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From relatedness frustrated to violent extremism: the mediating role of aggression

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Abstract

The present study builds on the Significance Quest Theory to investigate the mechanisms that render individuals susceptible to violent extremism. Through a survey study, we examined how feelings of (in)significance, conceptualized as the Self-Determination Theory's needs for autonomy, relatedness, and competence, relate to violent extremist attitudes. We tested models for both need frustration and satisfaction, including aggression as mediator, and simple knowledge beliefs and empathic concern as moderators. Our findings demonstrate that relatedness frustration is a prominent risk factor for violent extremism, whereas relatedness satisfaction serves as a protective factor. The unique impact of autonomy and competence were relatively limited. Furthermore, increased levels of aggression partly explained the relationship between relatedness frustration and violent extremism, and simple knowledge beliefs and empathic concern respectively strengthened and weakened the relationship between aggression and violent extremism. These findings help to understand how feelings of insignificance can instill a susceptibility to violent extremism, and how addressing relatedness may be key for deradicalization programs.

Keywords Violent extremism · Significance Quest Theory · Self-determination theory · Frustration-aggression · Relatedness

Introduction

Violent extremism poses a major threat to societies, inflicting severe physical harm and material damage while spreading fear among communities (D'Olimpio, 2023). Although the prevalence is higher in conflict regions (United Nations, 2020), violent extremism also appears in countries of relative stability. For instance, in the United States, incidents of violent extremism have increased in recent decades (Doxsee, 2023), and Europe likewise deals with extremist cases (Europol, 2023). While violent extremism manifests itself in various forms, most instances involve religious and far-right or far-left political groups (Doxsee, 2023; Europol, 2023).

In order to understand violent extremism, theories such as the Significance Quest Theory (Kruglanski et al., 2019; Kruglanski et al., 2022b) focus on both intra- and interpersonal processes that instill a susceptibility to violent extremism. Furthermore, recent approaches have considered violent extremism as a continuum wherein the general population shows attitudes and behaviors ranging from mild to severe (Miklikowska et al., 2022). Building on these recent conceptual developments, the current study attempts to delve deeper into the psychological underpinnings that guide individuals toward violent extremism. By increasing our understanding of these mechanisms, we hope to contribute to the improvement of interventions that can mitigate the risk of radicalization and reduce the prevalence of violent extremism worldwide.

Violent extremism

According to Ozer and Bertelsen (2018), violent extremism consists of extremist beliefs and violence endorsement. The first aspect refers to firm convictions about the necessity of certain fundamental changes in society and intolerance

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toward all who do not share these convictions. The second aspect refers to the belief in violence as the most effective means to realize those societal changes. Despite a long history of theorizing, violent extremism remains a difficult concept to grasp, and throughout the years, numerous efforts have been made to understand its sources and complexities. For instance, early psychological theories turned to psychopathologies for answers, focusing on the role of psychopathic and narcissistic features (for an overview, see Gill & Corner, 2017). However, it became clear that personality disorders are not the primary drivers of violent extremist behaviors (for a systematic review, see Trimbur et al., 2021), and that there is, in fact, a lot of variation among individuals drawn to violent extremism (Atran, 2003). Subsequent theories, known as pathway models, investigated the psychological factors that could increase a person's propensity to violent extremism (Gill & Corner, 2017). One of the first models within this approach was developed by Shaw (1986), who, in addition to narcissistic injuries, included socialization processes, escalation events, and personal connections with the extremist group as relevant factors. More pathway models followed, such as Horgan's (2008) approach outlining a series of risk factors (e.g., emotional vulnerability, political dissatisfaction, identification with the victims of a grievance) or McCauley and Moskalenko's (2008) model listing 12 psychological mechanisms that can advance the radicalization process (e.g., personal victimization, group polarization, martyrdom). More recently, Borum (2014) posited that extremists have a worldview marked by authoritarianism, apocalypticism, dogmatism, and fundamentalism. This worldview, combined with an emotional vulnerability (e.g., a lack of meaning) and certain propensities (e.g., a hostile attribution bias), is thought to increase the likelihood of engaging in violent extremism. It is evident that various theories have attempted to understand how individuals become drawn to violent extremist groups. Yet, it was only recently that a more comprehensive framework in this regard was presented by Kruglanski and colleagues (2019), named the Significance Quest Theory.

A quest for significance

The Significance Quest Theory (Kruglanski et al., 2019, 2022b) is built upon three pillars. The first pillar encompasses *the need to be significant* (Kruglanski et al., 2019), stating that humans have "the desire to matter, to have dignity and merit respect" (Kruglanski et al., 2022b, p. 1050). Consequently, it is argued that *a quest for significance* will be activated when one feels insufficiently significant (Kruglanski et al., 2022b). Supposedly, there are numerous ways to fulfill this quest (Kruglanski et al., 2019), most of them non-harmful or even beneficial (e.g., as an activist). Yet,

there are also primal ways to restore a sense of significance, for instance, by engaging in aggressive behavior. Here, it is thought that lashing out allows people to show their strength and power to retaliate (Kruglanski et al., 2019, 2023), which elicits temporary pleasure (Chester & DeWall, 2016). However, established social norms place limits on aggressive behavior, and to use violence as a sustainable means of gaining significance, such norms must be overridden (Kruglanski et al., 2019). This is where *the narrative*, the second pillar of the Significance Quest theory, comes into play.

The *narrative* encapsulates the story of the extremist group, often centered around a perceived injustice and the mission to triumph over the alleged perpetrators (Kruglanski et al., 2022a). An extremist narrative is typically characterized by a justification of violence (Kruglanski et al., 2022a), stimulating the idea that significance can be restored through violent actions and removing the social norms that restrict the use of aggression (Kruglanski et al., 2019). Moreover, these violent narratives tend to be simplistic and black-and-white, including simple reasonings on how feelings of significance can be realized. This allows extremist groups to present a clear-cut path to significance that non-extremist groups often cannot provide, which may make extremist groups more appealing when one is frantically searching for a sense of significance (Kruglanski et al., 2019; Kruglanski, Molinario, Ellenberg, & Di Cicco, Kruglanski et al., 2022a).

Finally, the third pillar, the *network*, refers to the social aspect of extremism. Often, individuals become familiar with the ideological content of an extremist group through their close circle, like friends or family (Kruglanski et al., 2019). When the social context of the individual endorses extremist groups and their ideologies, the individual will be more likely to restore their feelings of significance in that manner (Jasko et al., 2017, 2020).

In essence, the Significance Quest Theory posits that the need for significance is the primary driver of individuals' susceptibility to violent extremism. Specifically, it may instill a sensitivity to the aggression-justifying narratives of extremist groups. In the current research, we want to examine this notion further. In particular, we are interested in the role of aggression as a tool for significance-restoration and how it is positioned to violent extremism. One challenge, however, is the difficulty in assessing the concept of significance. To address this, we adopted the framework of the Self-Determination Theory (Ryan & Deci, 2017; Ryan, 2023), which posits that a sense of purpose and meaning in life arises from fulfilling three basic psychological needs.

Significance loss from the perspective of self-determination theory

The Self-Determination Theory (Ryan & Deci, 2017; Ryan, 2023) is a broad theory that addresses people's psychological functioning and motivation through the satisfaction - versus frustration - of three basic psychological needs: autonomy, relatedness, and competence. *Autonomy* is defined as the need for self-agency and the ability to think and act according to one's true self and values. When this need is met, it enhances a person's sense of meaningfulness by promoting authentic self-expression and alignment with core values (Deci & Ryan, 2000). Conversely, when autonomy is thwarted, individuals may feel coerced and dominated, subject to external or internal pressures. *Relatedness* involves the need for intimacy and genuine connection with others. When satisfied, one sees their relationships with others as warm and responsive, whereas having the perception of having cold and distant relationships indicates frustrated relatedness. *Competence* encompasses the need to feel capable and effective in overcoming challenges and achieving goals. Satisfied competence involves a sense of accomplishment and mastery, while frustrated competence leads to feelings of inadequacy and doubt about one's abilities (Czekierda et al., 2017; Ryan & Vansteenkiste, 2023). Although highly related, these three needs are argued to have their own unique contribution to one's purpose and meaning in life.

In previous work, the developers of the Significance Quest Theory have linked the need for significance to the basic needs from the Self-Determination Theory: "We conceive of the need for significance as a preeminent social motive that subsumes such motives as competence, relatedness, the need to belong, and so on." (Kruglanski et al., 2022b, p. 1052). While the authors do not limit their concept of significance to the three basic psychological needs, they argue that satisfying those needs can instill a sense of significance.

Conversely, frustration of any basic need can result in a loss of significance, which in turn can activate a quest for significance. This raises the possibility that individuals with frustrated basic psychological needs may be more susceptible to violent extremism. In fact, multiple studies have linked violent extremism to experiences indicative of basic need frustration. For instance, Jasko and colleagues (2017) demonstrated that individuals who had experienced a relationship-related loss of significance (i.e., *relatedness frustration*) were more likely to have committed violent actions with ideological motives. Furthermore, these authors found that people with an achievement-related loss of significance such as unemployment and/or low socioeconomic status (i.e., *competence frustration*), were also more likely to have

engaged in violent extremism. As to *autonomy frustration*, previous work has found that when individuals experience a loss of agency, they often attempt to rebuild a sense of order by trusting external sources of control such as the government or God (Kay et al., 2008), or conspiracy theories (Whitson & Galinsky, 2008). Along similar lines, one may expect that an extremist group can function as an external substitute for a sense of control and agency, especially considering that extremist groups uphold simplistic narratives to explain complex phenomena.

As more direct evidence for the relationship between the basic psychological needs and violent extremism, Rappel and Vachon (2023) showed that high levels of basic need satisfaction in a right-wing population negatively predicted violent extremist attitudes, with the strongest protective effects of relatedness satisfaction. In turn, a study by Briki (2022) found that relatedness frustration uniquely predicted violent extremist attitudes, and several experiments have also demonstrated that experiencing relatedness frustration in the form of social exclusion increases the willingness to engage with extremist groups (Pfundmair, 2018; Pfundmair & Mahr, 2022; Renström et al., 2020). These findings further underscore how need frustration, especially relatedness, may be relevant in understanding people's inclination toward violent extremism.

However, at this stage, it is still unclear through which processes need frustration may increase susceptibility to violent extremism. As the Significance Quest Theory suggests, violent extremism may be particularly high among individuals with high levels of psychological need frustration because they seek a sense of significance and see the use of aggression as a way to regain it (Kruglanski et al., 2019).

The role of aggression

The Frustration-Aggression Hypothesis, as originally formulated by Dollard and colleagues in 1939, states that "the occurrence of aggressive behavior always presupposes the existence of frustration and, contrariwise, that the existence of frustration always leads to some form of aggression" (p. 1). Over the decades, the Frustration-Aggression Hypothesis has been thoroughly investigated and further refined, with later formulations deeming frustration necessary for aggression, but acknowledging that frustration not always results in aggression (Miller, 1941; Sears, 1941).

Empirical research in various contexts supports the idea that frustrated psychological needs increase aggressive tendencies. For example, social exclusion has been shown to increase aggression (Chow et al., 2008; Gaertner et al., 2008; Twenge et al., 2001; Warburton et al., 2006), as has thwarted competence (Breuer et al., 2015; Przybylski et al.,

2014), and a loss of control (Neighbors et al., 2002; Poon et al., 2020). Furthermore, the Self-Determination Theory as well specifically highlights aggression as a compensatory response to severe frustration of basic psychological needs (Ryan & Deci, 2017). This is also evident in the histories and narratives of terrorists and serial killers, where long-term experiences of need frustration seem to play a crucial role (Mitchell & Aamodt, 2005).

Based on these theoretical and empirical grounds, we argue that violent extremism is a manifestation of increased aggression due to need frustration. Specifically, need frustration instills a heightened inclination towards aggression, which extremist groups can subsequently exploit. Extremist groups frame aggression as a justified and effective means for restoring a sense of significance, thus providing individuals with a 'functional' outlet for their heightened aggressive impulses (Kruglanski et al., 2019).

However, we do not posit that frustration-fueled aggression consistently translates into violent extremism. Rather, aggression represents a general response to need frustration, which can manifest in various forms depending on individual characteristics and contextual factors. For instance, aggression may also result in interpersonal difficulties (Kewalramani & Singh, 2017) or self-directed harm (O'Donnell et al., 2014). Importantly, while some individuals may reject extremist ideologies altogether, others may be more susceptible to the promises of extremist groups, thereby increasing the likelihood of violent extremist engagement.

This theoretical framework contrasts with a direct causal model in which need frustration directly leads to violent extremism. Instead, we advance that aggression functions as an intermediate stage, and violent extremism is one possible manifestation of aggression.

Provoking and protecting factors

Simple knowledge beliefs

The Significance Quest Theory proposes that, when experiencing a loss of significance, the simple narratives provided by extremist groups on how to regain significance, may become especially appealing (Kruglanski et al., 2019). However, the degree of this appeal may vary as people differ in the extent to which they generally believe that knowledge is simple rather than complex, and hence whether there are singular solutions to multifaceted problems (Schommer, 1990). Such individual differences in simple knowledge beliefs have been shown to positively predict the disposition to avoid arguments (Nussbaum & Bendixen, 2003), and negatively predict principled moral reasoning (Bendixen et al., 1998) and reflective judgment (Bendixen et al., 1994).

As such, we propose that simple knowledge beliefs may facilitate the adoption of simple narratives in which violence is presented as a means to significance gain. Previous research already established higher levels of cognitive simplicity in extremists (see van Prooijen & Krouwel, 2019). In particular, it has been demonstrated that extremists perceive the social world more simply with clearly defined mental categories (Lammers et al., 2017), and that they are more eager to embrace simple solutions to complex political problems (van Prooijen et al., 2018).

Considering these findings, we hypothesized that aggressive tendencies due to frustrated needs are more likely to be channeled into violent extremism, if the individual has higher simple knowledge beliefs.

Empathic concern

The second moderating variable we considered is empathic concern, which is the tendency to experience feelings of sympathy and concern for others during their moments of hardship or misfortune (Davis, 1983). It is theorized that through sympathizing with other people, violence toward these others gets inhibited (Lovett & Sheffield, 2007). Moreover, earlier research has also identified empathy as a negative predictor of extremist attitudes (Rappel & Vachon, 2023). As such, empathic concern may serve a similar function as social norms (see Kruglanski et al., 2019) in preventing people from acting out on their aggressive tendencies. Therefore, we expect empathic concern to weaken the relationship between aggression and violent extremism.

The present study

Building upon these theoretical frameworks and the supporting empirical evidence, we aimed to further examine the intricate relationships between feelings of significance, aggression, and violent extremism. To assess feelings of significance, the basic psychological needs from the Self-Determination Theory were employed. This resulted in a mediation model with (a) the needs for autonomy, relatedness, and competence as predictors, (b) aggression as mediator, and (c) extremist beliefs and violence endorsement as outcomes. Additionally, we explored the role of simple knowledge beliefs and empathic concern in the proposed mediation by implementing them as moderators in the model. Although our hypotheses on the moderating effect primarily pertained to the relationship between aggression and violent extremism, we tested for moderating effects on each pathway.

The model aimed to investigate to what extent significance loss, operationalized through basic need *frustration*, predicts a person's susceptibility to violent extremism, and

the mechanisms through and the conditions under which the effects materialize. Based on theoretical and empirical grounds, basic need frustration is expected to be a risk factor for violent extremism. However, less is known as to whether need *satisfaction* may act as a protective factor. To address this imbalance, we ran the model both for need frustration and need satisfaction.

Method

Participants

We sampled from the general population, in line with recent approaches that consider violent extremism as a continuum within the general population (Miklikowska et al., 2022). Participants were sampled from the USA adult population, recruited on Prolific. Recent studies on data quality have shown that Prolific provides higher data quality than popular alternative web-based recruitment platforms (Peer et al., 2017), and performs well relative to widely used panels maintained by commercial survey firms and in-person research with undergraduate students (Douglas et al., 2023). A total of 743 participants completed the online survey and received monetary compensation in return for participation. Two attention check questions were included ("Please select Disagree"), and nine participants were excluded because they answered incorrectly on at least one of the two check questions, bringing the final sample to 734 participants (368 women, 360 men, and six non-binary persons; $M_{age} = 43.51$, $SD_{age} = 13.39$).

A sensitivity power analysis was conducted with the achieved sample size. We performed a diagram-based power analysis using WebPower (Zhang & Yuan, 2018), employing a Monte Carlo simulation with 1000 replications and a significance level of $\alpha = 0.05$. When considering a small effect ($\beta = 0.10$; Nieminen, 2022) for each regression, the power of the mediation model ranged between 0.75 and 0.79, and for the moderated mediation model, between 0.74 and 0.80. For a medium effect ($\beta = 0.30$), the power for both the mediation and moderated mediation model was > 0.99.

Measures

All constructs were measured on a 5-point Likert scale (1 = "Strongly disagree", 2 = "Disagree", 3 = "Neither agree or disagree", 4 = "Agree", 5 = "Strongly agree"), except for the extremism measurements, which were assessed on a 7-point Likert scale (1 = "Strongly disagree", 2 = "Disagree", 3 = "Somewhat disagree", 4 = "Neither agree or disagree", 5 = "Somewhat agree", 6 = "Agree," 7 = "Strongly agree").

Basic psychological needs

The *basic psychological needs* (i.e., autonomy, relatedness, and competence) were measured with the Basic Psychological Need Satisfaction and Frustration Scale (Chen et al., 2015). For each need, four items assessed satisfaction ($\alpha_{autonomy} = 0.83$; $\alpha_{relatedness} = 0.91$; $\alpha_{competence} = 0.89$), and four items assessed frustration ($\alpha_{autonomy} = 0.84$; $\alpha_{relatedness} = 0.84$; $\alpha_{competence} = 0.90$). As to need satisfaction, autonomy was measured by items such as "I feel a sense of choice and freedom in the things I undertake", relatedness by items such as "I feel connected with people who care for me, and for whom I care", and competence by items such as "I feel confident that I can do things well". As to need frustration, an example item for frustrated autonomy is: "My daily activities feel like a chain of obligations", for frustrated relatedness: "I feel the relationships I have are just superficial", and for frustrated competence: "I feel like a failure because of the mistakes I make".

Aggression (mediator)

Aggression was measured via the nine-item ($\alpha = 0.84$) physical aggression subscale of the Aggression Questionnaire (Buss & Perry, 1992). Items of this scale include "Once in a while I can't control the urge to strike another person" and "If someone hits me, I hit back".

Violent extremism

To assess the concept of *violent extremism*, various measures have been proposed in the literature, mostly focusing on different aspects. Therefore, we decided to use multiple scales in order to better cover this construct and to be able to detect whether need frustration and satisfaction effects are similar across operationalizations.

To operationalize *extremist beliefs*, the 14-item Extremism Scale (Ozer & Bertelsen, 2018; $\alpha = 0.91$) was employed. This scale includes items such as "It is wrong and immoral to live peacefully side by side with people who don´t live the good and correct life".

To estimate *violence endorsement*, two scales were used: the 12-item Pro-violence and Illegal Acts in Relation to Extremism Scale (Ozer & Bertelsen, 2018; $\alpha = 0.97$) and the 6-item Radicalism Intentions Scale (Moskalenko & McCauley, 2009; $\alpha = 0.89$). Whereas the pro-violence and illegal acts attitudes focus primarily on beliefs (e.g., "Using physical violence is the only thing that really works when it is a matter of creating a new and better society"), the radicalism intentions encompass a behavioral aspect (e.g., "I would participate in a public protest against oppression of my group even if I thought the protest might turn violent").

This enabled us to differentiate between purely endorsing violence and illegal acts and being willing to actively participate in them.

Simple knowledge beliefs and empathic concern (moderators)

To measure *simple knowledge beliefs*, the seven-item simple knowledge subscale of the Epistemic Beliefs Inventory (Nussbaum & Bendixen, 2003; α=0.80) was employed. This scale consists of items such as "The best ideas are often the most simple" and "If a person tries too hard to understand a problem, they will most likely end up confused".

Empathic concern was measured with the seven-item empathic concern subscale (α=0.87) of the Interpersonal Reactivity Index (Davis, 1983). An example item from this scale is "I often have tender, concerned feelings for people less fortunate than me".

Plan of analyses

The analyses were performed in R Statistical Software (v4.2.1; R Core Team, 2022). First, Pearson correlation coefficients between the variables were calculated. Next, two mediation models were constructed using the *lavaan* package (v0.6.17; Rosseel, 2012)—one with the frustrated basic psychological needs and one with the satisfied basic psychological needs as independent variables. In both models, extremist beliefs, pro-violence and illegal acts attitudes, and radicalism intentions were included as dependent variables and aggression as mediator. To estimate the standard errors, bootstrapping (n=5000) was employed (Rosseel, 2012), which is a non-parametric resampling method that does not assume a normal distribution (Shrout & Bolger, 2002). The confidence intervals were based on the bootstrap resampling (Rosseel, 2012). Subsequently, we tested the mediation models again with simple knowledge and empathic concern included as moderators on each pathway.

Results

As shown in Table 1, the correlations provided initial support for the assumed interrelations between the variables. That is, levels of need frustration showed positive correlations of moderate strength with aggression and with the extremism measures. In turn, aggression showed a moderate to strong positive correlation with each extremism measure. Remarkably, although need satisfaction generally showed the expected reverse correlation pattern with aggression and the extremism measures, these relationships were relatively small or non-significant. Between autonomy satisfaction

Table 1 Correlation table

|	M	SD	1	2	3	4	5	6	7	8	9	10	11
Need frustration													
1. Autonomy frustration	2.87	0.94											
2. Relatedness frustration	2.16	0.91	0.57***										
3. Competence frustration	2.43	1.05	0.62***	0.61***									
Need satisfaction													
4. Autonomy satisfaction	3.73	0.73	−0.56***	−0.40***	−0.59***								
5. Relatedness satisfaction	4.04	0.78	−0.39***	−0.68***	−0.51***	0.56***							
6. Competence satisfaction	3.90	0.79	−0.48***	−0.46***	−0.78***	0.65***	0.55***						
Mediator													
7. Aggression	2.26	0.77	0.26***	0.36***	0.27***	−0.14***	−0.22***	−0.12***					
Extremism measures													
8. Extremist beliefs	3.04	1.09	0.26***	0.39***	0.15***	0.08*	−0.13***	0.01	0.38***				
9. Pro-violence & illegal acts	1.95	1.19	0.30***	0.42***	0.28***	−0.07	−0.20***	−0.10**	0.52***	0.61***			
10. Radicalism intentions	2.62	1.33	0.27***	0.34***	0.22***	−0.05	−0.14***	−0.08*	0.49***	0.52***	0.65***		
Moderators													
11. Simple knowledge	3.03	0.69	0.19***	0.22***	0.07	0.10**	−0.02	0.06	0.28***	0.51***	0.26***	0.19***	
12. Empathic concern	3.88	0.70	−0.18***	−0.28***	−0.23***	0.16***	0.33***	0.24***	−0.26***	−0.22***	−0.30***	−0.17***	−0.15***

***$p<.001$, **$p<.01$, *$p<.05$
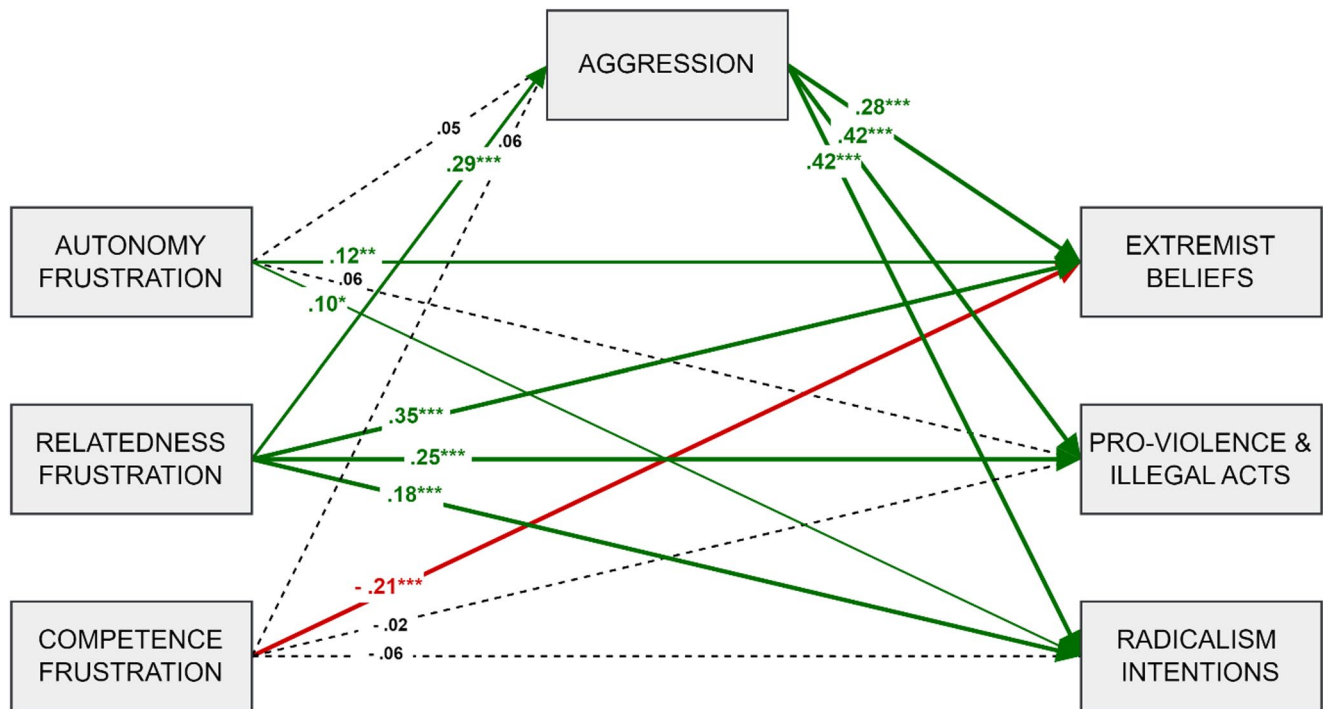
Fig. 1 The mediation model with frustrated basic needs as independent variables

Table 2 The indirect, direct, and total effects of the need frustration model

	Extremist beliefs			Pro-violence & illegal acts attitudes			Radicalism intentions		
	Standardized coefficient	95% CI	p-value	Standardized coefficient	95% CI	p-value	Standardized coefficient	95% CI	p-value
Autonomy frustration									
Indirect	0.02	[-0.01; 0.05]	0.29	0.02	[-0.02; 0.08]	0.28	0.02	[-0.02; 0.09]	0.28
Direct	**0.12**	[0.03; 0.22]	0.007	0.06	[-0.03; 0.17]	0.17	**0.10**	[0.03; 0.24]	0.01
Total	**0.13**	[0.04; 0.24]	0.007	0.08	[-0.02; 0.21]	0.11	**0.12**	[0.04; 0.29]	0.01
Relatedness frustration									
Indirect	**0.08**	[0.05; 0.13]	<0.001	**0.12**	[0.09; 0.20]	<0.001	**0.12**	[0.10; 0.22]	<0.001
Direct	**0.35**	[0.27; 0.49]	<0.001	**0.25**	[0.19; 0.42]	<0.001	**0.18**	[0.11; 0.36]	<0.001
Total	**0.43**	[0.36; 0.58]	<0.001	**0.37**	[0.32; 0.58]	<0.001	**0.30**	[0.25; 0.54]	<0.001
Competence frustration									
Indirect	0.02	[-0.01; 0.05]	0.23	0.03	[-0.02; 0.08]	0.23	0.03	[-0.02; 0.09]	0.23
Direct	**−0.21**	[-0.33; −0.12]	<0.001	−0.02	[-0.14; 0.09]	0.72	−0.06	[-0.20; 0.04]	0.17
Total	**−0.19**	[-0.32; −0.09]	<0.001	0.01	[-0.12; 0.13]	0.88	−0.04	[-0.18; 0.09]	0.46

and extremist beliefs, there was even a small positive relationship.

Need frustration model

We first tested the mediation model with levels of need frustration as independent variables, aggression as mediator, and the extremism measures as dependent variables (see Fig. 1). The indirect, direct, and total effects can be consulted in Table 2.

The need frustration model clearly identified relatedness frustration as the most potent unique predictor for each extremism measure (see total effects in Table 2). We observed a positive, direct path from relatedness frustration to extremist beliefs, pro-violence and illegal acts attitudes, and radicalism intentions. Moreover, there were significant indirect paths from relatedness frustration through aggression on extremist beliefs, pro-violence and illegal acts attitudes, and radicalism intentions. For autonomy frustration, there was only a positive, direct pathway to extremist beliefs and radicalism intentions. As to competence frustration, there was a negative, direct pathway to extremist beliefs. Neither for autonomy frustration nor competence frustration were there significant indirect pathways.

Secondary moderation analyses were conducted in which simple knowledge beliefs and empathic concern were added to the model as potential moderators on each pathway. In Appendix A, Table A1 contains an overview of the tested effects of the moderated mediation analysis, revealing several significant moderation effects.

First, simple knowledge beliefs strengthened the relationship between aggression and pro-violence and illegal acts attitudes. In particular, for high levels of simple knowledge, there was a stronger path between aggression and pro-violence and illegal acts attitudes (+1 *SD*; β=0.57; CI [0.50, 0.76]; *p*<.001), compared to low levels of simple knowledge (−1 *SD*; β=0.23; CI [0.19, 0.41]; *p*<.001).

Second, empathic concern weakened the relationship between aggression and both extremist beliefs and pro-violence and illegal acts attitudes. The relationship between aggression and extremist beliefs was stronger for low levels of empathic concern (−1 *SD*; β=0.40; CI [0.31, 0.53]; *p*<.001), compared to high levels (+1 *SD*; β=0.15; CI [0.05, 0.27]; *p*=.004). Likewise, the relationship between aggression and pro-violence and illegal acts attitudes was stronger for low levels (+1 *SD*; β=0.50; CI [0.45, 0.70]; *p*<.001) of empathic concern, compared to high levels (+1 *SD*; β=0.31; CI [0.24, 0.48]; *p*<.001). Lastly, empathic concern weakened the direct relationship between frustrated relatedness and both violence endorsement measures. Specifically, for low levels of empathic concern, there was a strong path between aggression and pro-violence and illegal acts attitudes (−1 *SD*; β=0.42; CI [0.32, 0.66]; *p*<.001), while the

pathway disappeared for high levels of empathic concern (+1 *SD*; β=0.06; CI [-0.07, 0.26]; *p*=.27). Similarly, there was a stronger pathway between aggression and radicalism intentions for low levels of empathic concern (−1 *SD*; β=0.56; CI [0.55, 0.92]; *p*<.001) compared to high levels (+1 *SD*; β=0.27; CI [0.16, 0.54]; *p*<.001).

Finally, we ran the models while also controlling for age and gender, and these demographic variables did not influence the observed effects. The obtained effects can be consulted in Table A3 and Table A4 of the Appendix.

Need satisfaction model

Next, we tested the mediation model with levels of need satisfaction as independent variables, aggression as mediator, and the extremism measures as dependent variables (see Fig. 2). The indirect, direct, and total effects can be consulted in Table 3.

Also for need satisfaction, relatedness emerged as the most potent unique predictor for each extremism measure (see total effects in Table 3). There was a negative, direct path from relatedness satisfaction to extremist beliefs and to pro-violence and illegal acts attitudes. Moreover, there were significant indirect paths from relatedness satisfaction through aggression on extremist beliefs, pro-violence and illegal acts attitudes, and radicalism intentions. Regarding autonomy satisfaction, there was a positive, direct pathway to extremist beliefs and pro-violence and illegal acts
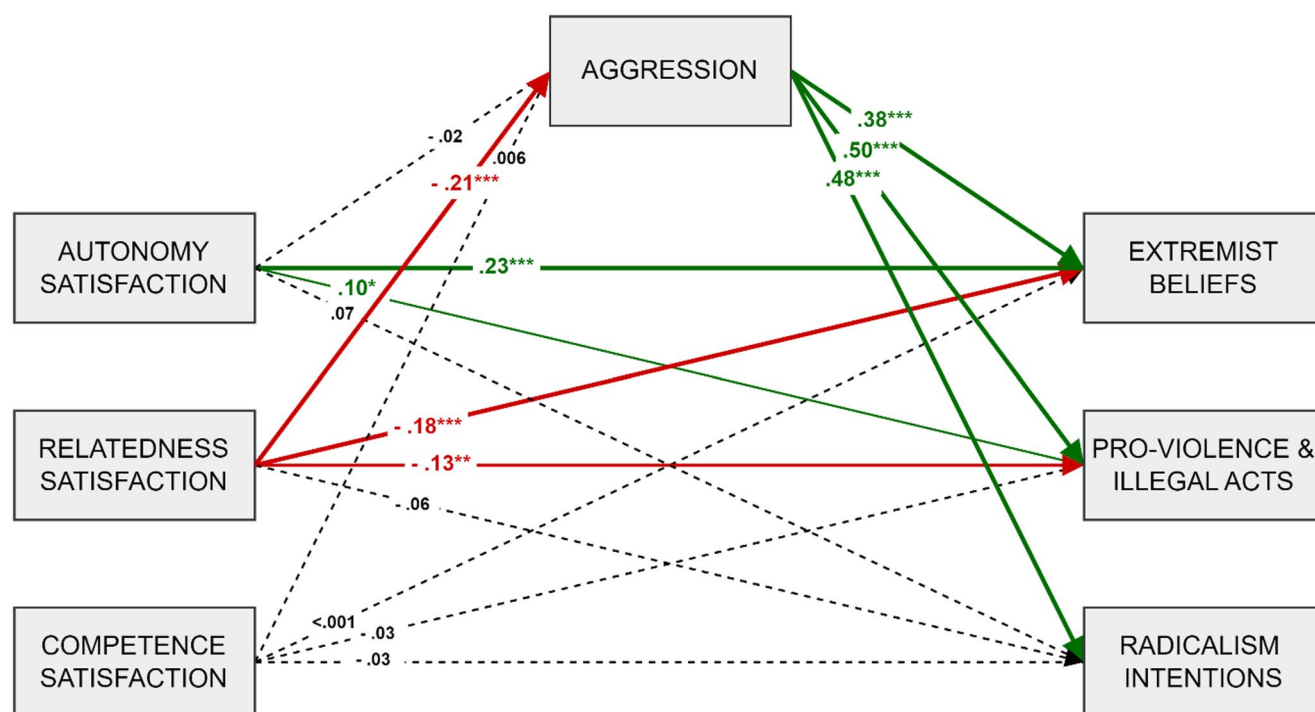

Fig. 2 The mediation model with satisfied basic needs as independent variables

Table 3 The indirect, direct, and total effects of the need satisfaction model

	Extremist beliefs			Pro-violence & illegal acts attitudes			Radicalism intentions		
	Standardized coefficient	95% CI	p-value	Standardized coefficient	95% CI	p-value	Standardized coefficient	95% CI	p-value
Autonomy satisfaction									
Indirect	−0.01	[-0.05; 0.03]	0.66	−0.01	[-0.07; 0.05]	0.66	−0.01	[-0.08; 0.05]	0.66
Direct	**0.23**	[0.15; 0.35]	<0.001	**0.10**	[0.01; 0.21]	0.03	0.07	[-0.02; 0.22]	0.12
Total	**0.22**	[0.14; 0.35]	<0.001	**0.08**	[-0.02; 0.21]	0.08	0.06	[-0.06; 0.21]	0.25
Relatedness satisfaction									
Indirect	**−0.08**	[-0.13; −0.04]	<0.001	**−0.10**	[-0.19; −0.06]	<0.001	**−0.10**	[-0.20; −0.07]	<0.001
Direct	**−0.18**	[-0.29; −0.10]	<0.001	**−0.13**	[-0.26; −0.05]	0.004	−0.06	[-0.20; 0.04]	0.20
Total	**−0.26**	[-0.38; −0.18]	<0.001	**−0.24**	[-0.40; −0.17]	<0.001	**−0.16**	[-0.35; −0.08]	0.002
Competence satisfaction									
Indirect	0.002	[-0.04; 0.04]	0.90	0.003	[-0.05; 0.06]	0.90	0.003	[-0.06; 0.06]	0.90
Direct	<0.001	[-0.10; 0.10]	0.99	−0.03	[-0.15; 0.07]	0.51	−0.03	[-0.17; 0.08]	0.47
Total	0.002	[-0.10; 0.10]	0.96	−0.03	[-0.15; 0.08]	0.57	−0.03	[-0.17; 0.08]	0.53

attitudes. Neither for autonomy satisfaction nor competence satisfaction were there significant indirect pathways.

Secondary moderation analyses were conducted in which simple knowledge beliefs and empathic concern were included as potential moderators on each pathway. Due to this, the original model altered slightly and the positive, direct pathway from autonomy satisfaction to pro-violence and illegal acts attitudes disappeared. In Appendix A, Table A2 contains an overview of the tested effects of the moderated mediation analysis, revealing several significant moderation effects.

For simple knowledge beliefs, the path between aggression and pro-violence and illegal acts attitudes was strengthened for high levels of simple knowledge (+1 *SD*; β=0.67; CI [0.62, 0.87]; *p*<.001), compared to low levels (−1 *SD*; β=0.26; CI [0.22, 0.44]; *p*<.001). Moreover, simple knowledge beliefs moderated the relationship between satisfied autonomy and all three extremism outcomes. That is, for high levels of simple knowledge, there was a strong relationship between autonomy satisfaction and extremist beliefs (β=0.45; CI [0.29, 0.63]; *p*<.001), pro-violence and illegal acts attitudes (+1 SD; β=0.21; CI [0.06, 0.39]; *p*=.01), and radicalism intentions (β=0.35; CI [0.22, 0.56]; *p*<.001), while these relationships disappeared for low levels of simple knowledge (−1 *SD*; extremist beliefs: β = −0.03; CI [-0.14, 0.17]; *p*=.86; pro-violence and illegal acts attitudes: β = −0.07; CI [-0.19, 0.09]; *p*=.40; radicalism intentions: β=0.09; CI [-0.07, 0.27]; *p*=.32).

Next, empathic concern also showed several moderating effects. In particular, empathic concern weakened the relationship between aggression and all three extremism measures. That is, the pathway between aggression and extremist beliefs was stronger for low levels of empathic concern (−1

SD; β=0.50; CI [0.42, 0.65]; *p*<.001), compared to high levels (+1 *SD*; β=0.19; CI [0.09, 0.32]; *p*<.001). Likewise, the pathway between aggression and pro-violence and illegal acts attitudes was stronger for low levels of empathic concern (−1 *SD*; β=0.60; CI [0.56, 0.83]; *p*<.001), compared to high levels (+1 *SD*; β=0.33; CI [0.27, 0.52]; *p*<.001). Finally, the pathway between aggression and radicalism intention was also stronger for low levels of empathic concern (−1 *SD*; β=0.56; CI [0.59, 0.88]; *p*<.001), compared to high levels (+1 *SD*; β=0.36; CI [0.33, 0.62]; *p*<.001).

Subsequently, we ran both models while also controlling for age and gender, and these demographic variables did not influence the observed effects. The obtained effects can be consulted in Table A5 and Table A6 of the Appendix.

Finally, for each extremism outcome, we tested whether the total effect of relatedness frustration was greater in magnitude than that of relatedness satisfaction. To assess this, we conducted chi-square tests, which confirmed that the effects of relatedness frustration were greater in absolute magnitude than those of relatedness satisfaction (extremist beliefs: 0.43 vs. −0.26, X^2_1=80.35, *p*<.001; pro-violence and illegal acts attitudes: 0.37 vs. −0.24, X^2_1=44.74, *p*<.001; radicalism intentions: 0.30 vs. −0.16, X^2_1=19.60, *p*<.001).

Discussion

The present study aimed to illuminate the intrapsychological processes behind the development of violent extremist attitudes. Building on the Significance Quest Theory (Kruglanski et al., 2019; 2022b) and the Self-Determination Theory (Ryan & Deci, 2017; Ryan, 2023), we developed and tested a model that advances an effect of need frustration

on various conceptualizations of violent extremism, with aggressive tendencies as a potential mediator in these effects. Furthermore, two extensions to the core mediation model were tested. First, we considered that the strength of the effects in the mediation model may be boosted by simple knowledge beliefs, and weakened by empathic concern. Secondly, we considered whether basic need satisfaction could serve as a protective factor, mirroring the effects of need frustration.

The relationship between basic psychological needs and violent extremism

The most focal finding of the current study is the prominent, unique role of relatedness in explaining susceptibility to violent extremism. In particular, in the frustration model, relatedness frustration was the strongest unique predictor for each of the violent extremism outcomes, whereas, in the satisfaction model, the perception of having warm and close connections emerged as a safeguard against the development of violent extremist attitudes. Yet, when comparing the total effects of frustration and satisfaction, it became apparent that the adverse effects of relatedness frustration were greater than the protective effects of relatedness satisfaction. As suggested by earlier research (Briki, 2022; Chen et al., 2015), these findings support the notion of differentiation between need satisfaction and need frustration.

The observation that violent extremism may be especially appealing to individuals with relatedness frustration, attests to the idea that individuals often turn to extremism for social reasons (for an overview, see Abrahms, 2008), because extremist groups are close-knit and promise feelings of belonging. Indeed, the importance of social belonging in extremism has also been demonstrated through experimental studies. For instance, Renström and colleagues (2020) demonstrated that socially excluded individuals were more willing to be part of a radical group that promises inclusion. Likewise, Pfundmair and Mahr (2022) observed that social exclusion increased the willingness to join a terroristic organization and to commit property and personal damage on behalf of it.

Although less strong compared to the unique effects of relatedness, autonomy frustration also showed an expected positive pathway to extremist beliefs and violence endorsement. This is in line with our argument that extremist groups can function as an external substitute for a sense of control.

Remarkably, when considering its unique impact, autonomy satisfaction also showed a positive pathway to extremist beliefs and violence endorsement. This effect may appear counterintuitive but becomes clearer when considering the additional moderation analyses that showed that autonomy satisfaction was only related to violent extremist attitudes

for individuals with high levels of simple knowledge beliefs. In this regard, Briki (2022) already showed that autonomy satisfaction is predictive of dogmatism and fact resistance, and therefore argued that higher levels of autonomy satisfaction may instill a sense of cognitive comfort that discourages critical thinking. Following this reasoning, individuals with satisfied autonomy may be less critical of extreme notions, which, if combined with an existing predisposition to simple knowledge beliefs, may increase susceptibility to adopting violent extremist beliefs.

Finally, although mere zero-order correlations showed positive relationships between competence frustration and the extremism measures (see Table 1), in the model that tested the unique effects, these relationships were negative. This remarkable effect when controlling for frustration of the other needs, may be understood in terms of disengagement. Previous work by Earl and colleagues (2017) demonstrated that competence frustration led to classroom disengagement in students due to reduced feelings of vitality. A similar process of disengagement may be present regarding extremism in the sense that specifically the feeling of incompetence may dishearten the individual to invest energy in any sort of outcome.

In summary, although each of the basic needs in some way and to some extent affects susceptibility to violent extremism, our models demonstrate that the relatedness need is the most critical unique predictor of violent extremist attitudes, which is in line with the recent studies of Briki (2022) and Rappel and Vachon (2023). While extremist groups may also offer possibilities of feeling competent and restoring a sense of control, it seems that these dynamics are less prominent. While we do not wish to reduce feelings of significance to feelings of relatedness, the present research clearly corroborates its relative importance in relation to violent extremism.

The role of aggression

In line with the expectations, autonomy, relatedness, and competence frustration all showed positive (zero-order) correlations with aggression. However, when considering the unique effects within the model, a unique effect on aggression emerged only for relatedness frustration. Kruglanski and colleagues (2023) argue that one's aggressive reaction depends on the extent to which one's feelings of significance are thwarted. Hence, the present findings indicate that frustrated relatedness may be experienced as more significance-reducing than thwarted autonomy and competence. Alternatively or additionally, relatedness frustration and aggression may be more strongly connected because they are both interpersonal constructs, whereas autonomy and competence have a more intra-personal focus.

Aggression, in turn, was strongly connected to the various measures of violent extremism, including not only those focusing on violence endorsement and behavioral intentions, but also extremist beliefs. As a result, indirect pathways were present from relatedness frustration through aggression on all the extremism outcomes.

Remarkably, in the models testing the effects of all three basic needs simultaneously, no significant indirect pathways through aggression emerged for autonomy or competence frustration. Hence, the theoretical model wherein the frustration of *any* basic needs would, to a similar extent, instill enhanced levels of aggression, resulting in higher susceptibility to violent extremism, may need some qualification moving towards a perspective with need-specific rather than generic effects.

Simple knowledge beliefs and empathic concern as moderators

The inclusion of simple knowledge beliefs and empathic concern in our secondary analyses indicated that these constructs can help to further understand the relationship between aggression and violence endorsement. As expected, simple knowledge beliefs and empathic concern affected the relationship between aggression and violent extremism in opposite ways. In particular, simple knowledge beliefs increased the likelihood that aggression translates into violent extremism with its typically simple narrative of violence as an acceptable means to an end. Conversely, high levels of empathic concern weakened the connection between aggression and violent extremism, and as such can serve as a protective factor.

Noteworthy, as we discussed earlier, the role of simple knowledge beliefs may go beyond only moderating the aggression-extremism links and also affect direct effects of basic needs. Specifically, high levels of simple knowledge beliefs were shown to be a "risk factor" for people with satisfied autonomy as this combination may hamper critical evaluation of extreme views.

Relatedness and deradicalization

The current study demonstrates the importance of relatedness concerning violent extremist attitudes, which supports interventions that focus on redirecting extremist or at-risk individuals towards alternate means of experiencing belonging. Breaking ties with the extremist network and rebuilding an alternative network is perhaps the first necessary step in the deradicalization process (Kruglanski et al., 2019).

Various deradicalization programs are built around this notion of rebuilding social ties. For instance, the Saudi program– a deradicalization program in Saudi Arabia– strongly involves the extremist's family throughout the rehabilitation process. During imprisonment, the family is nearby so the individual can (re)build close connections with their family members. After releasement, the family is given responsibility over the former extremist (Boucek, 2008). Similar involvement of family members was present in the American program in Iraq (Angell & Gunaratna, 2011), the Singaporean program (Gunaratna & Hassan, 2011), and the Sri Lankan program (Hettiarachchi, 2013). All these rehabilitation programs have a low recidivism rate, and although this will not solely be due to their emphasis on family reconnection, it is likely an important contributing factor to it.

These programs highlight the importance of the individual's network, which is the third pillar of the Significance Quest Theory. The network proves a pivotal element influencing both radicalization and deradicalization processes. This aligns with our finding that relatedness frustration is a risk factor for violent extremist attitudes, while relatedness satisfaction serves as a safeguard. Taken together, it can be concluded that social relations play a crucial role in the context of violent extremism.

Strengths, limitations, and directions for future research

Our study meaningfully contributes to the extremism literature by considering both the frustration and satisfaction of the basic psychological needs as outlined in Self-Determination Theory. By differentiating between these states, we demonstrated how relatedness can function as both a risk factor and a protective factor. Moreover, a key strength of this study lies in its focus on understanding the process by which individuals become susceptible to violent extremism, as well as the role of personal characteristics herein. This perspective highlights extremism as a dynamic process—one that can emerge but also diminish under certain conditions.

While the current research was strongly rooted in previous theoretical and empirical work, its main limitation is the cross-sectional design, which prevents making strong causal interferences regarding the proposed pathways. Hence, although the current data and the mediation analyses allowed us to investigate certain relationships, further research is necessary to establish causality. Of value would be longitudinal research that examines how fluctuations in need fulfillment go together with fluctuations in aggression and violent extremist attitudes. Alternatively, experimental designs may be considered to manipulate need frustration to estimate its effects on aggression and violent extremism. Furthermore, a limitation of the study is the self-reported data: considering the socially sensitive nature of the measured constructs, the presence of a social desirability bias

cannot be ruled out. Lastly, the sample was sufficiently sized for the study to be well-powered, yet it was not fully representative of the US population.

Conclusion

The current study provided further insights into the intra-psychological process that renders individuals susceptible to violent extremism. Specifically, the importance of relatedness frustration is highlighted: both relatedness frustration, as a risk factor, and relatedness satisfaction, as a protective factor, play a central and unique role in attraction to violent extremism. Moreover, these connections were partly explained by the intermediary effects on aggression, with simple knowledge beliefs and empathic concern respectively strengthening and weakening this mediation. The unique effects of the needs for autonomy and competence on violent extremism were limited and aggression played no substantial role herein. In sum, these findings further advance our understanding of how belongingness-based feelings of (in)significance affect susceptibility to violent extremism in the general population, and may provide a focus for intervention programs.

Declarations

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