

A Proposal to Develop Software to Prevent Young People to Acquire Extremist Beliefs

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Abstract

The advancement and adoption of technology in recent years has been unstoppable and has brought with it multiple benefits. However, progress towards a digitized world and society carries certain dangers and risks that must be addressed. One of these threats, which is becoming more and more frequent, for example, in social media/networks, is the radicalization towards extremism and the performance of acts of terror that, mainly, occur in a male audience. Therefore, the present study aims to analyze this perception that men are more vulnerable than women to adopt these extremisms, identifying the characteristics of people vulnerable in this regard, as well as to present the proposal of the practices that can be followed for the design and development of software to prevent young people from acquiring extremist beliefs. The final goal is that software that follows these practices can be implemented at online social platforms and used at an educational level, mainly in primary schools, where it can have the greatest impact in preventing extremism, and therefore contribute to reducing the number of terror and discrimination acts.

Keywords: Social sustainability; Extremism; Radicalization; Software; Digitalization; Education

1. Introduction

The recent years' technologies have developed at a tremendous speed, leading to what is now known as the fourth industrial revolution (Schwab, 2017). A consequence of this is that the vast majority of the world population has accounts on different online social platforms and the use of these does not stop growing¹ (Auxier & Anderson, 2021).

However, despite the benefits of social media/networks (such as staying connected with people around the world and being able to organize and manage our network and social life in a better way, among others), the risks of improper use of these entail an increasing danger (Reid & Weigle, 2014), mainly for young people (O'Keeffe & Clarke-Pearson, 2011). An example of these dangers is the great ease for extremist groups to recruit new members through these platforms and, in the worst cases, conduct acts of terror against other groups with contrary ideas or, simply, against the population in general (Awan, 2017; Alava et al., 2017). In addition, it is important to highlight that this radicalization is usually seen more linked to a male audience (Möller-Leimkühler, 2018) and the focus of recruiters are young people (Darden, 2019).

That is why it is extremely important to shed light on this issue and, on the one hand, investigate the reasons why men are more likely to adopt extremist beliefs and what are

¹ <https://backlinko.com/social-media-users>

the characteristics of people in this regard, and, on the other hand, develop proposals from different areas of knowledge that help educate and prevent people from acquiring these extremisms.

This study aims to address this problem, identifying the characteristics of people vulnerable to social media/networks extremism and proposing a set of practices that can be used for the development of software to prevent, mainly, young people from acquiring extremist beliefs.

The rest of this study is organized as follows: Section 2 includes the background about social media/networks, extremism and the gender perspective in this regard, and the main characteristics of the people vulnerable to such extremism; Section 3 presents the proposal to develop software to prevent young people to acquire extremist beliefs; and, finally, Section 4 contains the conclusions and lines for future work.

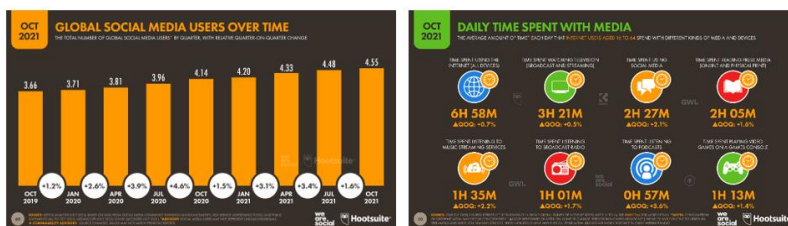
2. Background

2.1 Social Media/Networks

Investopedia defines social media as *“a computer-based technology that facilitates the sharing of ideas, thoughts, and information through virtual networks and communities”*². Social media/networks include platforms where such as text, pictures, videos, and links are shared.

The Digital 2021 October Global Statshot Report (Kemp, 2021) presents that the number of social media users has passed 4.5 billion users, as shown in Figure 1(a). Since October 2019, two years ago, the number of social media users has increased with almost 900 million users. Following the current trend, 60% of the world’s population will be on social media by the first half of 2022. The same report also presents statistics for the average internet user’s time spent on media, which Figure 1(b) visualize. An average user spends 6 hours and 58 minutes on the internet every day, where 2 hours and 27 minutes are on social media.

Hence, spending a lot of our waking time in front of a monitor exposed to good and bad content. Likewise, it is important to highlight that the algorithms on online social platforms are designed to feed people with content tailored for them. The purpose of these algorithms is not to feed people with extreme content, but this may be a result. If a person has started reading or watching radical content, the algorithms will continue to show similar content. That is why social media/networks have become a main target for extremist and terrorist groups, due to the ease with which they can spread their messages of hate and terror to a large number of people with little effort (Awan, 2017; Alava et al., 2017).



(a) Growth of social media users 10.19-11.21.

(b) Time spent on with different media.

Figure 1: Social Media Status 2021. (Kemp, 2021)

² <https://www.investopedia.com/terms/s/social-media.asp>

2.2 Extremism, Radicalization, and Terrorism

Oxford Learner's Dictionaries defines extremism as *“political, religious, etc. ideas or actions that are extreme and not normal, reasonable or acceptable by most people”*³. As suggested by this definition, there are many types of extremism. It could be argued that, for example, eating disorders, suicides, and alcoholism are extremism. However, the focus of this study is oriented towards extremisms such as political and religious.

A more detailed and suitable definition to use for political and religious extremism is the one made by the Government of the United Kingdom (UK) in a report called “Counter-Extremism Strategy” (HM Government, 2015, p. 9) that defines extremism as *“the vocal or active opposition to our fundamental values, including democracy, the rule of law, individual liberty and the mutual respect and tolerance of different faiths and beliefs. We also regard calls for the death of members of our armed forces as extremist”*.

Along with the term extremism, we must not forget the concept of radicalization, which is a process that may lead to a person becoming an extremist (Doosje et al., 2016). This process happens in religions, political views, and ideologies. The outcome of the radicalization process does not have to lead to someone becoming a violent extremist or an extremist at all, although in most cases this result usually occurs.

In the worst cases, extremism and the process of radicalization lead to acts of terrorism. The National Archive that holds the responsibility of publishing legislation by the UK Government defines terrorism as an action meant *“to influence the government or an international institution or to intimidate the public”*⁴. The definition also states that the action can be motivated by religious, ideological, or political reasons, and involves serious violence against a person.

An example of all this is that in the United States of America (USA) from 1994 to 2020, according to the Center for Strategic and International Studies (CSIS), 57% terror attacks and plots were perpetrated by Right-Wing terrorists, 25% were performed by Left-Wing terrorist, while 15% by religious terrorists (Jones et al., 2020; van Prooijen & Kuijper, 2020).

2.3 Gender Perspective in Extremist Groups

The statistics presented by Statista (Statista, 2021) and the report “Terrorism in Great Britain: the statistics” (Allen & Harding, 2021) are clear: *“Male terrorists are over-represented in both USA and UK”*. Figure 2(a) shows the gender distribution for jihadists from 2001 until 2021 in USA. According to this statistic, 91.9% of the terrorists were men. A similar distribution is shown in Figure 2(b), where the gender distribution of people arrested for terror-related crimes in the UK demonstrates a big difference with men being the main actors.

³ <https://www.oxfordlearnersdictionaries.com/definition/english/extremism>

⁴ <https://www.legislation.gov.uk/ukpga/2000/11/section/1>

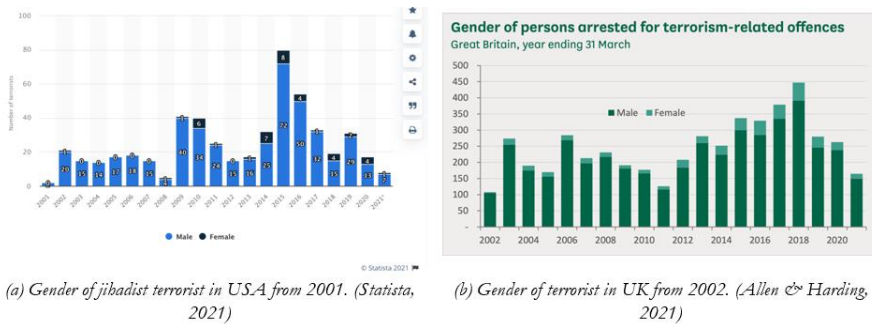


Figure 2: Statistics of Gender of Terrorists.

The report made by the European Parliamentary Research Service (EPRS) (Orav et al., 2018) presents that the number of radicalized women is higher than the population of the world thinks. The reason for that is that fewer women perform terror attacks like shootings and bomb attacks. Instead, they contribute to extreme groups in other ways. Typically, women travel to ISIL/Da'esh-occupied territory, where they have different roles, usually they are treated for sexual activities. But we must not ignore that they also play an essential role in spreading these extremist ideologies and supporting the systems and environments that keep these groups active.

A document from the United Nations (UN) presents that the number of women arrested for terror-related crimes has increased in the past years, but that the majority of violent terrorists still are men (Garms et al., 2019, p. 30-31). The report expresses that people often are recruited involuntarily to terrorist groups, where, in some contexts, it is proven to be truer for women, which they suspect is due to traditional gender roles. That is an important factor to recognize since it implies that it would be useful to consider the male sector as a main target since, statistically, they are the most numerous and with the most significant roles in this regard.

Of course, both genders are drawn to and involved in extremist ideologies, so it is essential to prevent both from being radicalized. However, as has been observed, women are relegated to a less radical plane, while men are the main perpetrators of terrorist actions that lead to severe consequences against the lives of innocent people.

2.4 Main Characteristics of People Vulnerable to Extremism

Identifying the characteristics of people vulnerable to extremism has always been a controversial and difficult topic to address. This is because professionals in these areas of interest typically feel insecure and uncomfortable raising issues around such a sensitive and risky topic due to possible retaliation or consequences.

The study developed by Cole et al. (2010) conducts an analysis of the risk factors and characteristics that indicate vulnerability in people prone to extremism. However, it should be noted that these risk factors are not a definitive guide, as violent extremists will not necessarily exhibit all these factors; it may be that the presence of a single factor is decisive for a person to adopt extremism or even that a person does not get involved in such areas with several factors present. Thus, the characteristics of people vulnerable to extremism identified by Cole et al. (2010) and that, from the point of view of this study, we believe

are relevant to consider to prevent people from acquiring extremist beliefs, are the following:

- **Cultural and/or religious isolation.** When the person at an educational and/or professional level does not relate to other ethnic and/or religious groups, his/her vision towards other points of view in this regard is limited. This usually generates a low tolerance towards other communities and religious beliefs, being more vulnerable to being recruited by extremist ideologies.
- **Isolation from family.** As highlighted by Cole et al. (2010), *“the family can be considered both a risk and a protective factor”*. This is because there are clearly toxic family environments, and the best option would be to separate young members from them; but also, the distance from the family (for whatever reason) eliminates a great emotional and social support that normally fights against negative influences. Therefore, without this support, the risk of falling into the networks of extremism increases.
- **Risk taking behaviors.** Hedonistic behaviors in young people, such as drug and alcohol consumption, risky or unusual (outside what is understood as healthy) sexual practices, etc., usually put them at high risk of consequences and inappropriate behaviors such as aggression, delinquency, diseases, etc. This is usually due to a lack of perception or understanding of the consequences of the acts, so extremist ideas can be very attractive if people do not think about the risks and negative effects that they entail.
- **Sudden change in religious practice.** An unexpected change from one religion to another or a sudden increase in involvement or practice in a religion is often an indication of a lack of understanding of or judgment about religion, which is very easily exploited by extremist groups.
- **Violent, hate, and/or death rhetoric.** Constant exposure or search for violent, hateful, and/or discriminatory rhetoric, or related to martyrdom and/or death, are directly related to the development of an inappropriate behavior and oriented towards extremist ideologies. The consumption and adherence to this type of rhetoric makes the individual see as acceptable and justify violent or inappropriate behavior against others.
- **Negative peer influences and isolated peer group.** The human being depends to a large extent on his social status, i.e., on how the individual is seen and included in one or several social groups. The social environment defines a person. However, this poses a threat, especially for young people and those marginalized sectors of the population, since on many occasions inappropriate behavior is adopted in order to achieve that identity of belonging to a social group, behind which are extremist groups. Likewise, social groups are at risk of succumbing to the problem known as “groupthink”, which occurs when the members of a group reinforce their ideas among themselves to the extreme that they lose contact with reality and, with it, respect for other points of view, among others.
- **Political activism.** The adoption of extreme political ideas and active participation, for example, defending these ideas or by attending meetings, demonstrations, rallies, and/or protests of political groups whose message is based on discrimination, hatred, violence, or any inappropriate behavior against life and coexistence, is a clear example that there is a vulnerability on which extremist groups can take great advantage in their favor.

3. Proposal

When developing software, the existing life cycle models coincide in the following phases (Tiky, 2016): 1) Planning; 2) Design; 3) Development/coding/building; 4) Testing/validation; and 5) Implementation/deployment/integration.

From the point of view of this study, the first four phases are the most important on which the relevant practices must be performed to develop software that aims to prevent young people from acquiring extremist beliefs. Thus, the following subsections discuss these four phases. Likewise, during the software development life cycle (especially in agile methodologies), tasks belonging to different phases are developed in parallel. For this reason, it has been decided to jointly describe the phases of, on the one hand, planning and design, and, on the other hand, development and testing, since they are the phases that have the most relationship and parallel tasks with each other.

It is important not to forget that the practices established in the following subsections are not a definitive guide and not all of them must be applied. Each project has a specific context and characteristics and based on this, these practices should be applied, modified, or not considered.

3.1 Planning and Design

On the one hand, the planning phase of a software project, as happens with other types of projects, mainly serves to identify and evaluate the problem and scope that is intended to be addressed, collect and analyze the requirements that will guide the development, build the project team, identify and involve stakeholders, establish costs and time, among other tasks.

On the other hand, the design phase is aimed at having a first non-functional approximation of the product to be developed, based on the requirements and characteristics established in the planning phase. On many occasions, during the planning phase, several prototype designs are developed in order to analyze alternatives and thus be able to make better decisions for future phases of development.

Thus, given the context of the planning and design phases, below are several best practices specific to develop software to prevent young people from acquiring extremist beliefs:

- **Investigate in detail the characteristics of people vulnerable to extremism.** A software to prevent people against extremism cannot be developed without knowing the characteristics of the people vulnerable to it. That is why it is vital to conduct a detailed study of these characteristics, since they form the core on which the functionalities that will be aimed at mitigating/solving said vulnerabilities (and thus preventing the adoption of extremism) must be implemented.

- **Investigate in detail the characteristics of people resistant to radicalization.** Analyze in detail the personal characteristics and strengths of people resilient to radicalization could result in a solution working to strengthen the individual's resilience. For this reason, it is also crucial to consider the success stories and how people resist extremism and radicalization, since they are the key that must be replicated.

- **Conduct interviews/surveys with strategic sectors of the population.** It would be beneficial to interview people of all ages (not only young people but with a focus on these)

and from sectors of the population that are vulnerable or targets of extremist groups (such as marginalized sectors) to get a more comprehensive understanding of the problems and hopefully acquire enriching ideas for the development of the software.

- **Identify if any detection software will be developed or used.** Along with the software to be developed to prevent the adoption of extremist beliefs in young people, it should be considered if it will only have this functionality or if a detection system will also be implemented in order to identify vulnerable people and show them directly the resulting software to prevent them from advancing towards a process of radicalization. Of course, this will depend on whether the software is intended to be targeted or used for general awareness raising, for example, in primary schools. In this regard, an example of detection software is the one developed by Mussiraliyeva et al. (2021), to identify extremist users, communities, and resources spreading radical content.

- **Involve professionals in the fields of psychology and pedagogy.** It is essential to have professionals who generate requirements to be implemented and help understand them based on the analysis of human behavior (psychology) and how the teaching or awareness of the message to be transmitted should be approached (pedagogy). Likewise, it is even more important to have this type of professionals when dealing with the target audience (young people), since it is during young ages that personality is formed and when people are more easily influenced by extremist ideas. Thus, any software in this regard that does not have the right professionals in these fields will have very limited effectiveness, since the keys that these professionals know are needed to really create a positive impact on young people.

- **Build an equal, inclusive, and diverse development team.** It is a very important characteristic to have development teams that advocate for equality, inclusion, and diversity, since in this way the development will be enriched by different points of view and opinions. In addition, this will help the software developed to address different sectors of the population more accurately (at the level of culture, gender, ideology, etc.), by considering their specific requirements.

- **Bring the design of the software as close to a game.** Since the idea is software geared towards young people, designing it as a game or close to a game will help young people use it as it will be entertaining for them. For this reason, it is highly recommended that the prototype(s) designed be oriented towards this type of entertainment software. Likewise, following the context of this study, this software could be easily distributed through online social platforms. For example, social media/networks show all kinds of advertisements based on the user analysis they perform. For this reason, it would be a good opportunity to work with the organizations in charge of these platforms to identify through these analyzes (based on a detection software) extremism in people within an age range (in this case, young people) and include small interactive games that are part of the full game in these advertisements. This will not only serve to educate this young audience in a progressive manner and without them noticing a direct intrusion, but it will also be a marketing strategy to attract users to the full software/game. Similarly, like the interactive advertisements, the full game could be integrated directly into the social media/network(s), which would be a more direct path to the audience and they would not need to go outside the platform(s) or install/access external software.

3.2 Development and Testing

First, development is the main part of a project in terms of team involvement and resource utilization since it is where the code is written and the software needed is built based on the identified requirements and the established plan.

And second, after the development of the software, a critical part is to test/verify that what has been developed works as expected, that there are no errors/bugs that could affect the user, that it meets the established quality and security requirements, and, lastly, that the user knows how to use the developed product and fulfills its objective.

Thus, below are the key best practices in terms of development and testing that can be used to develop software to prevent the adoption of extremism in young people:

- **Prioritize the development of a web application over other types of applications.**

Web applications have the great advantage that they can be used from any device and without the need to install any extra software, since they are fully accessible through the web browser. In this field in which it is intended to reach young people and they will come from different parts of the world and from different social levels, it is very important that the application/software/product is accessible to all of them. Likewise, this kind of applications are easily integrated into different platforms, so, as mentioned above, it would be a point in favor to be able to integrate it within social media/networks and reach the target audience more easily.

- **Adoption of agile software development.** The development of software following an agile methodology is very convenient since it allows constant control and feedback that helps to develop better products. During agile development, the final product is divided into small deliverables, which makes it possible to analyze the development progress and obtain feedback that helps to identify more easily if the product being developed meets expectations or if it should be make a change before the product progresses further and becomes more complex to implement. Likewise, this type of methodology facilitates the involvement and participation of stakeholders who are key to obtaining a product that is suitable for the established requirements and needs.

- **Involve the target audience (young people) during development and testing.** The best way to identify early on whether what is being developed is truly fit for purpose is to involve the target audience or end user, in this case young people, during software development and testing. On the one hand, during development, this involvement must take place in the review of the different deliverables, because it is in these moments where the end user can give his/her opinion or feedback on how he/she sees the product at that moment and what characteristics and features should be included next to meet his/her expectations. On the other hand, during the testing of the final product, a specific type of tests called user tests are performed, where it is vital to have a set of representative users through which it can be observed if the software really adapts, in this case, to the way young people interact with the software and helps them become aware of the problem of extremism, preventing them from adopting or acquiring it. Likewise, it is interesting that along with this target audience of young people, professionals in psychology and pedagogy are also involved (continuing the example identified in the planning and design stages), since they will help to validate the requirements established from the beginning and maintain the product with a professional approach from these fields.

3.3 Considerations on Privacy and Data Protection

When developing any software, it is necessary to consider the existing regulations on privacy and data protection, such as, for example, the General Data Protection Regulation (GDPR) defined by the European Union (EU)⁵. In this sense, the present proposal encompasses both the development of an awareness software to prevent the adoption of extremist beliefs in young people (prevention software) and the use of some software in conjunction with the former to detect those people prone to radicalization (detection software).

On the one hand, regarding the prevention software, no data should be collected that would compromise privacy or allow a person to be identified. This software must have the sole purpose of raising awareness to prevent the adoption of extremist ideas/beliefs. Therefore, even if the user must enter some type of data related to his/her thoughts or ideas regarding a specific topic, this data should be processed and stored (if necessary) on the user's own device and at no time should be personal data.

Nevertheless, on the other hand, the detection software does require it to be scrutinized from a privacy and data protection point of view. For example, as mentioned above, social media/networks use analytics software to identify interests or trends in their users and thus show advertisements more adapted to them. This software can also be used to identify possible extremist ideas/beliefs (or propensity in this regard) and thus show the prevention software to those users identified. However, this kind of online social platforms and software have always been in question due to the invasion of people's privacy (Kayes & Iamnitich, 2017). Therefore, it is very important to guarantee that the detection software does not violate people's privacy at any time, trying as much as possible not to collect personal data that allows someone to be identified, since the idea is to show prevention software without the need to know to whom it is being shown. Likewise, all the data collected in this regard (being mainly data related to the consumption of certain types of content), even if they do not allow the identification of a person, must be encrypted and must not be accessible by the organization(s) of the social platform(s) or of the software, and much less used for other purposes.

4. Conclusions

Technology has become an engine of change for our society (Harari, 2018). However, like any great revolution, not everything is good. Behind tools or platforms such as social media/networks, which are undoubtedly very useful to us, are threats and people who use them to sow hatred and terror, as is the case with extremisms (Klausen et al., 2018; Awan, 2017; Alava et al., 2017). So, as a society, it is our duty to protect the most vulnerable people from these threats.

The main objective of this study has been based on shedding light on this topic. To do this, the characteristics of people who are vulnerable to falling into the networks of extremist ideologies have been identified, as well as a series of best practices that can be used when developing software that prevents the acquisition of extremist beliefs by young people (the most vulnerable and susceptible to being captured by extremist groups, mainly

⁵ https://ec.europa.eu/info/law/law-topic/data-protection_en

through social media/networks).

The set of best practices presented in this study is of great relevance for both researchers and professionals, since it offers them a starting point and a guide for, on the one hand, the development of new research related to the field of extremism and software development, and, on the other hand, the development of new tools that help make technology and online platforms a safer place for everyone.

These new tools must have the capacity to reach young people around the world, since it is not a local problem, but a global one (Schroeder, 2018). For this reason, the development of software that is entertaining for this sector of the population, such as a game (Williamson, 2009; Fromme, 2003), and the use of social media/networks as a channel to reach said target audience (Kadushin, 2012), become two very important assets for consider about it. Likewise, the consideration of following the best practices defined in this study during the software development life cycle implies establishing a foundation oriented directly towards the identified problem, which increases the chances of success and effectiveness of software solutions to prevent the adoption of extremism in young people.

However, the work does not end here. Once the guide to be followed for software development in this regard has been established, it is intended to conduct the development and implementation of a web application for the prevention of extremist ideas in young people, following the same strategy as the idea proposed by (Manjur et al., 2021). The objective is that this software will be used at an educational level to raise awareness among young people from an early age (where it can have the greatest impact), as well as distributed through online social platforms where, together with a detection software, it will be shown mainly to those people who are at risk of falling to the message of hate and terror of extremism.

Prevention is the best asset to avoid major evils. It is our duty as a society to prevent the adoption of extremist ideas and create a better world together.

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