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Review article

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The psychology of zero-sum beliefs

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Abstract

People often hold zero-sum beliefs (subjective beliefs that, independent of the actual distribution of resources, one party's gains are inevitably accrued at other parties' expense) about interpersonal, intergroup and international relations. In this Review, we synthesize social, cognitive, evolutionary and organizational psychology research on zero-sum beliefs. In doing so, we examine when, why and how such beliefs emerge and what their consequences are for individuals, groups and society. Although zero-sum beliefs have been mostly conceptualized as an individual difference and a generalized mindset, their emergence and expression are sensitive to cognitive, motivational and contextual forces. Specifically, we identify three broad psychological channels that elicit zero-sum beliefs: intrapersonal and situational forces that elicit threat, generate real or imagined resource scarcity, and inhibit deliberation. This systematic study of zero-sum beliefs advances our understanding of how these beliefs arise, how they influence people's behaviour and, we hope, how they can be mitigated.

Sections

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Introduction

On 14 May 2022, only two days after publishing an online manifesto riddled with racist, antisemitic and xenophobic content, an 18-year-old white man entered a supermarket in Buffalo, NY, USA, armed with a legally purchased semi-automatic rifle and began a shooting spree that left ten Black Americans dead and three injured. In his hate-filled manifesto, the assailant promoted the white nationalist 'Great Replacement Theory', a conspiracy theory claiming that the immigration and advance of individuals from racial and/or ethnic minority groups throughout the Western world is displacing and oppressing people of European descent. Similar beliefs motivated the 2018 mass-shooting of a Jewish congregation in Pittsburgh, PA, USA, the 2019 mass-shooting of a Muslim congregation in Christchurch, New Zealand, and the 2019 mass-shooting of Hispanic and Latino Americans in El Paso, TX, USA.

Motivated by rancour and animosity, the conspiratorial belief that white people are being replaced by non-white minorities borrows its hateful ideas from game theory — the study of behaviour and decision-making in competitive environments[1]. According to game theory, people's behaviours in complex social interactions depend on whether these interactions are zero-sum (all parties' gains and losses sum to zero) or non-zero-sum (joint outcomes can be positive or negative). Whereas zero-sum situations involve incompatible interests for different parties and typically result in equilibria of mutual aggression, non-zero-sum situations involve opportunities for cooperation and collaboration.

Of course, many situations in life combine both zero-sum and non-zero-sum elements[2]. Yet, although the objective structure of social situations determines how people ought to behave in them, people's beliefs about these situations determine how they actually behave[3]. Unfortunately, people's beliefs do not always conform to reality[4], and examining whether people view a situation as zero-sum is as important as examining the actual, objective structure of the situation itself. Although zero-sum beliefs such as those reflected in the Great Replacement Theory are common among white supremacists, people of all walks of life hold various zero-sum beliefs about interpersonal and intergroup relations. It is therefore imperative to understand the causes and consequences of these beliefs.

In this Review, we highlight the importance of zero-sum beliefs: the subjective belief that, independent of the actual distribution of resources, one party's gains are inevitably accrued at other parties' expense. First, we review how zero-sum beliefs have been operationalized and studied in the psychological sciences and adjacent fields such as economics, management and political science. Next, we review the factors that elicit zero-sum beliefs and how such beliefs influence individuals, groups and society. Finally, we discuss directions for future research on zero-sum beliefs and highlight important open research questions.

Operationalizing zero-sum beliefs

Zero-sum beliefs have been operationalized in two very different ways. On the one hand, zero-sum beliefs have been conceptualized as a general mindset about the rules that govern outcomes in social relations and economic exchanges (general zero-sum beliefs). Indeed, anthropological research on how people reason about their social, economic and natural environments suggests that members of pre-industrial societies have a general cognitive orientation towards viewing desired resources as scarce and the distribution of resources as zero-sum (the image of the limited good)[5]. Similarly, scholars of negotiation and conflict resolution have suggested that people have a broad and socially acquired bias that fosters a view of social exchanges as zero-sum, believing that their interests are opposed to others' interests even when that is not the case (the fixed-pie bias[6,7]). In the past two decades, researchers in psychology, economics and political science have argued that zero-sum beliefs are culturally transmitted social axioms about the general antagonistic nature of interpersonal relationships[8], abstract 'generalized expectancies' about social behaviour[9], evolved folk-economic beliefs about how complex social systems operate[10], and generalized cognitive lay theories about how the world works and economies function[4,11–14]. Together, these approaches share a common view of zero-sum beliefs as a generalized way of thinking about resource distribution, such that one party can gain only when other parties lose. Accordingly, these approaches suggest that people hold general zero-sum beliefs about the world that transcend specific circumstances or situations.

On the other hand, zero-sum beliefs have been conceptualized as domain-specific judgements of how certain parties influence their counterparts' outcomes within a given context (domain-specific zero-sum beliefs). This domain-specific approach has led to a proliferation of research on zero-sum beliefs in narrowly circumscribed and well-defined contexts such as immigration[15,16], international trade[17], race relations[18], gender relations[19–22], ethnic identity[23], LGBTQ rights[24], college grades[4], corporate profits[25], labour relations[26], economic transactions[27], consumer products[28], public policies[29], political partisanship[17,26], geopolitical conflicts[30], social status[31], logical reasoning[32], empathy[33] and romantic relationships[34,35]. This domain-specific approach reveals how the emergence of zero-sum beliefs depends on the specific context studied[26], suggesting that holding zero-sum beliefs about a given context (for example, taxes), does not necessarily reflect a general zero-sum view of the world (for example, about the economy as a whole[12]). Thus, instead of treating zero-sum beliefs as a general view of the world, the domain-specific approach highlights how such beliefs unfold in different contexts and situations (Table 1).

Notably, by focusing on either general zero-sum beliefs about the world or domain-specific beliefs within given contexts, research has overlooked the fact that people can hold both types of belief and that general beliefs might both shape and be shaped by domain-specific beliefs (Fig. 1). First, general zero-sum beliefs might simply reflect an aggregation of domain-specific beliefs across different contexts. For instance, people who hold domain-specific zero-sum beliefs about immigration might be more susceptible to zero-sum beliefs in other domains (such as race relations) and therefore view life in general as zero-sum. Indeed, a working paper that has not yet been peer-reviewed reports robust correlations between different domain-specific zero-sum beliefs (for example, about trade, immigration and race)[36]. Consequently, this web of correlations between various domain-specific beliefs within each context might form the basis from which general zero-sum beliefs about human nature emerge.

Second, people who hold general zero-sum beliefs might be more susceptible to domain-specific beliefs within any given context, such that their general mental state (a zero-sum mindset) 'activates' specific beliefs within a given situation[11]. Because general zero-sum beliefs can shape what people notice, attend to and seek out[10], they probably make the zero-sum aspects of any given interaction more salient and thereby increase people's susceptibility to domain-specific zero-sum beliefs. Finally, general and domain-specific zero-sum beliefs might have a bidirectional relationship, whereby domain-specific beliefs result from, but also help to shape, general zero-sum beliefs.

Table 1 | Domain-specific zero-sum beliefs

Domain	Example zero-sum belief	Sample survey item or experimental design	Key finding(s)	Refs.
Immigration	Immigrants benefit at the expense of a country's citizens	"If some immigrants get richer, it means that other US-born citizens are getting poorer"	Stronger zero-sum beliefs about immigration are associated with greater conservatism and lower support for pro-immigration policies	15,26
International relations	A country's economic or geopolitical gains come at another country's expense	"A stronger Chinese economy means a weaker US economy"	Zero-sum beliefs about international relations are asymmetric: people believe that other countries gain at their own country's expense but not vice versa	17
Race relations	Black Americans gain at white Americans' expense	"More good jobs for Black people means fewer good jobs for white people"	Members of high-status racial groups endorse zero-sum beliefs about race relations when their status is threatened White Americans believe that decreasing anti-Black bias is offset by increasing anti-white bias	38,105
Gender relations	Women gain at men's expense	"As women gain social status, men lose social status"	Men endorse zero-sum beliefs about gender when they feel the gender hierarchy is under threat	19,20, 112,113
Ethnic identity	Identifying with one's country of origin comes at the expense of membership in one's adopted country	"Consider a person who immigrated to Germany five years ago from Iraq: the more 'Iraqi' he is, the less 'German' he will be"	Stronger identification with one's country of origin is perceived to constrain identification with one's adopted country	23
LGBTQ rights	Lower anti-LGBTQ bias comes at the expense of higher anti-Christian bias	"As LGBT individuals face less discrimination, Christian individuals end up facing more discrimination"	Christian people endorse zero-sum beliefs about LGBTQ rights when they feel that Christian influence is under threat	24
College grades	Higher grades for some students come at other students' expense	Participants see a distribution of grades and predict what the next grade will be	Students expect grades to be lower after seeing that many high grades have already been given	4
Corporate profits	Corporate profits come at the expense of social good	Participants estimate a business's profits and its value to society	People tend to believe that businesses with higher profits are more harmful to society	25
Labour relations	Employees benefit at a company's expense, and companies profit at employees' expense	"The push to increase business profits will inevitably hurt wages"	Stronger zero-sum beliefs about labour relations that maintain the status quo are negatively associated with conservatism	26
Economic transactions	Sellers gain at buyers' expense	Participants indicate whether transactions make buyers and sellers better off, worse off or the same as before	People tend to believe that buyers are less likely to benefit from transactions than sellers	27
Consumer products	Investment in eco-friendly products comes at the expense of product quality	"In order to make the product better for the environment, the company took resources away from making this product better quality"	Consumers believe that companies make products more eco-friendly by diverting resources away from other product features (for example, quality)	28
Public policies	Policies that benefit members of one group harm members of other groups	"The more resources the government spends on 'Blue' states, the less it can spend on 'Red' states"	Majority group members perceive policies that benefit minority group members as harmful to their ingroup	17,29
Geopolitical conflicts	Compromises benefit other countries at the expense of one's own country	"Anything that happens that's good for Palestinians must be bad for Israelis"	Stronger zero-sum perceptions of conflict are associated with negative attitudes towards geopolitical compromise	30
Social status	A person's gain in status comes at other people's expense	"When status for one person is increasing it means that status for another person is decreasing"	Viewing status as zero-sum increases people's willingness to use dominance tactics to rise in social rank	31
Logical reasoning	Support for one causal hypothesis comes at the expense of competing hypotheses	Participants indicate whether a probabilistic test result supports two, non-mutually exclusive hypotheses	People assume that evidence that supports one causal hypothesis necessarily disconfirms a competing hypothesis	32
Empathy and romantic love	Feeling empathy and/or love towards one person limits one's feelings towards other people	"In a romantic relationship, you can only fully love one person at a time"	Stronger zero-sum beliefs about love are associated with negative evaluations of people in non-monogamous relationships Stronger zero-sum beliefs about empathy are associated with lower empathy towards outgroup members	33, 34

Studying the relationship between general and domain-specific zero-sum beliefs could advance our understanding of their consequences. For instance, although general zero-sum beliefs predict hostility towards political opponents, a working paper that has not yet been peer-reviewed suggests that this effect is mediated by whether people specifically view the relationship between two given political

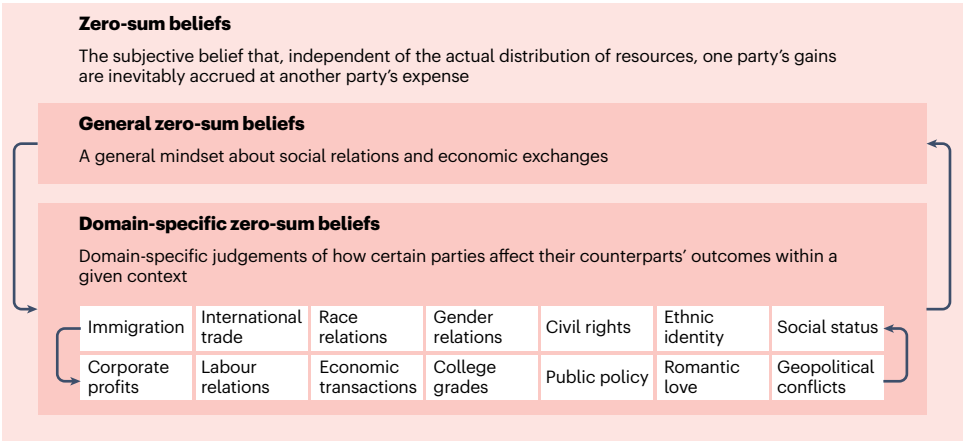

Fig. 1 | Operationalizations of zero-sum beliefs. An illustration of the interplay between two distinct operationalizations of zero-sum beliefs: a generalized mindset about the rules that govern outcomes in social relations (general zero-sum beliefs) and domain-specific judgements about relationships within specific contexts (domain-specific zero-sum beliefs). The arrows denote the potential bidirectional relationship between the two types of belief as well as the potential links among different domain-specific zero-sum beliefs.

parties as zero-sum[11]. Similarly, whereas both domain-specific and general zero-sum beliefs about race predict attitudes about discrimination, the former is a stronger predictor than the latter[37]. Furthermore, because domain-specific beliefs are typically more malleable than general beliefs, it is not surprising that perceived anti-male discrimination increases men's domain-specific zero-sum beliefs about gender (that is, that women gain at men's expense) but not their general zero-sum beliefs about society[38]. Thus, rather than studying zero-sum beliefs as either a general mindset or as domain-specific judgements, considering both operationalizations might be critical for future research.

The causes of zero-sum beliefs

Drawing on ideas of evolutionary psychology, some have argued that zero-sum beliefs were beneficial to our pre-agrarian nomadic ancestors who, rather than accumulate capital, were forced to compete over limited resources[4,10,13,39]. Accordingly, zero-sum beliefs might have been advantageous in times of actual scarcity (for example, by increasing vigilance to resource distribution and motivating aggression against intruders) but are no longer beneficial when value creation is possible. Such evolutionary accounts could potentially be useful for generating research hypotheses about when and why zero-sum beliefs are most likely to emerge. For example, given their relation to how people think about their and others' outcomes, the evolutionary adaptive function of zero-sum beliefs might have been especially prominent during the process of deciding how to distribute resources within our ancestral groups. If so, then a hypothesis directly derived from this function is that zero-sum beliefs might be more prominent even in present times when research participants are tasked with working together to allocate resources among group members compared to when they are tasked with working together to accumulate resources for the group. At the same time, such evolutionary accounts cannot fully explain interpersonal and situational variance in zero-sum beliefs. That is, evolutionary adaptations account for the existence of zero-sum beliefs in general but do not explain why people are as likely to exhibit zero-sum beliefs as they are unlikely to exhibit them in certain domains (such as immigration)[40,41], or why the prevalence of certain zero-sum beliefs (for example, about trade) oscillates over time[42]. Moreover, given the basic principle of evolutionary psychology — that human behaviour evolved to solve specific problems faced by our ancestors during our evolutionary history — one might expect the beliefs that ended up evolving through this process to be especially pronounced in situations that closely resemble the environments in which they evolved[43]. However, the evidence suggests otherwise: although economic barters better reflect human ancestral environments than currency-mediated exchanges, people are less prone to view such barters as benefiting one party at the expense of another (that is, 'win–lose')[27]. Thus, other proximal forces beyond evolution clearly play a part in the emergence of zero-sum beliefs.

In this section, we analyse the literature on these proximal forces and suggest that zero-sum beliefs result from non-mutually exclusive intrapersonal and situational forces that elicit threat, generate real or imagined resource scarcity, and inhibit deliberation (Table 2). This organizing framework resonates with evolutionary accounts. The cognitive defaults that people rely on when they are unable to sufficiently deliberate have evolved in the threatening and resource-scarce environments of our evolutionary past. In such environments, zero-sum beliefs might have been fitness-enhancing. For example, consider our pre-agrarian nomadic ancestors who worried about the possibility that others were gaining at their expense. Because such zero-sum beliefs naturally orient people to their relative outcomes, those who exhibited such beliefs might have been more prone to fiercely monitor whether others' gains led to their own losses. Consequently, such attention to relative outcomes would have helped to prevent an individual from receiving less than their peers and therefore increased their odds of securing a large share of the group's prey and surviving in that resource-scarce environment. As such, the tendency to subjectively view resource distribution as zero-sum might have been the dominant strategy in our evolutionary past, giving individuals with higher zero-sum beliefs a relative advantage over others. Thus, even in modern environments, a default of zero-sum beliefs is adopted under similar conditions of threat and resource-scarcity and can be overridden only with deliberation.

Threat

People often exhibit zero-sum beliefs when they feel threatened, such as when they think that their (or their group's) resources are at risk. For instance, people are more prone to domain-specific zero-sum beliefs in negotiations when they expect a competitive counterpart than when they expect a warm and cooperative counterpart[44]. Similarly, working under assertive leaders (versus approachable and likeable leaders) causally increases domain-specific zero-sum beliefs about success[45].

More generally, zero-sum beliefs are activated in response to perceived dangers in one's environment, making people more prone to believe threatening zero-sum propositions (for example, that the powerful gain at the expense of the weak) than parallel, yet non-threatening, zero-sum propositions (for example, that the weak gain at the expense of the powerful)[46].

Importantly, the effect of threat on zero-sum beliefs need not reflect objective reality, but rather people's subjective perceptions of their environment. For example, because high-status groups often feel that their status is under threat[47,48], they tend to believe that low-status groups gain at their expense[28]. In fact, perceived threat among high-status group members causally increases zero-sum beliefs[19,38]. Regardless of whether or not the experience of threat is grounded in reality, merely feeling threatened by one's political opponents[17] or by immigrants to one's country[26,49] fosters the belief that others gain at one's expense. Similarly, the perceived threat of impending demographic shifts causally increases white Americans' belief that declining discrimination against racial minorities has been offset by increasing anti-white discrimination[50] and that racial minorities gain at the expense of white Americans[51,52].

In addition to these situational causes, various intrapersonal causes can foster zero-sum beliefs via threat. General zero-sum beliefs are more prevalent among people who see social interactions as a competition[53] and among people who possess personality traits associated with high threat susceptibility, such as low agreeableness[8] and high psychopathy, narcissism and Machiavellianism[54]. Furthermore, although zero-sum beliefs have been associated with conservative ideologies[38], newer evidence suggests that even individuals who endorse liberal ideologies exhibit domain-specific zero-sum beliefs when they feel that their values are threatened. Whereas individuals who self-identify as politically conservative exhibit zero-sum beliefs when they feel that the status quo is under threat, individuals who identify as politically liberal exhibit zero-sum beliefs when their ability to change the status quo is threatened[26]. Similarly, people high in social dominance orientation (who feel threatened by changes to the social hierarchy[55]) often view other groups' gains as zero-sum[15,56]. Thus, several individual differences related to threat susceptibility contribute to the belief that life is zero-sum.

Finally, because people are more likely to feel threatened when their own interests are at risk, they tend to be especially prone to domain-specific zero-sum beliefs when they have a personal stake in a matter[57] or when the stakes are especially high[17]. For instance, Americans often believe that China gains at the expense of the USA. However, they are less prone to believe that China gains at the expense of other countries in which they have no personal stake. Furthermore, reducing threat by affirming USA advantage over China causally reduces Americans' tendency to view the two countries' relations as zero-sum[17].

Resource scarcity

Zero-sum beliefs typically arise whenever resources are scarce, and social and economic forces that foster a sense of resource scarcity can result in general zero-sum beliefs about the world. For example, people exhibit general zero-sum beliefs under unfavourable economic conditions that signal resource scarcity (for example, low GDP or high inflation)[8], and giving people dire economic projections about the future causally increases their zero-sum beliefs[58]. Similarly, although unequal resource distributions are not inherently zero-sum (and despite the fact that subjective perceptions of inequality often diverge from reality[59]), a working paper that is currently under peer-review suggests that high inequality causally increases domain-specific zero-sum beliefs about economic success (S.D., unpublished work). More generally, any situational factor that highlights people's financial insecurity[60] or prompts them to focus on their potential losses[31] might strengthen zero-sum beliefs. By contrast, another working paper that has not yet been peer-reviewed suggests that experiences of economic growth (for example, coming from an upwardly mobile family) might curb the emergence of zero-sum beliefs[36].

In fact, merely viewing resources as scarce (even when they are not) might foster zero-sum beliefs[4]. For example, misperceiving jobs as scarce based on the belief that there is a fixed amount of work to be done and that therefore jobs can only be redistributed, not generated (the 'lump of labour' fallacy[61]) fosters the belief that immigrants gain jobs at citizens' expense[15,62]. One potent driver of such subjective scarcity is upward social comparison — the tendency to compare oneself to others who are better off. Because people look to others to evaluate their traits and abilities[63], compare themselves to individuals who are better off than they are[64–68], and disproportionately attend to better-performing others[69], they often experience relative deprivation (feeling unfairly disadvantaged relative to others)[70]. Consequently, relative deprivation fosters the belief that better-off others gain at one's expense. Indeed, prompting people to compare themselves to financially successful others causally increases zero-sum beliefs about success[71], which help people to justify their desire to reclaim resources from others[72]. Regardless of whether resources are in fact limited, subjectively perceiving them as such can foster both general and domain-specific zero-sum beliefs.

Lack of deliberation

Insufficient deliberation about the dynamic and long-term effects of social relations and economic exchanges can foster zero-sum beliefs. Although people readily note the immediate and direct zero-sum impact of simple economic transactions (for example, more money for sellers means that buyers retain less money), they often overlook their potential long-term chain of indirect, dynamic and spatially dispersed non-zero-sum effects (for example, satisfied buyers gain utility from economic transactions and generate more business by spending more money, becoming return customers, and/or recommending the

Table 2 | Causes of zero-sum beliefs

	Zero-sum beliefs are more likely to emerge when...	Zero-sum beliefs are less likely to emerge when...
Intrapersonal causes	...people engage in unfavourable upward comparisons ...people are personally invested ...people are high in social dominance orientation, psychopathy, narcissism or Machiavellianism ...people focus on their losses (versus their gains) ...people feel threatened by demographic changes in society	...people have domain-specific knowledge ...people consider long-term effects ...people are high in agreeableness or individualism ...people have a family history of upward economic mobility
Situational causes	...the stakes are high ...perceived inequality is high ...inflation is high ...dominant leaders are in power ...people are financially vulnerable	...gross domestic product (GDP) is high ...economic growth is high ...multiple parties are involved ...accountability is high

business to their friends). Furthermore, although it is relatively easy to represent zero-sum beliefs using concrete metaphors of imbalance (for example, a seesaw or a pan balance scale), non-zero-sum dynamics are more cognitively burdensome to visualize[73]. Thus, given the intuitive appeal of zero-sum beliefs, overriding them requires deliberation[74] and sufficient consideration of others' perspectives[75].

Several studies highlight the effect of deliberation on zero-sum beliefs. Although people often see corporate gains as zero-sum (for example, believing that companies profit at society's expense), they are less prone to do so when prompted to consider the complex interplay between companies' behaviours and consumer choices across repeated interactions (for example, profits help companies to develop, produce and distribute cheaper, safer and/or better products for their customers)[25]. Similarly, a working paper that has not yet been peer-reviewed suggests that zero-sum beliefs about international trade can be attenuated by prompting people to consider its long-term and indirect effects (for example, currency surpluses make their way back to importing countries through investments and opposing trades)[76]. In fact, even zero-sum beliefs about simple economic transactions can be reduced by prompting people to consider other people's different priorities and preferences[27].

Of course, people vary in their ability and willingness to engage in cognitive deliberation, which influences their susceptibility to zero-sum beliefs. For instance, process-oriented individuals (who focus more on the details compared to the outcomes of their goal pursuit) are much less prone to see negotiations as zero-sum[77]. Moreover, whether people exhibit domain-specific zero-sum beliefs depends on their relevant knowledge and experience. Compared to people without formal training in economics, people with formal economics training are substantially less prone to see economic issues as zero-sum, viewing immigration as harmless to the supply of domestic jobs and trade as beneficial to the economy[78]. Similarly, although most people without a college degree believe that international trade is zero-sum, this belief is less common among college graduates[79]. Thus, just as people who engage in cognitive reflection are less prone to basic economic biases[80], deliberating on the often-invisible consequences of social interactions and economic exchanges can reduce people's susceptibility to zero-sum beliefs.

Evidence from research in negotiations suggests that various situational factors can also contribute to people's deliberation and, as a result, their zero-sum beliefs. For instance, people are less prone to zero-sum beliefs about negotiations when they feel accountable (that is, when asked to explain their beliefs)[81], suggesting that the need to justify one's thought process might reduce such beliefs. Similarly, people are less prone to zero-sum beliefs in multiparty versus two-party negotiations because multiparty negotiations typically require more cognitive processing (for example, about each party's unique interests)[82].

Finally, zero-sum beliefs might be more prevalent than non-zero-sum beliefs in everyday discourse because they require less deliberation and cognitive effort than complex, non-zero-sum ideas[83]. For instance, because zero-sum beliefs about trade ("imports hurt the economy") require less elaboration than non-zero-sum beliefs about trade ("imports reduce prices, giving consumers more discretionary income to invest in their own country's economy through spending and/or savings"), one could hypothesize that people are likely to encounter the former more than the latter in conversation, the media and political communication. Similarly, the intuitive appeal of zero-sum beliefs about immigration ("immigrants take Americans' jobs") might increase their social transmission relative to complex ideas about the dynamic and non-zero-sum aspects of immigration ("immigrants provide a cheaper labour force, cutting operational costs and therefore reducing consumer prices and/or increasing corporate research and development"). Thus, people's zero-sum beliefs are probably reinforced through their social circles, political messages, media narratives and other forms of social transmission.

Consequences of zero-sum beliefs

We next discuss the consequences of zero-sum beliefs for individuals, groups and society (Table 3), noting whether these are typically due to people's general or domain-specific beliefs. The difficulty of manipulating zero-sum beliefs has led many researchers to rely on correlational and cross-sectional research designs. However, work that has examined the causal impact of these beliefs[11,31,84] paints a consistent image of their potentially adverse effects.

Intrapersonal and interpersonal consequences

Zero-sum beliefs have important intrapersonal and interpersonal consequences. At the intrapersonal level, greater endorsement of general zero-sum beliefs is associated with more negative (and less positive) affect[85], more greed[86] and lower life satisfaction[85]. In addition, people with general zero-sum beliefs tend to be overly cynical, see society as unjust, distrust their fellow citizens and societal institutions, espouse more populist attitudes, and disengage from potentially beneficial interactions[84,87]. Similarly, greater endorsement of domain-specific zero-sum beliefs about happiness (that a person's happiness comes at others' expense) are negatively associated with life satisfaction[88]. Together, these findings suggest a clear association between both types of zero-sum belief and well-being. However, it is important to note that more evidence is needed to assess alternative causal pathways, including reverse causation and third-variable problems. For example, although zero-sum beliefs might foster distrust in one's fellow citizens, it is also possible that distrust fosters zero-sum beliefs, leading people to associate others' gains with their own losses. Finally, it may also be the case that resource scarcity simultaneously fosters both zero-sum beliefs and distrust in others, suggesting that the relationship between these two variables might be due to a latent third variable. Thus, future research must examine the causal impact of zero-sum beliefs more carefully.

Zero-sum beliefs can also be interpersonally detrimental, such as when negotiators who believe their that counterparts gain at their expense (domain-specific beliefs about negotiations) overlook opportunities for mutually beneficial deals[89]. More generally, domain-specific zero-sum beliefs about the workplace causally reduce willingness to help one's peers[45,58,84] and increase willingness to undermine others' achievements (for example, by speaking ill of a colleague[90]). Moreover, people who hold general zero-sum beliefs are more likely to worry that others might take advantage of them, are less proactive at work and tend to shirk their work responsibilities[9,91]. Finally, domain-specific zero-sum beliefs about status can affect people's relationships, causally increasing people's willingness to behave aggressively and act in dominant and coercive ways[31].

The harmful effects of zero-sum beliefs are also observed in close personal relationships. Viewing conflicts as zero-sum (that is, impossible to resolve in mutually beneficial ways) is associated with lower emotional responsiveness to romantic partners' needs and lower relationship quality[92]. Similarly, the domain-specific belief that gender

relations are zero-sum is negatively associated with men's participation in domestic tasks and their relationship satisfaction[22]. More broadly, people who endorse general zero-sum beliefs often feel lonelier[93]. Thus, zero-sum beliefs are associated with both the quality and the quantity of intimate personal relationships.

Of course, zero-sum beliefs are not uniformly negative and might also be associated with intrapersonal and interpersonal benefits. For instance, a study of university graduates during a period of high economic development found that viewing workplace success as zero-sum was associated with better adaptation to organizational change (such as learning new skills or coping with changes to one's tasks)[94]. Furthermore, domain-specific zero-sum beliefs about status causally inhibit autonomy-oriented helping (helping others succeed on their own) but not dependency-oriented helping (helping others by making them dependent on oneself)[84]. Similarly, domain-specific zero-sum beliefs causally increase people's willingness to use dominance in pursuit of status but not their willingness to pursue status in more socially acceptable ways[31]. Thus, despite their negative consequences, domain-specific zero-sum beliefs might be beneficial in certain contexts, such as those that reward more competitive behavioural tendencies.

Intergroup consequences

Zero-sum beliefs can be highly consequential in intergroup contexts, where they are sometimes used to justify extreme acts of violence (for example, the Great Replacement Theory and white supremacist victimhood narratives)[95–98]. Conspiracy beliefs that depict under-represented minority groups as gaining at the expense of white Americans[99] have steadily made their way from the fringes of society to its mainstream[95,100–103]. Consequently, seeing race relations as zero-sum[18,104,105] is associated with the denial of racism among many white Americans[37]. Moreover, white Americans who view race relations as zero-sum tend to categorize Black–white biracial people as Black[106] (thus limiting the size of one's ingroup and 'protecting' the resources available for group members) and to oppose collective action for racial justice[107]. Similarly, domain-specific zero-sum beliefs about race are negatively associated with white people's support for equity-enhancing policies[108], and this is especially true when they experience economic threat[109]. Ironically, misperceiving other groups as gaining at one's expense can blind people to their own advantages and thus lead them to misperceive mutually beneficial policies as being bad for their own group[29]. More generally, domain-specific zero-sum beliefs about immigrants and other groups in society are positively associated with prejudice and xenophobia[16,49,110,111] and support for anti-immigration policies (such as detaining undocumented immigrants without due process)[26].

Domain-specific zero-sum beliefs about gender and sexual orientation have similar consequences[20,112]. For instance, zero-sum beliefs about gender (for example, that less anti-female bias means more anti-male bias) are associated with lower support for gender-equity policies[19] and greater discrimination against female leaders and collaborators[113]. Likewise, viewing LGBTQ rights as coming at the expense of one's religious values is associated with greater support for anti-gay policies (for example, restricting same-sex couples' right to marriage) among Christian people[24]. Thus, both general and domain-specific zero-sum beliefs about intergroup relations foster a sense that groups are competing for limited resources such as status and wealth and are critical for understanding people's attitudes about social issues and support for equality-enhancing policies.

Table 3 | Consequences of zero-sum beliefs

	Outcomes associated with higher zero-sum beliefs	Outcomes associated with lower zero-sum beliefs
Intrapersonal and interpersonal consequences	Negative affect Lower engagement in social interactions Pessimistic worldviews Populism Dominance and aggression Greed Loneliness Adaptability to competitive environments	Positive affect and life satisfaction Relationship satisfaction Prosocial behaviour Interpersonal trust Trust in social institutions Less social undermining (for example, spreading rumours about co-workers or intentionally delaying work to slow co-workers down)
Intergroup consequences	Prejudice and discrimination Anti-immigrant sentiment Anti-egalitarianism Concern about demographic changes Collective angst	More support for immigration More support for gender equality More support for racial equality More support for LGBTQ rights
Societal consequences	Higher military expenditures	More civil liberties More commitment to democracy Increased support for hosting refugees Increased support for conflict resolution

Societal consequences

Research has focused mostly on zero-sum beliefs in interpersonal and intergroup contexts. However, these beliefs can have broader societal implications when they become sufficiently widespread, shaping who gets elected and what policies garner the most support[12,13]. For instance, domain-specific zero-sum beliefs about wealth are negatively associated with concern about inequality[26] and support for redistribution[36,114]. Moreover, countries with higher general zero-sum beliefs spend more of their budget on military expenditures[115], have fewer civil liberties[115] and are less devoted to democratic institutions[8], even after controlling for various macro-level factors. Finally, zero-sum beliefs might create barriers for conflict resolution, as stronger domain-specific beliefs about national conflicts are associated with lower support for compromise[30,116].

Importantly, the prevalence of zero-sum beliefs among key decision-makers might amplify their societal consequences, such as when policymakers and elected officials fail to implement pareto-optimal policies (policies that make at least some people better off without making other people worse off)[117,118]. For example, because stronger zero-sum beliefs about race are associated with lower support for equality-enhancing efforts among high-status groups[29] (who are disproportionately represented among key decision-makers), such beliefs among leaders and legislators might negatively affect their support for legislation that benefits under-represented minorities and their willingness to distribute resources to their communities. In addition, some have argued that zero-sum beliefs operate in the same manner at the country level and individual level[119], such that a country's average level of zero-sum beliefs negatively predicts the average level of trust between its citizens. Consequently, it might be important to consider the aggregate, country-level consequences of

zero-sum beliefs, such as when zero-sum beliefs at the national level predict a country's military expenditure[115]. Thus, understanding how individual-level zero-sum beliefs spread across society as well as how cultural factors at the national level shape the adoption of zero-sum beliefs might shed light on the effects of such beliefs on both individual and societal decision making.

Summary and future directions

From interpersonal negotiations to international trade, people, groups and nations engage in various 'games' in which each party's payoffs are influenced by their and all other parties' decisions. By understanding the nature of these games, each party can optimize its behaviour to increase its chances of success. Yet, the beliefs that people hold about the games they play do not always match reality, and these misperceptions can shape and distort decisions and behaviours. Building on a rapidly growing body of work across the psychological sciences, we have synthesized research on the nature, causes and consequences of zero-sum beliefs. The adverse consequences of zero-sum beliefs on factors such as interpersonal trust and intergroup conflict highlight the importance of exploring when and why people believe that others gain at their expense.

We have suggested that zero-sum beliefs are influenced by threat, a sense of resource scarcity and lack of deliberation. Although each of these three channels can separately lead to zero-sum beliefs, simultaneously activating more than one channel might be especially potent. For instance, focusing on losses (versus gains) is both threatening and heightens a sense of resource scarcity. Consequently, focusing on losses might be especially likely to foster zero-sum beliefs[17,31]. Similarly, insufficient deliberation on the long-term and dynamic effects of international trade might foster a view of domestic currency as scarce, prompting the belief that trade is zero-sum[17,76]. Thus, any factor that simultaneously affects the threat that people experience, their perceptions of resource scarcity, and their level of deliberation is more likely to result in zero-sum beliefs, and attenuating zero-sum beliefs requires an exploration of all the different factors that lead to these experiences in the first place. For instance, increasing deliberation reduces zero-sum beliefs about negotiations by increasing people's accountability, perspective-taking or consideration of mutually beneficial issues[81,118–120]. Future research could manipulate deliberation in other contexts to examine its causal effect on zero-sum beliefs. Indeed, because people express more moderate beliefs after deliberating policy details[121,122], prompting participants to deliberate about social issues (for example, asking them to explain the process by which one group's outcomes influence another group's outcomes) might reduce zero-sum beliefs. More generally, research could examine long-term and scalable solutions for reducing zero-sum beliefs, focusing on interventions that simultaneously reduce threat, mitigate views of resource scarcity and increase deliberation. For instance, as formal training in economics is associated with lower zero-sum beliefs[78,79], researchers could examine whether teaching people basic economic principles reduces zero-sum beliefs across various domains. Similarly, because higher socioeconomic status is negatively associated with zero-sum beliefs, creating a sense of abundance might counter the belief that life is zero-sum.

Beyond factors that lead to their emergence, future research could examine the psychological function of zero-sum beliefs (that is, why people hold such beliefs in the first place). For instance, although research has mostly examined prejudice as a consequence of zero-sum beliefs, people might also adopt zero-sum beliefs to justify their existing prejudiced attitudes and desired courses of action. To examine whether people strategically adopt zero-sum beliefs, researchers could study whether zero-sum beliefs are more likely to be exhibited after exposure to negative exemplars from a given domain (for example, whether people believe that 'the rich' gain at the expense of 'the poor' after exposure to self-indulgent millionaires versus charitable wealthy people[123]). Similarly, by examining how people judge others who express zero-sum beliefs, research could test whether these beliefs function as socially acceptable alternatives to explicit prejudice. For instance, research could investigate whether anti-immigration attitudes are judged more favourably when rooted in concern about job loss (zero-sum beliefs about immigration) rather than concern about personal safety (explicit prejudice against immigrants).

Research on zero-sum beliefs tends to focus on high-status groups[48] (who often feel threatened by demographic and power shifts in society). Future research could examine these beliefs among other, less privileged groups in society (for an early analysis of the prevalence of various domain-specific zero-sum beliefs across different racial and ethnic groups, see ref. 124). Moreover, socioeconomic status, gender, race and political ideology independently predict zero-sum beliefs[25,79] and future research should examine how the intersection of such factors influence people's belief. For example, because dual group membership probably reduces the perceived threat that people experience from each group's gains, researchers could specifically target religious people within the LGBTQ community to examine whether holding both identities reduces the belief that LGBTQ rights come at the expense of religious freedoms[24].

Finally, as noted above, more causal research on the impact of zero-sum beliefs is needed. Although it is difficult to manipulate zero-sum beliefs in ecologically valid ways, researchers could affect zero-sum beliefs indirectly via threat (for example, by manipulating people's direct involvement in a situation), perceived resource scarcity (for example, by manipulating whether participants focus on losses rather than gains), or deliberation (for example, by manipulating cognitive load). In addition, future research could use more direct manipulations of zero-sum beliefs (which can be especially helpful in ruling out the effect of potential third variables), emphasizing a given situation's zero-sum or non-zero-sum characteristics[31]. Similarly, future research could examine the long-term stability of zero-sum beliefs as well as the interplay between general and domain-specific zero-sum beliefs across time by testing how zero-sum beliefs at one time point influence beliefs and behaviours at a subsequent time point (for a discussion of causal inference in longitudinal studies, see ref. 125). Longitudinal studies might also help researchers to understand the development of zero-sum beliefs across the lifespan. For example, research could examine when people first exhibit zero-sum beliefs, how early life experiences influence them, and whether people are more prone to develop different types of belief at different developmental stages (for example, whether children first exhibit domain-specific or general zero-sum beliefs). By exploring these questions, future research will surely expand our understanding of the formative role of zero-sum beliefs in our social lives.

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