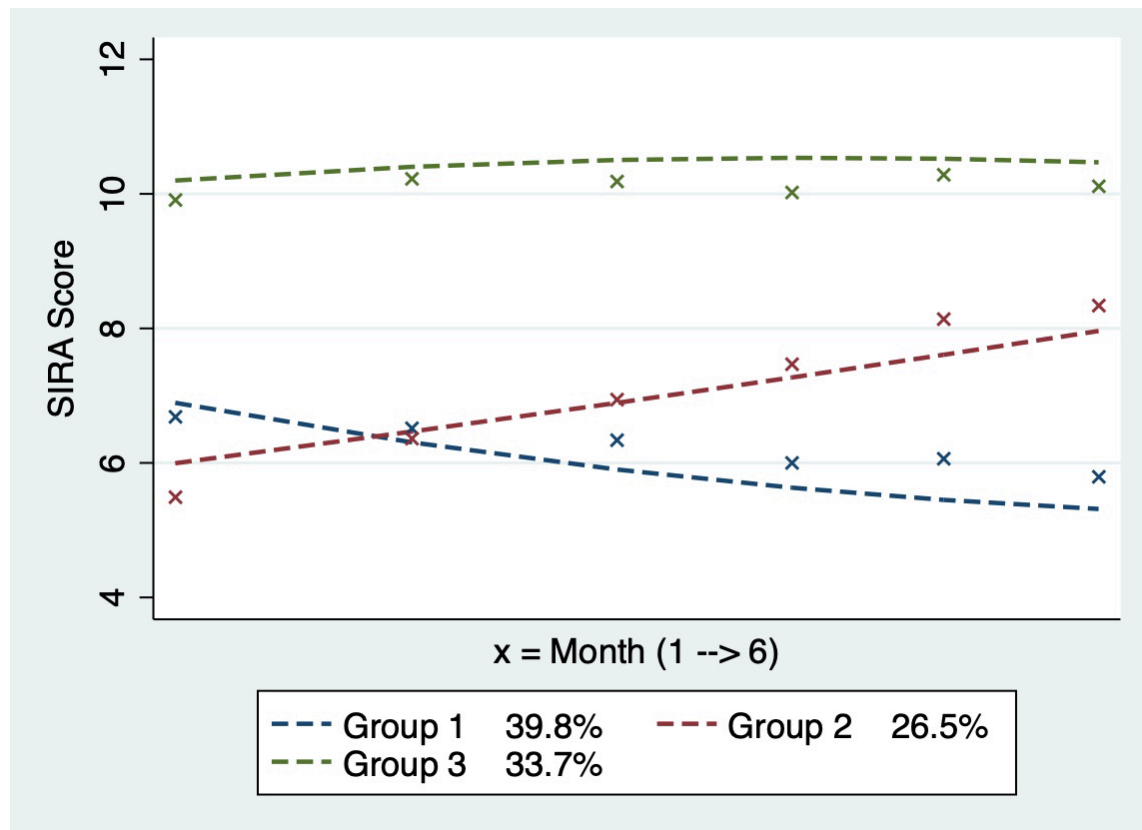
*Number of Trajectories, Trajectory Shapes, and Corresponding BIC for Mental Health and Suicide*

Number of trajectories	Trajectory shapes	BIC (N = 4940)
2	3 3	-62076.98
3	1 1 1	-62058.06
3	1 1 2	-62058.06
3	1 2 2	-62040.63
3	2 2 2	<b>-62026.05</b>
3	3 3 3	-62038.25
4	3 3 3 3	-62038.59

The model performed well in terms of assignment accuracy as the odds of correct classification based on the posterior of group membership were over 5% for all three groups. The three trajectories for mental health and suicide are presented in Figure 2.

**Figure 2**

*Three Trajectories of incel.co Users Relating to Mental Health and Suicide*



Within the three trajectories, posting on incel.co led to one of two outcomes after six months. First, for 39.8% of users (Group 1), negative sentiment referencing mental health and suicide decreased. These users began at a, relatively, moderate level of negative sentiment and over time decreased to a moderately low level. Second, for the remaining 60.2% of users, negative sentiment increased over time. For Group 2 (26.5%), negative sentiment began at moderately low and increased to moderately high after six months. While these users started at the lowest point of the three groups, in the six months after joining the site they surpassed the trajectory of users in Group 1. For Group 3 (33.7%), negative sentiment began high and slightly increased over time.

### Idealization of Violent Perpetrators

A 3-group model with three linear trajectories (1 1 1) generated the lowest BIC, thus it was selected as the best-fit model for analysis (e.g., Table 3).

**Table 3**

*Number of Trajectories, Trajectory Shapes, and Corresponding BIC for Idealization of Violent Perpetrators*

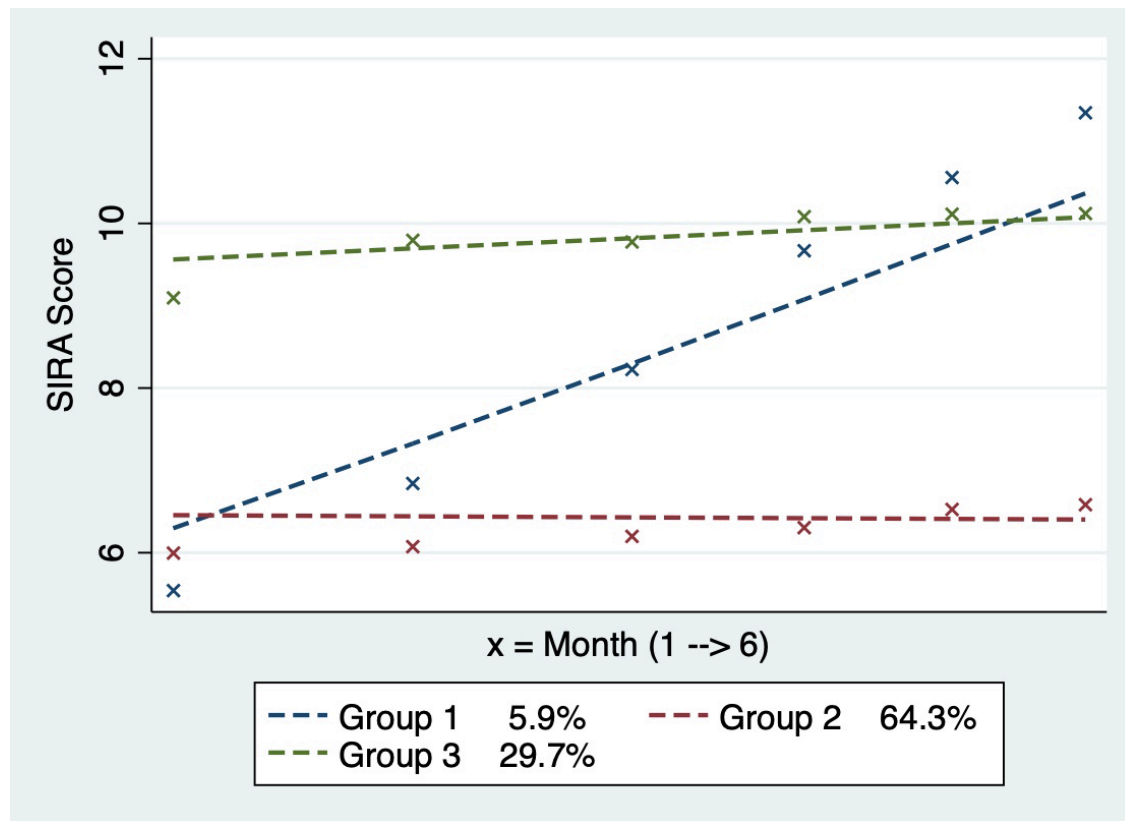
Number of groups	Trajectory shapes	BIC (N = 3848)
2	3 3	-48689.82
3	1 1 1	<b>-48620.53</b>
3	1 1 2	-48628.20
3	2 2 1	-48626.21
3	2 2 2	-48629.89
3	3 3 3	-48630.39
4	3 3 3 3	-48633.88

Group membership barely surpasses the 5% minimum required for the odds of correct classification for Group 1. However, the model upheld assignment accuracy as trajectories with higher group membership were not deemed the best-fit model. The three trajectories for idealization of violent perpetrators are presented in Figure 3.



**Figure 3**

*Three Trajectories of incel.co Users Relating to Idealization of Violent Perpetrators*



Over the course of six months, for a small group of users their negative sentiment relating to the idealization of violent perpetrators dramatically increased, while the rest of the sample population remained low or high. For 64.3% of users (Group 2), posting on incel forums began at a, relatively, low negative sentiment level and remained at that low level. For 29.7% of users (Group 3), negative sentiment began high and remained high throughout the six-month period. Finally, for 5.9% of users (Group 1), the negative sentiment of their posts began at the same level as Group 2 and then increased to the same level as Group 3. Thus, users from Group 1 began with posts deemed low in severity, volume, duration, and percentile of negative sentiment. However, over time, their posting began to display high rates in *all* these categories.

## Chapter 5: Discussion

The findings of this thesis indicate prolonged exposure to *incel.co* can either increase or decrease negative sentiment relating to aggrieved entitlement and violence, mental health and suicide, and idealization of violent perpetrators. Firstly, the volume, duration, severity, and percentile of negative sentiment for a small proportion of users posting to *incel.co* increased over time in relation to other users, which demonstrates the extent these forums can act as echo-chambers. Secondly, the data indicates for a proportion of users, these online forums can reduce negative sentiment surrounding these topics. Lastly, a small percentage of users posted content to *incel.co*, which embraced the most violent and misogynist ideologies of the incel subculture. Overall, the findings of this thesis comprehend the emergence and dynamics of the incel movement within online platforms, as well as the threat of online violent rhetoric evolving to real-world acts of violence.

An increase in overall negative sentiment for a proportion of users on *incel.co* highlights the cycle of reinforcement displayed within these online forums. Sustaining an increasingly negative mindset required any user examined via the SIRA algorithm to obtain a higher overall “radical score” for each month of observation. In order for users to display this trajectory, the volume, duration, severity, and percentile of negative sentiment needed to escalate each month. Therefore, the longer and more frequently users posted to these online forums, the easier it became for them to embrace progressively extreme positions. Echo-chambers as theorised by Sunstein (2017), states long-term exposure to opinions from like-minded individuals promotes people to increasingly adopt and reinforce more homogenous attitudes. Formation of “closed chambers”, whereby select opinions are reinforced and opposing topics are repressed, within these online incel forums highlights the disturbing growth and spread of misogynistic, hateful, and violent

rhetoric within the manosphere (Hassan et al., 2018; Salojärvi et al., 2020; Venkatesh et al., 2016).

However, the effects of echo-chambers are not always adverse. In some cases, online forums can function as a safe-space for members to find emotional support and a feeling of camaraderie based on shared perceptions of personal and societal hardships (Ging, 2019; Kimmel, 2017). For 20 to 30% of users analysed in this thesis, negative sentiment decreased each month of engagement with *incel.co*. This relates to the concept of community highlighted by Bauman (2001), notably the efforts of members to preserve support between one another. Arguably, a faction of incels interacting on these online forums are not focused on the extremist aspects of the subculture. Instead, the community acts as a means to share and express their grievances without resorting to violence and can be beneficial to decreasing their senses of aggrieved entitlement, tendencies towards violence, and suicidal ideations.

While the majority of incels found online do not condone these ideologies and acts of violence, recent research has discovered a troubling minority of incels whom embrace violent manifestation within the subculture and glorify incel perpetrators, such as Rodger and Minassian (Moskalenko et al., 2022). Prior research has shown a disproportionate amount of content within online incel communities supports violence (Baele et al., 2021). The prevalence of discourse pertaining to the idealization of notable incels and violent perpetrators, as well as the glorification of violence, were demonstrated within these findings. While only a small percentage of those posting to *incel.co* exhibited either escalating or consistently high negative sentiment regarding these topics, the level of hateful and violent rhetoric dispersed is substantive. As group polarisation grows within online incel communities, because of echo-chamber dynamics, the likelihood of members

adopting violent solutions to their perceived incelness increases (Zimmerman et al., 2018). Filtering content and gravitating to like-minded individuals in the digital sphere is not inherently dangerous, however, prior cases of incel-related violence demonstrate the extent it can lead to extremism.

### **Limitations**

Prior research has shown the benefits of sentiment analysis, NLP, and web-crawling technology in detecting the volume, severity, and prevalence of extremist content online (Jelodar & Frank, 2021; Scrivens, Gaudette, et al., 2019; Scrivens, 2021). However, sentiment analysis has limitations in regard to measuring the degree of negative sentiment within online incel communities. This is largely due to the coded language and slang, often filled with metaphor and sarcasm, formulated by the incel subculture to conceal explicit or derogatory rhetoric (Wasniewska, 2020). While the sentiment analysis software used, *SentiStrength*, has near-human accuracy for short web texts, its inability to decipher sarcasm in the text can lessen accuracy (Thelwall, 2017). This limitation highlights the difficulty of analysing the extent of extremist content posted to online platforms by members of the incel movement (Hoffman et al., 2020).

Additionally, the group-based approaches of this thesis were unable to determine the level of engagement for users whom do not interact and/or only observe the content posted by other members. Despite a lack of online interaction, these users may be reinforced to adopt or accept more extremist ideologies only by observing the content. As shown in prior research, reinforcement of these ideals does not require an individual to actively interact online with other members of incel communities (Holt et al., 2017). Arguably, similar consequences can be achieved by a user privately reflecting on content seen as relatable and intriguing to them. While limitations are evident in the application

of these method, prior research has demonstrated the benefits of automated detection to identify misogynistic and hateful sentiment within online incel communities (Helm et al., 2022; Jaki et al., 2019; Pelzer et al., 2021). Overall, the evidence presented in this thesis effectively comprehends the emergence and dynamics of the incel subculture within online platforms. As algorithmic and automated language detection methods advance, future research should be able to detect, prevent, and reduce violent radicalization within the echo-chambers of online incel forums.

### **Future Research**

Evidence of online radicalization to offline violent outcomes remains under-researched (Hassan et al., 2018). Therefore, contemporary cybercrime research must consider the likelihood long-term online exposure to incel communities leads to offline acts of incel-related violence. While this thesis improves research on the subject due to its longitudinal analysis, the data collected comes from a mid-point whereby the user to some degree has already formed a negative or extreme mindset. Future research should examine the factors which lead the user to incel.co, whether it be reinforcement of their personal ideals or voyeurism into the life of others. Expanding further on the subject, unlike the intended echo-chambers created within dedicated online incel communities (e.g. incel.co), future research needs to account for the formation of echo-chambers in unintended platforms, such as TikTok, 4chan, Facebook, and YouTube.

In the context of YouTube, the user-submitted video content site has been known to promote inappropriate and hateful content due to its recommendation algorithm (Papadamou et al., 2021). Prior solutions to these issues relied on cooperation from digital platforms to develop reductionist strategies, enhance community guidelines, and require moderation on incel forums and incel-related content (Salojärvi et al., 2020).

However, de-platforming and restricting online incel communities has failed to prevent expansion, as evident in the migration of users from the banned *r/incel* subreddit to dedicated incel websites, such as [incel.co](http://incel.co) (Helm et al., 2022). By forming an adequate understanding of the socio-behavioral patterns and trajectories of online users in the manosphere, as seen in this thesis, digital platforms can properly address the social and legal implications to reduce real-world occurrences of violence stemming from online incel communities, and their dissemination of misogynistic rhetoric.

## **Chapter 6: Conclusion**

Research on the role of echo-chambers in facilitating extremist rhetoric within online incel communities is limited, despite real-world acts of violence perpetrated by self-proclaimed incels. Therefore, the objective of this thesis was to address this limitation within cybercrime research by examining user posts on online incel forums to determine shifts in negative sentiment. The longitudinal analysis performed in this thesis showed attitudes and opinions can become increasingly more negative with longer engagement in echo-chambers. As negative sentiment grows within online incel communities, due to echo-chamber dynamics, the likelihood of members adopting violent solutions to their perceived incelhood increases. Therefore, it is important for government-funded agencies and private tech companies to develop advanced information technologies and risk assessment tools to identify and counter signs of misogynistic and violent extremism evident on online platforms. In conclusion, the treat of online violent rhetoric evolving to offline acts of violence is a global concern, and more relevant research should be established to comprehend the evolution of this phenomenon through technological platforms.

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