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Extremism and Radicalisation. A Systematic Review of Empirical Evidence for Personality, Quest for Significance, Spirituality and Intolerance of Uncertainty

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ABSTRACT

Extremism and radicalisation pose significant threats to national security and socio-political stability, particularly in Western countries. Despite the extensive scientific literature addressing these phenomena from various perspectives, existing empirical research lacks cohesion due to differing theoretical models. This systematic review aims to unify recent empirical research on psychological factors associated with extremism and radicalisation, focusing on empirical studies across diverse cultural and socio-political contexts. Key findings indicate that certain personality traits—specifically, low openness to experience and high conscientiousness—may increase susceptibility to extremist beliefs. Additionally, quest for significance seems to stand out as a powerful motivator for radicalisation. Spirituality seems to play a complex role: it may mitigate or, conversely, amplify extremist tendencies, depending on interpretative frameworks and group dynamics. Intolerance of uncertainty is another critical factor, as individuals with low tolerance for ambiguity may be drawn to extremist ideologies that offer rigid, black-and-white perspectives. This review emphasises the importance of a comprehensive understanding of these psychological variables, which, altogether, suggest that both individual traits and contextual factors contribute to radicalisation pathways and extremism. The findings highlight opportunities for targeted interventions, suggesting directions for future research to develop more effective strategies for preventing radicalisation in clinical and community environments.

Extremismo y Radicalización. Revisión Sistemática de la Evidencia Empírica sobre Personalidad, Búsqueda de Significación, Espiritualidad e Intolerancia a la Incertidumbre

RESUMEN

Palabras clave

Revisión sistemática
Personalidad
Extremismo
Radicalización
Significación personal

El extremismo y la radicalización representan amenazas significativas para la seguridad nacional y la estabilidad sociopolítica, especialmente en países occidentales. Una cuestión relevante es como la investigación empírica existente carece de cohesión debido a la variedad de modelos teóricos empleados. El objetivo de esta revisión sistemática es tratar de unificar los resultados de investigaciones empíricas recientes sobre los factores psicológicos asociados con el extremismo y la radicalización, atendiendo a estudios realizados en contextos culturales y sociopolíticos diversos. Los resultados señalan que ciertos rasgos de personalidad - baja apertura a la experiencia y una alta responsabilidad -, pueden aumentar la probabilidad de creencias extremistas. Además, la búsqueda de significación personal destaca como un importante factor para la radicalización. La espiritualidad parece mitigar o, por el contrario, amplificar las tendencias extremistas. La intolerancia a la incertidumbre es otro factor crítico, especialmente para personas con alta necesidad de certeza. Los resultados de la revisión sugieren que tanto los rasgos individuales como los factores contextuales contribuyen a los procesos de radicalización y extremismo. Se subrayan las oportunidades para futuras intervenciones más específicas, señalando direcciones para futuras investigaciones con el fin de desarrollar estrategias más efectivas para prevenir la radicalización en entornos clínicos y comunitarios.

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Introduction

Extremism and Radicalisation

Far right surges in EU vote, topping polls in Germany, France, Austria (Al Jazeera, 2024); *A Far-Right Takeover of Europe Is Underway* (Vohra, 2024); *EU elections: earthquake in France and a rightward policy lurch?* (Lau et al., 2024). These are just but a few examples of the headings that appeared on some of the most famous international agencies after the results of the past European elections that took place on June 9th, 2024. There seems to be consensus in acknowledging the steady growth of the far-right across Europe, a fact that make some state “Wake up! After these elections, Europe is again in danger” (Garton Ash, 2024). This latest development in Europe’s politics seems just to confirm a global trend that could be considered to have started in 2016, with the election of Donald Trump as the 45th President of the United States (Fortunato et al., 2022; Rehman, 2017). But why does this resurgence of the far-right in Western countries, characterised by being consolidated liberal democracies (Our World in Data, 2024), a matter of concern by so many analysts and experts from different areas? (Reuters, 2023).

Two of the most frequently adjectives that usually accompany news and reflections about far-right are “extremists” and “radicals”. Sometimes, these qualificatives are even directly used for referring to these part of the political spectrum (Kondor & Littler, 2023; Youngblood, 2020), as if all could be used as synonyms that reflected the same reality. However, do we all know what we are talking about when using these two qualificatives?

Extremism and radicalisation have emerged as critical concerns in contemporary societies in its multiple possible manifestations, especially for its relationship with violence — i.e., terrorism (Kruglanski et al., 2014), political (Jasko et al., 2022), religious (Ahmed & Bashirov, 2020), racial (Williams et al., 2022) or nationalist (Tetrault, 2022). They pose multifaceted challenges to global stability, social cohesion, and individual well-being (Lösel et al., 2020).

According to Kruglanski et al. (2014), radicalisation is the process through which individuals or groups come to adopt increasingly extreme political, social, or religious ideologies that reject or undermine the status quo and can potentially lead to violence or other forms of conflict. Horgan (2009) proposes that radicalisation reflects “the social and psychological process of incrementally experienced commitment to extremist political or religious ideology” (p. 152). Similarly, Doosje et al. (2016) define radicalisation as “a process through which people become increasingly motivated to use violent means against members of an out-group or symbolic targets to achieve behavioural change and political goals” (p. 79). Finally, a more recent definition of radicalisation is the one provided by Trimbur et al. (2021) in their systematic review, where they conceptualise it as dynamic process comprised by different stages (which can be represented in specific models — i.e., as a pyramid or staircase) which would go from radical feelings to radical behaviours. As it can be observed, all the provided definition of radicalisation shares the conceptualisation that it is a process in which different levels or stages can be identified.

At the end of the radicalisation process, extremism would arise. There exist many different definitions of extremism, as there is still

lack of consensus regarding a universally accepted definition (due to the ideological connections that the term unavoidably has; Hogg et al., 2013; Lowe, 2017). For the present study, the definition of extremism that has been considered more adequate according to the available empirical evidence is the one provided by Klein and Kruglanski (2013, p. 421), and which comprises two complementary elements:

- (1) Deviation from a behavioural norm. Extremism needs to be compared to the “central norms” that are accepted into a society in a given historical moment (Berger, 2018). That is to say that, without a social background to compare, it is not possible to establish the existence of extremism. According to this first component of extremism definition, it can be observed one of the main difficulties in defining it, as what it may be regarded as deviated from a central norm in one society, may well be “normal” in another (Stancato & Keltner, 2021). Therefore, the major conflict resides in the existing hardship for translating what is understood as extreme between societies.
- (2) Zeal, intensity, or attitude polarity. This reflects the reality in which a given need (i.e., quest for significance) gain such level of intensity that completely eclipse any other basic concern (even those that basic as the self-preservation instinct, in the case for instance of suicide terrorists; Kruglanski et al., 2009). When there is a disproportional investment of personal resources in that particular need, there is simultaneously a conscious or unconscious inhibition of alternative needs (Jasko et al., 2020a). This implies that, the counterbalance that these alternative needs exercise one over the others disappears, freeing resources (both material and psychological) and widening therefore the options that may be considered as adequate or effective for the focal need (Kruglanski & Ellenberg, 2020).

Taking into consideration the provided definitions of radicalisation and extremism, from here onwards, the first will be understood as a process, whilst the second would be represented as a state. Once that the effort of establishing the frame of what it is most widely accepted for radicalisation and extremism, next logical step is to try to uncover other variables that may be related with them and which could explain both their appearance and development with time, as well as the different existing degrees in commitment and involvement. Extremism and radicalisation are two of the most pressing social challenges that are present in current societies around the world (Gutzwiller-Helfenfinger et al., 2022; Trip et al., 2019), reason why gaining such knowledge of the underlying related factors may mean a key difference in how these societies may adequately face them.

These factors could include socioeconomic disparities, political grievances, identity crisis or psychological causes. They could therefore be related to different social and individual levels. Scientific research underscores the gravity of these issues, highlighting the cognitive, psychological, and social mechanisms underpinning radicalisation, as well as the imperative for comprehensive approaches encompassing prevention, intervention, and rehabilitation strategies (Bélanger et al., 2019). For the present study the focus was set in variables that, independently, have

already shown some kind of relevant relationship with extremism and/or radicalisation: quest for significance, intolerance of uncertainty, personality traits and spirituality.

Definition of Variables and Their Relationship With Extremism/Radicalisation

As [Dalgaard-Nielsen \(2010\)](#) stated, there is no single event or even a prevalent set of motivations causing radicalisation at the individual level. Therefore, is the result of the interaction of sundries causes of any type (individual, social or political, among others).

As it is not possible to embrace each risk factor that showed evidence, the search has been reduced specifically to psychological factors that could ease the path to extremism and radicalisation. Some of the most relevant psychological causes that scientific literature shows as related to these two processes are spirituality/religiousness ([Gómez et al., 2022](#)), personality traits ([Meiza, 2023](#); [Morgades-Bamba et al., 2020](#); [Rottweiler & Gill, 2022](#)), quest for significance ([Milla et al., 2022](#)) and intolerance to uncertainty ([Gotzsche-Astrup, 2019, 2020](#)). They will be therefore explained.

Spirituality refers to an individual's sense of connection to something greater than themselves, which can involve a search for meaning in life, a sense of purpose, or a connection to the sacred or transcendent ([Koenig, 2012](#)). Related to spirituality and conceptually included within it, religiousness refers to the degree to which an individual is involved in, committed to, or believes in a concrete religious' faith or practice ([Koenig et al., 2001](#)). According to these definitions, religiousness could be spirituality adjusted to an established system of faith, beliefs and behaviours. Religiousness and extremism are complexly intertwined, with the former sometimes serving as a framework for the latter ([Bélanger et al., 2019](#); [Wibisono et al., 2019](#)), providing a fertile ground for extremist ideologies. Extremism often exploits religious doctrines to justify radical beliefs and actions, manipulating sacred texts to validate violence and intolerance ([Hogg & Adelman, 2013](#)).

Another variable that has been widely researched in scientific literature in relation to extremism and radicalisation is personality. By personality it is understood those individual traits that reflect stable and temporally coherent characteristics that define and guide an individual's behaviour, emotional state and general mindset ([American Psychiatric Association \[APA\], 2013](#)). Currently there are many different theoretical models of personality, that aim to provide a conceptual framework for its understanding (i.e., Big Five Model, HEXACO, PEN model). However, not all those models have the same amount of empirical evidence supporting them. As [Altungy et al. \(2025\)](#) highlighted, it is the Big Five Model of personality the one that, since the 90s', counts with significantly more empirical research. Therefore, this is the personality model and, more specifically, [Costa and McCrae \(1985\)](#) proposal, the chosen one as reference for the present review. The [Costa and McCrae \(1985\)](#) Big Five Model classifies personality in five main traits (Neuroticism, Extraversion, Agreeableness, Openness, Conscientiousness) and six factors per each trait. It is also this personality model the one that has been most widely used in the scientific literature for researching its possible explanatory capacity for extremism and radicalisation process, with the latest reviews suggesting that personality traits would represent significant

vulnerability factors to extremism and radicalisation ([Corner et al., 2021](#); [Morgades-Bamba et al., 2020](#)).

Regarding a variable that has been already mentioned before, significance quest could be understood as “the desire to matter, to feel worthy and appreciated by others whose positive regard one seeks” ([Kruglanski et al., 2022b](#)). It is a motivational force that can drive individuals toward various goals, including those that align with extremist ideologies when they promise to restore or enhance one's sense of significance ([Kruglanski et al., 2018](#)). In the last decade, significance quest has arisen as one of the most prominent variables for trying to explain why people may be attracted towards extreme attitudes and behaviours, initially focused on terrorism ([Kruglanski & Orehek, 2011](#); [Kruglanski et al., 2014](#)) and, lately, in other examples of radical conceptualisations, such as political activism ([Jasko et al., 2019](#)), moral foundation ([Hasbrouck, 2020](#)), ethnonationalism ([Whitehead et al., 2018](#)) or sports ([Chirico et al., 2021](#)). A specific model that has significance quest as the pivotal variable for explaining extremism is the 3N model ([Bélanger et al., 2019](#); [Kruglanski et al., 2022a](#)), which states that every radical/extremism endorsement requires a need activation (restore or increase significance), a narrative (that supports an extreme behaviour — i.e., violence — as an adequate mean for significance restoration) and a network (that creates and validates the narrative and which serves as the reference point for the individual). Regardless of these different examples, in all cases the empirical evidence seems to prove that significance quest is a fundamental variable for understanding people's attachment towards extremist behaviours and/or attitudes.

Lastly, intolerance to uncertainty is a concept that has gained significant recognition in the last decade. [Carleton et al. \(2016\)](#) defined it as the inability to tolerate aversive reactions generated by the perceived lack of information in a situation and maintained by the associated perception of uncertainty. Individuals who experience high levels of intolerance to uncertainty often find ambiguous situations distressing and strive to reduce this discomfort by seeking certainty and predictability. In uncertainty-identity theory ([Hogg, 2014](#)) the feeling of uncertainty about oneself can be extremely aversive and suffocating, thus it threatens the predictability and stability of life. Scientific literature indicates that the relationship between uncertainty and extremism lies in the fact that group membership, particularly within radical groups, provides a structured environment that offers a heightened sense of control and predictability ([Gotzsche-Astrup, 2019](#)). This sense of control provided both by the membership, but also by its extremist attitudes would significantly reduce the feelings of uncertainty that members might otherwise experience ([Landau et al., 2012](#)). Radical groups typically exhibit strong structuration and rigid hierarchies, which clearly delineate roles, norms, and expectations. This organizational structure offers members a clear roadmap for behaviour and beliefs, thus mitigating the discomfort associated with uncertainty ([Gotzsche-Astrup, 2019](#)).

Aim of the Review

As it has been indicated, the previous variables have been analysed in relation to both extremism and radicalisation. However, up today, there is no systematic review that the authors of the present study are aware that synthesises together the findings available regarding these variables. This is considered as an

important task, as the prerequisite for developing empirical studies that take into consideration all these variables together to continue disclosing the reasons and possible explanations for engagement in radicalisation processes and its end, extremism, a fundamental step for developing valid and accurate prevention and intervention programs.

Method

Search Strategy and Data Abstraction

The current systematic review was performed along February and March 2025. We sought for peer-reviewed articles written in English published from January 1, 2019, until December 31, 2024. PRISMA 2020 guidelines for systematic reviews (Page et al., 2021) were fulfilled.

In order to guarantee search replicability, the whole boolean syntax was: ((TI=(extremi*) OR TI=(radical*)) AND ((TI=(intolerance of uncertainty)) OR TI=(quest for significance) OR TI=(significance quest) OR TI=(personality) OR TI=(spiritual*))).

Evidence Acquisition

Studies were identified through a search in multiple databases, namely Web of Science, Scopus, ProQuest and PubMed, requesting the Full Text option. To avoid publication bias, these searches were supplemented with a manual search. Ancestral and forward searches were also conducted by examining bibliographies and locating studies citing each of the identified articles. For analysing the suitability of the obtained studies, researchers used *Rayyan*© software, which allowed an independent analysis by the different researchers based on inclusion/exclusion criteria providing comments for a second review, as well as the detection of duplicated studies.

Inclusion Criteria

For the present systematic review, studies that meet the following criteria were included: (1) have been published in the last six years (2019-2024); (2) include in the title the terms *extremis** AND/OR *radical** AND/OR *personality/spirituality/significance quest/quest for significance/intolerance of uncertainty/uncertainty*; (3) were empirical studies. The rationale for these inclusion criteria was: (1) locate the most recent evidence found in relation to the aim of the current systematic review, (2) cover all the key variables for the goal of the study.

Exclusion Criteria

Reviewers considered the following exclusion criteria for the results: (1) case studies; (2) studies that were in a language different from English; (3) studies with no full-text availability (no open access or no accessible through the authors institutional databases); (4) studies that addressed personality disorders as the main independent variable/predictor. The rationale behind this was: (1) the goal to the present review is to focus on empirical research with groups and/or population samples; (2) personality disorders are

beyond the scope of the current systematic review (although it might be relevant for future research).

A total of 169 studies, published between 2019 and 2024, were identified from all databases and search methods. 62 duplicate studies were initially excluded. The abstracts of the remaining 107 studies were assessed, excluding 79 in this phase. After exhaustingly examining the abstract, 26 articles were thought for retrieval, not finding 2 of them. The remaining 24 reports were assessed for eligibility. 11 were excluded because they were non empirical, reviewers could not find the full text of 2 of them, and another 2 were not in English. On the other hand, a total of 17 studies were identified via other methods: 2 by findings and 15 by citation searching in systematic reviews and meta-analyses. One report was not retrieved, leaving 16 reports sought for retrieval. Of the 14 reports assessed for eligibility, 2 reports were excluded because the year publication was out of our age range (prior to 2019), 4 reports were not relevant to research questions, and 1 has not yet been published. Ultimately, 16 studies compose our systematic review (Fig. 1).

Assessment of Methodological Quality

Critical appraisal of the methodological quality of studies was undertaken using McMaster Critical Review Form — Qualitative Studies (Version 2.0) (Letts et al., 2007). View Appendix 1.

Results

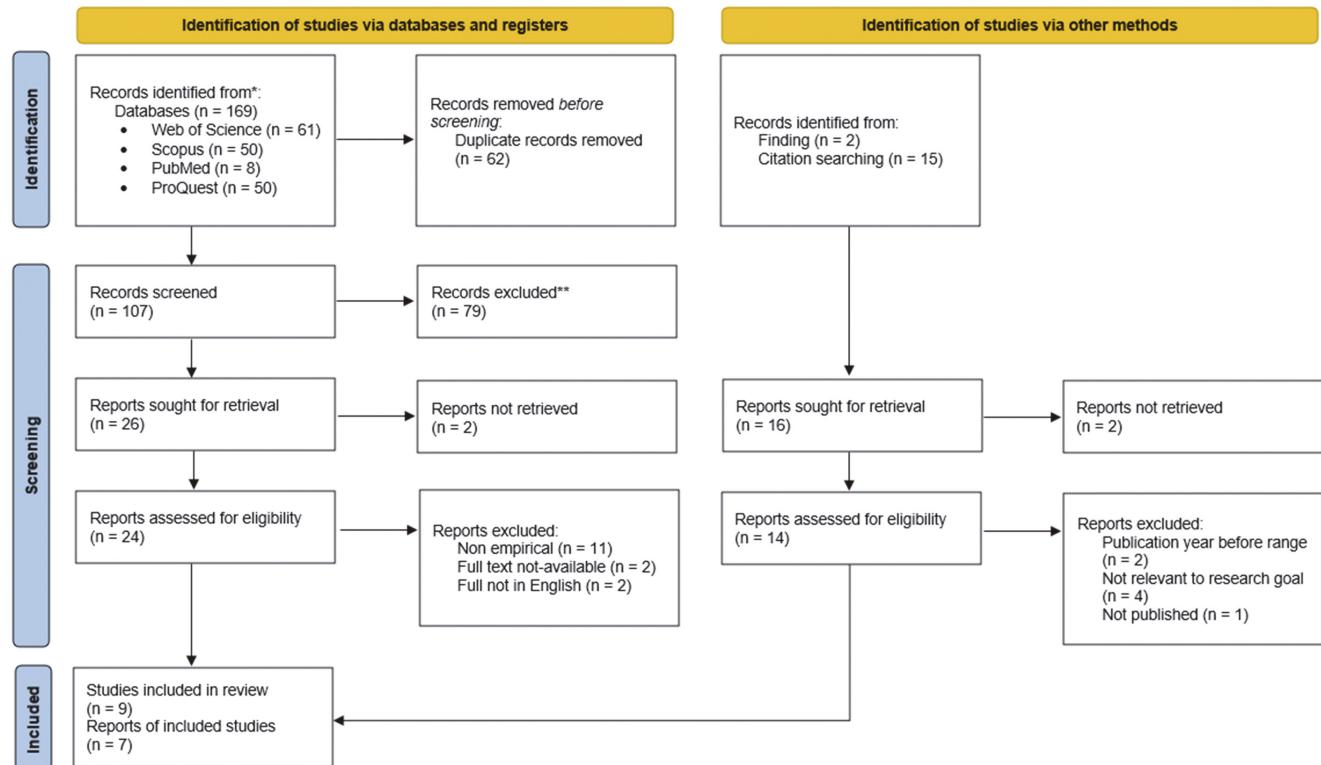
In the current research, 16 studies were identified as relevant for the intended systematic review aiming to identify possible explanatory variables that may lay behind radicalisation and extremism processes. Hereafter the most relevant information found in scientific literature will be presented, classified by each of the four research variables. At the end of the Results section Table 1 offers a summary of these findings.

Extremism and Spirituality/Religiousness

Current study initially considered spirituality, and not religiousness, as a key variable for possible explaining extremism and radicalisation processes. The reason for this was that spirituality comprises a wider range of transcendent experiences, emotions, thoughts and beliefs, which include (but are not reduced to) religiousness (Zinnbauer & Pargament, 2005), as the later would imply some form of “formal” organisation and social structure (Mellor & Shilling, 2014). The need for this differentiation has been highlighted in the recent years for academic and validity reasons (Lucchetti et al., 2021). Taking this into consideration, the five included studies in the systematic review in this regard all referred to religiousness, being this the reason why hereafter this will be the used term.

Even though there are countless examples in media that link extremism and radicalisation to religiousness (or, at least, to some religions) (Al-Azami, 2016), there is no conclusive scientific evidence that support this common assumption. Thereby, it may result surprising to some readers that Gómez et al. (2022), in their research with Muslim women in prison for jihadism charges, found that they perceived themselves and their families as less religious as the control-Muslim group, not finding any significant relationship

Figure 1
Flow Chart of the Search Process, Sieving and Selection of Relevant Articles Along With our Study



between their religious adherence and their commitment to extremism (jihad).

Similarly, [Chabrol et al. \(2019\)](#), in their study with French women sample of explanatory variables for religious extremism found that religiosity itself (religious involvement) played no major role in the risk for radicalisation, but their personality traits (measured following the Dark Tetrad model — these results will be explained in more detail later) and their perceptions of being discriminated, being the later “the main psychosocial factor for radicalisation” ([Chabrol et al., 2019, p. 8](#)). In this line, [Furnham et al. \(2020\)](#), in their research about explaining factors for the *Militant Extremist Mindset*, report that participants religiousness (measured using a 9-points Likert self-report scale) appear to have a significant relationship with extremism, but through the mediation of openness and agreeableness personality traits (which will be discussed later on). It has to be noted that religiousness was not significantly related to extremism when personality traits were not included in the model, results that seems to hint the same conclusions as for [Chabrol et al. \(2019\)](#) study.

In a very similar study with also a French women sample, [Morgades-Bamba et al. \(2020\)](#) results hint that it was the Dark Tetrad the variable that was most related to radicalised cognitions and behaviours, while participant’s religious involvement was associated with radicalisation through an indirect path, mediated by levels of dogmatism.

Finally, in a sample with Christian participants from different affiliations (Orthodox, Roman Catholic, Evangelical and Reformists) [Trip et al. \(2019\)](#) indicate that religious affiliation seemed to be a good predictor for extremist mind-set. However, this

affirmation may be problematic and could lead to confusion, as in the study, religious affiliation was a dichotomic variable (Orthodox vs. Non-Orthodox) and there was no control group (no non-religious participants). Therefore, a possible more precise conclusion from the results found by [Trip et al. \(2019\)](#) could be that, for that particular sample, Christian Orthodox participants tended to show higher levels of extremist beliefs. Nonetheless, to our opinion, there may be some methodological questions that should also be attended in order to be able to draw more precise conclusions (i.e., religious affiliation sample balance, sociodemographic characteristics).

Therefore, based on the lack of conclusive results and on the fact that there is yet no extensive literature that have empirically assessed the relationship between religiousness and extremism/radicalisation (only 4 studies in the past 5 years), religiousness does not seem (so far at least) to be a key variable for explaining these two processes.

Collectively, these studies underscore that while religiousness alone does not seem to cause extremism, it can interact with various personal and contextual factors to influence extremist outcomes.

Extremism and Personality Traits

As it has been already hinted in the previous section, personality traits seemed to be a more promising variable for explaining radicalisation and extremism processes. Out of the seventeen articles included, ten of them included personality traits as an independent variable in the research of extremism and/or radicalisation. However, there is an initial conceptualisation challenge, as not all of them approached the study of personality traits the same way: while

Furnham et al. (2020), Göttsche-Astrup (2020), Meiza (2023) and Trip et al. (2019) used the Big Five Personality model (Costa & McCrae, 1985) as framework; Chabrol et al. (2019), Morgades-Bamba et al. (2020), Pavlović and Franc (2021), Pavlović and Wertag (2021), Tetrault and Sarma (2021) and Trip et al. (2019) followed the Dark Triad model (Paulhus & Williams, 2002) or its later Dark Tetrad personality model (Buckels et al., 2013). However, being the scope of this systematic review to find whether there is empirical evidence in scientific literature that personality (from a holistic approach) is related to extremism and radicalisation, this conceptual challenge does not hinder the review goal.

As it has been already mentioned, there are evidence that linked some of the Dark Tetrad traits with a higher probability of radical cognitions and behaviours across a sample of French women (Morgades-Bamba et al., 2020). Particularly, Machiavellianism, sadism and narcissism were directly related to radicalised cognitions, while narcissism was the only one of the four traits that was directly associated to radicalised behaviours. Psychopathy trait was only related to radicalised cognitions and behaviours through an indirect path mediated by dogmatism.

Similarly, Pavlović and Franc (2021), in their study about responses to perceived group relative deprivation and its link with violent extremism, using a general population Croatian sample, demonstrated that those individuals with higher percentiles in the Dark Tetrad (taken as a whole) were more prone to radical intentions. However, interestingly the Dark Tetrad also was significantly associated to pacific activist intentions. Therefore, these results seem to hint that those with a high profile on the Dark Tetrad model are more willing to take an active role to try to overturn the perceived deprivation in their ingroup, although these results appear not to be that much sensitive in determining the reasons for choosing the violent or pacific path for doing so.

In more comprehensive research on the possible explanatory role that the Dark Triad may had for understanding the adherence to radicalisation and extremism ideologies, Pavlović and Wertag (2021) found in an on-line Croatian sample that both the three Dark Triad traits (Machiavellianism, psychopathy and narcissism) and its general factor were significantly correlated to support for political violence. Although relevant, the main limitation of this study is that it is limited to a correlation analysis, which only allows to slightly hint a possible association, although with low statistical strength.

On their side, Tetrault and Sarma (2021) studied the possible existing relationship between the Dark Tetrad and support for state-supported extremism (SSE). Their results indicate that each of the four Dark Tetrad traits were associated to specific statements measuring SSE. Even though the line of this study is very promising and innovative, in so much as it is one of the few that analyse specifically SSE, it has important methodological limitations that prevent from extracting more solid conclusions. Nonetheless, this research results hint in the same direction as the previous ones, indicating that Dark Tetrad traits are promising candidates for partially explaining extremism support.

Focusing now on the studies that take the Big Five personality model as its framework, Trip et al. (2019) propose that the presence of a global personality factor (comprised by subjects who score low on openness and extraversion, and high on agreeableness) is positively associated with extremist attitudes.

The study carried out by Göttsche-Astrup (2019) focuses on the moderation role that personality traits may play in the relationship between intolerance of uncertainty and extremism (in the form of political violence). Leaving aside (for the moment) the uncertainty involvement in the model, Göttsche-Astrup (2019) results indicate that extremism was negatively related to agreeableness, openness and conscientiousness traits (controlling the effect of intolerance of uncertainty). Neuroticism and extraversion were not related to extremism, although the latest was positively associated with activism involvement, a factor that also showed a positive relation with agreeableness and openness traits. These results are similar to those found by Furnham et al. (2020) and which religiousness aspect was already presented above. Focussing now on the personality traits relation to extremism mindset, these authors report that only openness and agreeableness traits were significantly and negatively associated with the proviolence subscale of the Militant Extremist Mindset Questionnaire (Stankov et al., 2010), being these results almost identical to those reported by Göttsche-Astrup (2019).

Meiza (2023) research on factors that may influence radicalisation among young Muslim Indonesian students conclude that personality traits did not prove to be a significant variable affecting this process. Nonetheless, this research has some methodological issues that may hinder the generalisability of the findings, and of which the reader should be aware. Despite this, the sample used for the study is of great ecological value.

In the light of the information gathered from the few empirical studies that address the personality traits relationship with extremism and radicalisation processes, it seems that it is still required further research on this, especially for overcoming the methodological and statistical challenges present in some of these initial tries. However, it seems that agreeableness and openness traits have proven to be relevant variables in the radicalisation process, with people low on both traits being more susceptible to be radicalised.

Extremism and Intolerance of Uncertainty

It is remarkable that, even though there are many theoretical proposals in scientific literature that have suggested the role that intolerance of uncertainty would play in the development and maintenance of extremism and radicalisation, the number of empirical research in this line seems to be significantly scarce. As so, in the present systematic review, only 2 studies were identified in this regard, both run by the same author.

In his 2019 study, Göttsche-Astrup reports that individuals who showed higher levels of intolerance of uncertainty seemed to be more susceptible to extremist ideologies, as “uncertainty prompts people to seek refuge with in-groups to patch up a hurt sense of self” (p. 103). People therefore would seek refuge in extremist beliefs when feeling less significant or when feeling they are facing an ambiguous situation. However, it would depend on the personality traits of the individual that intolerance of uncertainty plays a significant role in extremism. Results from the regression analyses indicated that uncertainty interacted positively with neuroticism, and negatively with extraversion and openness traits to predict intentions to engage in violence. That means that those participants with high emotional stability, who are more extrovert and who

enjoy new experiences were less inclined to defend extremist perspectives (political violence particularly in this study) in the face of uncertain experiences or situations. On the other hand, intolerance of uncertainty only interacted (in a negative relation) with openness to predict intentions to engage in pacific activism. A last important remark on [Götzsche-Astrup \(2019\)](#) results is how they also link to the last variable that will be discussed in this systematic review: the quest for significance.

One explanation could be that people with high neuroticism and openness are people who tend to be involved in new experiences and enjoy them. Therefore, uncertainty does not threaten them, and they do not need to seek comfort in political violence or hierarchical groups.

Subsequently, [Götzsche-Astrup \(2020\)](#) further confirms his previous findings, showing that intolerance of uncertainty would exacerbate cognitive rigidity, making individuals less open to diverse perspectives and interpretations on ambiguous and potentially threatening situations, causing them to be more prone to radicalisation.

Extremism and Quest for Significance

The last variable analysed in this current systematic review on its possible relation to extremism and radicalisation was the quest for significance, namely, the desire to matter, to feel worthy ([Kruglanski et al., 2022b](#)). The interest of this variable for trying to explain extremism and radicalisation has exponentially increased in the last decade. However, only in the very last years, empirical studies have started to be published.

In line with the theoretical hypothesis on the role of significance quest has on embracing extremism, the results of the studies included in this systematic review all show a clear progression from experiencing a loss of significance (individual or collective), to higher probabilities of getting involved in extremist activities, mediated by the activation of the quest for significance. In the already discussed [Gómez et al. \(2022\)](#) study, results indicate that Muslim women participating in the research had become radicalised after having lived what they felt as a humiliating moment in their lives. It is also interesting to see that, as female jihadists seemed to have engaged in radicalization because of a crisis in their personal and social identities, they also suggest having disengaged from jihad when they perceived disappointment and disenchantment for unfulfilled expectancies.

In the same line, [Jasko et al. \(2019\)](#) conclude that the quest for significance plays a pivotal role in the process of radicalisation. The researchers found consistently in the six studies that comprises their research that, individuals seeking personal significance and meaning, were more likely to be drawn to radicalisation, in the form of self-sacrifice or activism, as these would offer a clear purpose and a sense of belonging. Widening these findings, [Jasko et al. \(2020b\)](#) reported how radical social contexts strengthened the association between quest for significance (with special attention to collective significance) and support for political violence. These findings lead us to the question of whether there exist mediating or moderating variables that are necessary for the activation of the significance quest to end up in a radicalisation process.

In research with terrorism inmates across Indonesia, [Milla et al. \(2022\)](#) found that significance quest did not predict violent

extremism on a direct path, but through an indirect one. In this indirect path, the key variables that mediated the relationship between significance quest and violent extremism were the group identity (or group fusion) and individuals' ideology (Salafi jihadism). These results are consistent with the 3N model of radicalisation ([Kruglanski et al., 2022a](#); [Webber & Kruglanski, 2016](#)), providing empirical support for it.

Lastly, [Mahfud and Adam-Troian \(2021\)](#) in a research on the French Yellow Vests phenomenon that surged in France on December 2018, they studied how loss of significance may foster radical actions (i.e., armed struggle, radical intentions or non-normative collective actions) through the perception of an installed *anomia* (a term coined by Durkheim in the late 19th century to represent the perception of the breakdown of social norms, values, and expectations within a society; [Britannica, n.d.](#)). Their results supported the idea that this perception of anomia among Yellow Vesters mediated the relationship between their feelings of personal significance loss and support of radical violent actions against French government.

Discussion

As explained at the beginning of this article, the rise of extremist movements (i.e. religious, political, racism...) which are many of them starting to inherently exhibiting violence, are one of the main domestic challenges societies are presently facing. The consequences if this path continues in the future are indeed dire. However, with knowledge comes alternatives for a change. Therefore, the present study was motivated by the desire of gathering current existing scientific knowledge on extremism/radicalisation, and some of the most promising variables that partially explain them. Psychology, as a scientific discipline, offers meaningful empirical evidence in this regard, a pre-requisite for developing future effective preventive and interventive initiatives.

Therefore, as a first step, it was considered essential to collect the information that exists in the literature in this regard, especially empirical information that supports the theoretical proposals that have been established (i.e. [Kruglanski et al., 2019](#)). With this goal in mind, the present systematic review of the variables that can intervene in this process was proposed, looking for collecting available empirical information on the role that personality traits, intolerance of uncertainty, spirituality and quest for significance play in creating and maintaining extremism/radicalisation. The search offered a total of 16 empirical research works which had considered at least one of the aforementioned variables in relation to extremism and/or radicalisation.

Out of the four variables, intolerance to uncertainty has proved to be the variable which relation to extremism has been empirically tested the most. In spite of this, only two studies met the criteria of the systematic review and, in both of them, evidence suggests that those individuals who find harder to manage uncertainty are the ones more prone to get caught into radicalisation and extremism ([Götzsche-Astrup, 2019, 2020](#)). Therefore, even this evidence seems to point towards the relevance of intolerance of uncertainty, more empirical research is still required, not only due to the limited available research, but also because of the remarkable relation found between this variable and another of the variables included in this review: personality traits. Thus, uncertainty is not positive

Table 1*Summary of key Information of the Studies Included in the Systematic Review*

Reference	Aim	Sample	Measures	Results and conclusions
Chabrol et al. (2019)	Study the relationship between Dark Triad Traits and radicalisation (cognitive and behavioural)	n=643 French college-women aged 18-29. Non-clinical.	Self-report questionnaires.	Cluster analysis yielded four groups: a Narcissistic group, a Moderate Machiavellian traits group, a Low Traits group, and a group characterized by high levels of sadistic, psychopathic, and Machiavellian traits called the SPM cluster. Results suggest that the intensity of religious involvement is not a risk factor for radicalisation in the absence of Dark Tetrad traits.
Furnham et al. (2020)	Analyse the role that personality traits, personal beliefs (religion and politics) and self-monitoring have in displaying an extremist mindset.	n=506 young-adults.	– MEMS – TIPI – Self-Monitoring Scale – Personality Disorders Questionnaire. – Self-Evaluations	Self-monitoring and personality disorders mediated the relationship between Neuroticism, Openness, Conscientiousness and Agreeableness, and the display of an extremist mindset.
Gómez et al. (2022)	Examine the motives underlying radicalisation and the process of disengagement	n=25 Muslims females incarcerated. 12 women incarcerated because of crimes related to radicalisation, the other 11 participants were incarcerated for other kind of crimes.	– Interviews – Self-Esteem – Quest for Significance – Collective resilience – Ad hoc dynamic measure about ingroup cohesion – Religiosity (three items ad hoc) – DIFI – Three-item measure based on the MMPI as a liars' detection.	The radicalized group showed lower levels of quest for significance and self-esteem than the control group. On religiosity, jihadists perceived themselves and their families as less religious than non-jihadists.
Götzsche-Astrup (2019)	1. Investigate the relationship between uncertainty and political violence, and its generalizability. 2. Analyse whether this relationship depends on individual differences in personality.	Two samples of U.S. adult population (n= 4806) n ₁ = 2317 aged 18-30 n ₂ = 2489 > 18 y/o.	– Demographic and political orientation. – Mini-IPIP – One-item measure about uncertainty ad hoc. – ARIS – Demographic and political orientation – TIPI – Six items scale ad hoc about uncertainty. – One-item measure about support for political violence.	Uncertainty significantly predicted intentions to be involved in political violence. Lower levels of the personality traits of openness, agreeableness, and conscientiousness were found to predict both intentions to engage in political violence and support for such violence.
Götzsche-Astrup (2020)	To test two pathways to intentions to engage in political violence: uncertainty and dark world perceptions.	U. S. sample of 1300 adults. Danish sample of 1188 adults. (n total= 2488)	– Demographic measures – Short personality scale (Donnellan et al., 2006) – One item about uncertainty ad hoc. – Political violence and activism intentions scale.	After demographic measures and the personality scale, participants were randomly assigned to conditions by the orthogonal manipulation of uncertainty (low versus high) and dark world perceptions (high versus control). Results indicated uncertainty is a pathway to political violence, whereas dark world perceptions are not. Nevertheless, uncertainty did not increase political activism.
Jasko et al. (2019)	Study whether engaging in political actions on behalf of important social values provides a sense of personal significance, which motivates self-sacrifice for the cause.	Activists for a radical left-wing party n1= 84. Pro-democratic social activists (n ₂ =1409) Feminist activists (n ₃ = 158) (n ₄ = 258) Environmental activists (n ₅ =396) Labor and healthcare activists (n6=156)	– Three-items measure ad hoc about significance loss. – Cause importance (measure by asking the participant to write down the four most important values associated with the party) – 10-item scale about willingness to self-sacrifice developed by Bélanger et al. (2014). – Activist intentions with a five-item ad hoc measure. – One item ad hoc about significance gain.	Commitment to the cause has a significant effect on willingness to self-sacrifice. In most of the studies, significance loss did not significantly predict activist intentions. Authors indicate that these results may be explained by the fact that participants were already engaged in actions for a cause. They propose that negative emotions may lead to an initial engagement in a cause, but further positive emotions would explain that engagement on the long term.

Table 1

Summary of key Information of the Studies Included in the Systematic Review (continuation)

Reference	Aim	Sample	Measures	Results and conclusions
Jasko et al. (2020b)	Examine the relationship between quest for significance (individual and collective) and ideological-violent extremism, in addition to the influence of social context.	Sri Lanka ($n_1 = 335$), Morocco ($n_2 = 260$), Indonesia ($n_3 = 379$ and $n_4 = 334$).	– Collective-Quest: five items from the short version of the CNS. – Individual-Quest: three items ad hoc. – Ideological extremism: two items ad hoc. – Violent extremism: three items ad hoc.	Quest for collective significance was positively related to support for violence through ideological extremism in all groups. Perception of social deprivation also increased support for political violence. Quest for individual significance was not related to ideological extremism. There was a stronger relationship between the quest for significance and violent extremism among members of radical groups (i.e., jihadists) with respect to the individual form of quest, as opposed to the collective form. Levels of individual quest for significance was higher for jihadists than for the other two groups.
Mahfud and Adam-Troian (2021)	Study whether personal Significance Loss may predict the use of violence, mediated by the feelings of anomia.	Study 1 ($n=776$, general French population)	– One question about Significance Loss – MAS – ARIS – Two items about intentions to engage in armed struggle – 7-item scale about nonnormative collective action ad hoc. – One-item measure of identification with the Yellow Vests ad hoc. – One-item measure of political ideology ad hoc. – Demographics.	Loss of significance through feelings of anomia predicts intentions to engage in political violence (support for the Yellow Vests).
	To conduct an experimental study to corroborate the findings in the cross-sectional study.	Study 2 ($n= 511$, undergraduate students)	– One question about Significance Loss. – MAS – ARIS – Two items about intentions to engage in armed struggle – 7-item scale about nonnormative collective action ad hoc.	Indirect effects caused by the loss of significance manipulation were small for intentions to engage in armed struggle. However, were significant to engage in activism. Meaning that people experiencing humiliation are more likely to take violent action on behalf of a cause in order to restore their dignity.
Meiza (2023)	Analyse the psychological internal factors contributing to radicalisation.	$n=175$ Indonesian university students	– IPIP – Tolerance Scale (Van der Walt, 2016) – Radical Intention Scale ad hoc, influenced by Silber et al. (2007)	The level of tolerance has a significant effect on radical intentions. The less tolerant one is, the greater the potential to engage in radical activities. Personality traits did not show a significant relationship with radical intentions.
Milla et al. (2022)	Empirically test the 3N model, analysing the possible relationship between quest for significance and violent extremism.	$n=135$ inmates sentenced for terrorism (age: 16 to 55 years)	– Questionnaires administered through face-to-face interviews. – Four items ad hoc about the need for significance. – Two items ad hoc about group identity. – One-item ad hoc about ideology. – Four items ad hoc about violent extremism.	Contrary to the 3N model, no significant association was detected between significance quest and violent extremism. Need for significance was not significantly associated with violent extremism when ideology and group identity were controlled.
Morgades-Bamba et al. (2020)	Test a predictive model of radicalisation where socio-cultural factors, personality traits and depressive symptoms would lead, through dogmatism, to radicalisation.	$n=643$ college women (age: 18-29) from French universities.	– MEIM – SAFE – Religiosity and Spirituality Scale for Youth – FFMI – YPI – NPI – SSIS – PDQ-4 – SPQ-B – PHQ-9 – BDS – Acceptability of Religiously Radicalized Behaviours	Dark personality traits contribute to both cognitive and behavioural religious radicalisation. Narcissism is the factor that contributes directly to both radicalized cognitions and behaviours, while sadism contributes directly to radicalized cognitions and indirectly to radicalisation through dogmatism, and psychopathy contributes indirectly to radicalisation through dogmatism. Indirectly, perceived cultural discrimination, religious involvement and cultural identity increase risk of radicalisation (as they increase dogmatism, and dogmatism itself increases radicalisation).

Table 1*Summary of key Information of the Studies Included in the Systematic Review (continuation)*

Reference	Aim	Sample	Measures	Results and conclusions
Pavlović and Franc (2021)	To examine the interactive effect that dark personality traits have on extremism	Study 2 (n=461) Croatian citizens	– ARIS. – Perceived Economic Status. – PGRD. – H8 – Five-item social (un)desirability scale.	There seems to exist an interaction between dark personality traits and perceived group deprivation in the prediction of radicalized intentions, but not for activist intentions. Furthermore, the emotional component of the perceived group deprivation, and not the cognitive, is the one involved in that relationship. In the context of perceived structural pressures (such as perceived group deprivation), individuals with higher scores on dark personality traits are more eager to use violent means to make the system responsive to their needs.
Pavlović and Wertag (2021)	Analyse the relationship between the dark personality traits and radicalisation, plus the use of violence.	n=250 Croatian college students.	– Scale of political violence. – Dirty Dozen questionnaire (Jonason & Webster, 2010). – Proviolece scale ad hoc.	Individually, every dark personality trait significantly and positively correlated with extremism. However, proviolece has emerged as a significant mediator in that relationship.
Rottweiler and Gill (2022)	To examine the effect that group-based relative deprivation can cause on violent extremism, both attitudes and intentions. Study if this relationship is contingent upon individual differences in personality.	n=1500 British participants	– Violent extremism attitudes scale ad hoc. – RIS – PGRD – PES – Affiliation motivation scale - SANU	Need for uniqueness, (assimilated to the quest for significance by authors) resulted as a positive and significant predictor of violent extremist attitudes and violent extremist intentions. Need for uniqueness significantly conditioned the effects of relative deprivation on both violent extremism attitudes and intentions.
Tetrault and Sarma (2021)	To investigate whether people with higher levels on the dark tetrad personality traits and right-wing authoritarianism (RWA) demonstrate more support for SSE (State-sponsored extremism)	n= 398	– Four vignettes ad hoc about level of agreement to SSE. – SD3 – Short version of RWA.	The study shows that dark personality traits can make people vulnerable to supporting SSE. However, supporting SSE does not involve actual extremist behaviour or cognitions.
Trip et al. (2019)	To investigate whether irrational beliefs and personality factors are psychological mechanisms influencing adolescents to develop an extremist mind-set.	n=257 Romanian adolescents, aged 15-18.	– Militant Extremist Mind-Set Scale (Stankov et al., 2010) – CASI – Mini-IPIP	Affiliation to Christian Orthodoxy increased the possibility to support violence. A combination of personality traits, characterized by low Intellect/Imagination, low Extraversion, and high Agreeableness, appears to make individuals susceptible to extremist ideology.

*DIFI = Dynamic Identity Fusion Index; MEMS = Militant Extremism Mindset Questionnaire; TIPI = Ten Item Personality Inventory; Mini-IPIP = International Personality Item Pool; ARIS = Activism and Radicalism Intentions Scale; MMPI = Minnesota Multiphasic Personality Inventory; MAS = Middleton Alienation Scale; BDS = Balanced Dogmatism Scale; MEIM = Multigroup Ethnic Identity Measure; FFMI = Five Factor Machiavellianism Inventory; YPI = Youth Psychopathic traits Inventory; NPI = Narcissistic Personality Inventory; SSIS = Short Sadistic Impulse Scale; PDQ-4 = Personality Diagnostic Questionnaire; SPQ-B = Schizotypal Personality Questionnaire-Brief; PHQ-9 = Patient Health Questionnaire; H8 = Hateful Eight questionnaire; PGRD = perceived group deprivation; PES = Psychological Entitlement Scale; RIS = Radicalism Intention Scale; SANU = Self-attributed Need for Uniqueness scale; CASI = Children and Adolescent Scale of Irrationality; Mini-IPIP = International Personality Item Pool; RWA = Right-wing Authoritarianism; SD3 = Short Dark Triad

or negative by itself; its affective appraisal will depend on individual differences, namely personal background and biography, beliefs or personality traits (Kruglanski & Ellenberg, 2023). As so, in the present systematic review it was found empirical evidence that precisely indicates that neuroticism (positively), extraversion and openness (negatively) mediated the relationship between intolerance of uncertainty and extremism (intention to engage in political violence) (Gotzsche-Astrup, 2019).

The next most studied variable in terms of its relationship to extremism were personality traits. Here, too, there is lack of

consensus. Several studies found evidence that seemed to indicate that Dark Tetrad personality traits facilitate the path to extremism (Morgades-Bamba et al., 2020; Pavlović & Franc, 2021; Pavlović & Wertag, 2021; Tetrault & Sarma, 2021). Surprisingly, research that used the Big Five Model (Costa & McCrae, 1985) as the personality model of reference did not find these same conclusive results regarding how personality traits influenced the radicalisation process and extremism. As so, while two studies found that high neuroticism, low openness to experience and low agreeableness increased radicalisation (Gotzsche-Astrup, 2019; Furnham et al., 2020); Meiza

(2023) concluded that personality traits did not have a significant influence on extremism, at least not without another variable mediating in that relationship. Therefore, regarding personality traits, empirical research with a stronger methodological strength and a consistent theoretical framework would be greatly recommended.

Spirituality and, more specifically, religiousness, seems to have been widely linked to extremism in the popular mindset (Aly & Striegher, 2012). However, scientific evidence seems to point out in a different direction, noting that, as with the previous two studied variables, there is a significant lack of empirical research on the matter. Thence, religiousness itself has not been accounted as a significant variable for predicting a higher vulnerability towards radical and extremist attitudes or behaviours (Gómez et al., 2022). The only consistent conclusion that empirical evidence has shown on the matter is that religiousness may play as a mediator in the relationship between other variables (i.e., personality traits) and extremism (Chabrol et al., 2019; Morgades-Bamba et al., 2020). For this reason, more empirical research on the role of not only religiousness, but also spirituality (which, up to this day, has not been empirically studied in relation to extremism nor radicalization) would be greatly useful for future prevention and intervention programs.

The last variable considered in the present systematic review was quest for significance. Even though it has gained great popularity in the last decade, and hugely solid theoretical proposals have been published on its relationship with extremism and radicalisation (Kruglanski et al., 2009, 2013, 2022b, Webber & Kruglanski, 2016) the truth is that there is little empirical evidence yet for backing these proposals. Nonetheless, empirical evidence reveals that the experience of a personal (or collective) loss of significance often triggers a quest to restore that sense of worth, which may lead individuals towards extremist ideologies or actions (Gómez et al., 2022; Jasko et al., 2019, 2020b; Mahfud & Adam-Troian, 2021; Milla et al., 2022). While the quest for significance appears to be indeed a central factor in radicalisation processes, various mediating factors like group identity and ideology shape its outcomes, offering key insights into how radicalization can be understood and potentially mitigated.

As a general conclusion drawn from the findings presented in this systematic review, it could be stated that those individuals who have more difficulty with managing of uncertainty (both situational and personal), who have experienced (or are experiencing) an important loss of vital significance (feeling undervalued, socially rejected or humiliated), and who, on a personality level, have more difficulties in managing their emotions, are not that much open to new and/or intense experiences, would be those at a higher risk of being susceptible to radicalisation processes (without being here able to draw a definite conclusion regarding the role played by personal spirituality/religiousness). Despite the indicated description, this does not imply that anyone who meet these broad criteria is doomed to become a radical or extremism, as these results should be always read as a constituent of vulnerability.

One last aspect to emphasise in the light of the information reviewed is that future empirical research on extremism and radicalisation should try to analyse the possible existence of a latent variable/construct which may underlay both variables. The reason for it is that, so far, all the evidence we have regarding extremism and radicalisation comes more from a semantic perspective rather

than from an operational one. It would be interesting therefore that future research would attempt to empirically study if the semantic differences between extremism and radicalisation are accurate, or, contrary to that, extremism and radicalisation share a high percentage of variance, indicating that they are just two traits of a high order construct.

The studies included in the review are not without limitations. In some cases, the methodology or statistical analysis chosen did not allow conclusive results to be drawn (Meiza, 2023). Secondly, the lack of a consistent theoretical framework makes it difficult to extrapolate the results, especially when studying the variable 'personality traits': ten of the seventeen articles studied it as a variable, but the different frameworks prevent the variable from being understood as one. Finally, the different conceptualisations of religiousness and spirituality were a problem. After carrying out this revision, it became clear that spirituality includes religiousness and many other elements that are relevant; therefore, reducing the variable to religiousness leaves out a lot of important information about the individual experience of spirituality. Furthermore, despite the importance of intolerance of uncertainty in relation to extremism, only two studies (by the same author) were found to meet the criteria.

This systematic review has its strengths. Firstly, the review and selection of articles was carried out by two independent researchers and high coefficients of agreement were found. The review was performed by two independent researchers and high coefficients of agreement were found. Secondly, the methodological quality of the studies included in this review was assessed. Both elements comply with the guidelines and standards for the methodological quality of systematic reviews and favour the quality of this review. Finally, to the best of our knowledge, this is the first systematic review that examines the empirical findings in scientific literature on the relationship between extremism and various psychological variables.

Author Contributions

First author: Conceptualization, Resources, Data Curation, Formal Analysis, Methodology, Writing — Original draft, Writing — review and editing, Supervision. Second author: Resources, Data Curation, Formal Analysis, Methodology, Writing — Original draft. Third and fourth authors: Writing — Original Draft, Writing — review and editing. Fifth, sixth and seventh authors: Writing — review and editing.

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The authors declare that there is no conflict of interest.

Data Availability Statement

Currently, the raw data are not publicly available in an institutional repository. Nonetheless, the authors are open to share the data with researchers interested in replicating the results found in this paper.

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Appendix 1

Quality Assessment Based on McMaster Critical Review Form — Qualitative Studies (Version 2.0) (Letts et al., 2007)

Reference	Study purpose	Literature	Design			Sampling			Data collection		Data Analysis			Overall rigour	Conclusions and implications
			Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q1	Q2	Q3		
Chabrol et al. (2019)	1	1	1 (CS)	1	1 (Q)	1	1	1	1	1	1	1	1	1	1
Furnham et al. (2020)	1	1	1 (CS)	1	1 (Q)	1	1	1	1	1	1	1	1	1	1
Gómez et al. (2022)	1	1	1 (CS)	1	1 (I)	1	1	1	1	1	1	1	1	1	1
Gotzsche-Astrup, O. (2019)	1	1	1 (CS)	1	1 (Q)	1	1	1	1	1	1	1	1	1	1
Gotzsche-Astrup, O. (2020)	1	1	1 (CS)	1	1 (Q)	1	1	2	1	1	1	1	1	1	1
Jasko et al. (2019)	1	1	1 (CS)	1	1 (Q)	1	1	2	1	1	1	1	1	1	1
Jasko et al. (2020b)	1	1	1 (CS)	1	1 (Q)	1	1	1	1	1	1	1	1	1	1
Mahfud & Adam-Troian (2021)	1	1	1 (CS)	1	1 (Q)	1	1	1	1	1	1	1	1	1	1
Meiza, A. (2023)	1	1	1 (CS)	1	1 (Q)	1	1	2	1	1	1	1	0	0	0
Milla et al. (2022)	1	1	1 (CS)	1	1 (Q)	1	1	1	1	1	1	1	1	1	1
Morgades-Bamba et al. (2020)	1	1	1 (QS)	1	1 (Q)	1	1	1	1	1	1	1	1	1	1
Pavlović & Franc (2021)	1	1	1 (QS)	1	1 (Q)	1	1	1	1	1	1	1	1	1	1
Pavlović & Wertag (2021)	1	1	1 (QS)	1	1 (Q)	1	1	1	1	1	1	1	1	1	1
Rottweiler & Gill (2022)	1	1	1 (QS)	1	1 (Q)	1	1	1	1	1	1	1	1	1	1
Tetrault & Sarma (2021)	1	1	1 (QS)	1	1 (Q)	1	1	2	1	1	1	1	1	1	1
Trip et al. (2019)	1	1	1 (QS)	1	1 (Q)	1	1	1	1	1	1	1	1	1	1

*1= Yes; 0= No; 2 = Not addressed CS = Cross-sectional; Q = Questionnaires; I = Interview