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Transcultural pathways to the will to fight

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In 2022, the "Will to Fight Act" was referred to the US Congress urging attention to measuring and assessing will to fight. That Bill was not enacted, and evaluation efforts within the political and military establishment remain contentious, fragmented, and meager. This likely will persist, along with attendant policy failures and grievous costs, without awareness of research that the social and psychological sciences reveal on the will to fight [S. Atran, *Science* 373, 1063 (2021)]. We illustrate such research using converging data from a multimethod and multicultural approach, including field and online studies from the Middle East, North Africa, and Europe. These studies reveal specific psychosocial pathways, within a general causal framework, that predict willingness to make costly sacrifices, including to cooperate, fight, and die in war and sustained conflict. From the continuing strife in Iraq to embattled Ukraine, 31 studies were conducted in 9 countries with nearly 12,000 participants. These include people in longstanding conflicts, refugees, imprisoned jihadists and gangs, US military, studies in Ukraine before and during the current war, and rolling studies with a European ally of Ukraine. Results provide evidence for a mediation model of transcultural pathways to the will to fight. Building on our previous behavioral and brain research, on the battlefield in Iraq, with violent extremists, and with US military, the linear mediation yielding the will to fight involves identity fusion, perceived spiritual formidability, and trust. The model, a variation on "The Devoted Actor Framework," applies to primary reference groups, core cultural values, and leaders.

identity fusion | spiritual formidability | trust | core values | will to fight

Significance

Upon entry into WWII, the United States committed to unconditional victory through overwhelming force. But paramount focus on material capacity to the neglect of "will to fight" in subsequent regional wars—Vietnam, Iraq, and Afghanistan—has carried woeful costs in lives, treasure, and policy failures. This nearly happened with Ukraine. Despite political and military leaders acknowledging its importance after the fact, consensus remains that will to fight is "imponderable." Without rigorously assessing nonmaterial sensibilities, including among civilian populations, conflict can appear intractable or only resolvable with massive force, and the United States and partners may continue to overrate or underrate allies, armies, and peoples in disregard of the spirit that can only arise from one's own cultural identity and values.

On July 28, 2022, US House Bill H.R. 8560, the "Will to Fight Act" (1), was referred by Congressmen Jason Crow (D-CO) and Peter Meijer (R-MI) to the House Permanent Select Committee on Intelligence. The bill sought to empower the House and Senate:

> To direct the Director of National Intelligence to submit to Congress a report relating to analyses of the military will to fight and the national will to fight with respect to the Governments of Ukraine, Afghanistan, and Iraq, and for other purposes.

The bill noted failure of US intelligence to "accurately assess the will of Ukrainian forces to fight in opposition to a Russian invasion," the wrongful estimate by the intelligence community "that the Afghan government's forces could hold out against the Taliban for as long as 2 y" after a US withdrawal, and "the rapid advance of the Islamic State in Syria and Iraq and near total-collapse of the Iraqi security forces [that] appeared to take policymakers of the United States by surprise."

The bill advocated evaluating "the methodology of the intelligence community for measuring [and] assessing the military will to fight and the national will to fight"; that is, the resolve to fight on for an objective "even when the expectation of success decreases or the need for significant political, economic, and military sacrifices increases." Congress has failed to act on the bill or its recommendations.

Yet misjudging both allies' and adversaries' will to fight is recurrent among military and political decision-makers, with often disastrous results for planners and the public (2). In Congressional testimony, Gen. Scott Berrier, US Defense Intelligence Agency director, acknowledged misjudging Ukraine's ability to resist Russia: "I questioned their will to fight. That was a bad assessment" (3). Gen. Mark Milley, Chairman of the US Joint Chiefs of staff, blamed "strategic failure" in Afghanistan on neglecting the "intangible" factor in war: "We can count the trucks and guns and the units and all that. But we can't measure a human heart from a machine" (4). As President Biden put it: "We gave [Afghan forces] every tool they could need…. What we could not provide them was the will to fight" (5). When The Islamic State (ISIS or ISIL) routed US-backed Iraqi government forces despite vastly inferior manpower and firepower, then-US President Obama endorsed (6) the judgment (7) of his Director of National Intelligence: "We underestimated the Viet Cong… we underestimated ISIL and

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overestimated the fighting capability of the Iraqi army… It boils down to predicting the will to fight, which is an imponderable."

At a May 2022 US Senate Armed Services Committee hearing (8), Director of National Intelligence Avril Haines remarked that it is "quite challenging to provide effective analysis… and we're looking at different methodologies for doing so." The only methodology invoked was public opinion polling. In line with some polling (9), the State Department's Bureau of Intelligence and Research did surmise that the Ukrainians would resist; however, a senior State department official duly noted that "assessing a population's will to fight is an art, not a science, that defies purely data-driven analysis."

Nevertheless, recent work from behavioral and brain science reveals robust, data-driven psychosocial factors for assessing will to fight. For several years, a research partnership between Artis International, Oxford University's Changing Character of War Centre, Spain's Universidad Nacional de Educación a Distancia, and the Universitat Autònoma de Barcelona has focused on willingness to fight and other costly sacrifices: from giving up material or social benefits to abandoning family and launching suicide attacks.

The conceptual frame is the "Devoted Actor" (10), which focuses on the spiritual dimension of human conflict (11). Devoted actors are individuals who share non-negotiable values with members of a group with which they are viscerally united. They are particularly prone to make extreme and costly sacrifices when personal identities "fuse" (12) with collective identity in a primary reference group (13)— often expressed as a family in arms (14) of imagined kin (15)—and in defense of core cultural values that are highly cherished (16) and often held to be sacred (17).

Devoted actors resemble incarnations of what Durkheim termed the "collective conscience" of society (18): that is, paragons of a solidary system of social relationships, imbued with shared values (as with religions, nations, and tribes), and by no means strictly bound to representing and responding to the mundane and material forms and necessities of society (19). For example, the idea of a hero who sacrifices for others forms part of the collective conscience of many societies. Heroism and martyrdom transcend mundane moral principles of reciprocity, such as quid pro quo or the Golden Rule, yet can inspire long-term advantage for low-power groups against materially better-endowed groups (20).

The studies presented here, along with our previous investigations in real-world conflicts, show ways that devoted actors, whose personal identities are fused within a unique collective identity that is perceived to be spiritually formidable and trustworthy, willingly make costly sacrifices to fight, and even die when that identity is threatened. We test the specific proposition that will to fight can be predicted by fusion with a cherished group (e.g., country, ally, and battalion), individual (e.g., a leader), or value/cause (e.g., religion, freedom, and democracy) through two psychosocial mediators: (perceived) spiritual formidability and trust. Focus on these mediators does not result from a priori theorizing or speculation; they spontaneously arose as candidate mediators in interviews with frontline combatants and militants during fieldwork conducted in different conflicts, with populations from different cultures, who perceived themselves fighting for something. We propose a linear model whose components (fusion with people or value, spiritual formidability, and trust) involve distinct but related cognitive capacities and evolutionary histories (outlined in the *Discussion* section), which combine in a specific, directed way to mobilize cooperative, self-sacrificial action in situations of group conflict. The constituent psychosocial processes of the linear model of will to fight are identity fusion, spiritual formidability, and trust, which we briefly describe below.

Identity fusion is a visceral feeling of oneness with a group, individual, value, or abstraction, that provides a strongly irrevocable sense of personal agency, and visceral responsibility toward the target of fusion. Highly fused individuals feel that they and the target of fusion synergistically strengthen each other, which fosters the perception that, together, they are invulnerable. Identity fusion has been successfully examined in the field as a reliable predictor of will to fight. Meta-analyses indicate that identity fusion is the strongest predictor of radical intentions among dozens of candidates (21, 22).

Extension of identity fusion with values aims to take advantage of measures of fusion with persons (*SI Appendix*) to measure commitment to cherished values, such as sacred values. "Sacred values" refer to preferences for beliefs, practices, or objects that people consider nonfungible with material goods and non-negotiable with profane matters (e.g., compromise over sacred land or law for economic or social benefit) (23, 24). Sacred values can be religious or secular, like God or Nation (10, 19). They tend to be very stable and unyielding to transitory social pressures, and they resist spatial or temporal discounting (25, 26). The stronger the attachment to such values, the greater the willingness to endure conflicts involving them (16, 17).

Spiritual formidability, along with physical formidability, is a subdimension of the formidability representation hypothesis, which is the sum of another actor's or coalition's tactical assets and liabilities compared to one's own. Their assessment is critical to deciding whether to fight, flee, or negotiate in situations of potential conflict. Formidability is represented by two physical dimensions, stature and muscularity (27). Representing physical formidability combines all factors that could contribute to decisions in violent contexts, including psychosocial factors (28). In this vein, our work supports the use of the same visual measures of relative size and strength for both physical and spiritual formidability, distinguishing them only by different verbal frames (29, 30).

Trust in an individual or members of a group is the expectation that they are sincere and mean you good and fosters development and maintenance of well-functioning relationships (31, 32). Trust in the leader, in the collective, and its members is associated with self-sacrifice (33). Thus, in a study of operation "Iraqi Freedom" in 2003, US soldiers' willingness to fight was at least partly expressed in terms of trust between buddies ("watching your back") and in leaders and the army to do right by them (34). Research suggests that one underlying mechanism through which identity fusion may predict will to fight is via trust in the source of fusion. For example, strongly fused individuals trust that members of their country or religious group would never willingly harm them (35). Experiencing trust involves an interplay of values, attitudes, moods, and emotions and may become unconditional when shared values are the basis of trust (36). For shared values greatly reduce the transaction costs of social exchange and cooperation and lead to trust through reliability in how others will act in certain circumstances; and if there is reliability that others will come to aid in life-and-death circumstances, then trust is likely to be absolute.

In previous research, we examined contributions of identity fusion (*SI Appendix*, Fig. S1), sacred values, and spiritual formidability (*SI Appendix*, Fig. S2) to costly sacrifices made by frontline combatants in Iraq (10, 11), including ISIS, Kurdish Peshmerga and Kurdistan Worker's Party (PKK), Arab Sunni militia, and the Iraqi army. In 2015, when the ISIS frontline was stable, and in 2016, when the allied offensive to retake Mosul commenced, field surveys revealed that willingness to fight and die was greatest for those

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who viscerally bonded with their comrades in arms, were fighting to uphold sacred values, and "spiritual formidability"—be it their own group, allies, or enemies—as more critical than "physical formidability" (firepower and manpower). Fighters recurrently described this as "spirituality with bravery" to defend what is most cherished, "what is in our heart" and "strength of belief in what we are fighting for." Only the secular (Marxist-Leninist) Kurdish PKK fighters matched religious ISIS fighters for willingness to sacrifice for their cause (validated in terms of casualties, time at the front, and so forth), including readiness to abandon comrades deemed willing to compromise their beliefs. The United States considers ISIS and PKK to be terrorist organizations, which may feed resistance in learning proactive lessons from them.

In parallel, neuroimaging probed willingness to make costly sacrifices among Moroccan immigrants in Spain who professed support for armed jihad and strict conformity with Sharia, and among supporters of Lashkar-e-Taiba, a Pakistani associate of Al-Qaeda. Participants indicated greater readiness to sacrifice against violation of sacred values (e.g., caricatures of Prophet Mohammed) than nonsacred values (e.g., women refusing the veil), with neuroimaging during processing of sacred values showing inhibition of activity in brain areas associated with cost–benefit and deliberative reasoning (36) but enhanced activity in areas linked to subjective value (37) and rule-bound judgments (38) ("do it because it's right," whatever cost or consequence). Moreover, perception of social exclusion resulted in sacralization of hitherto important but nonsacred values and increased willingness to sacrifice.

This converges with research showing that fused individuals who feel excluded become more willing to fight and die (39) and complements findings from Iran that material disincentives to abandon the nation's nuclear energy program (international sanctions, a version of political exclusion) only increase support as a sacred mission linked to national sovereignty and religion (40). Further brain and behavioral studies indicate that far-right extremists also are cued to core values. For example, in social media, they more readily share misinformation about core values (e.g., immigrant threats to cultural purity), with responses on this score during brain imaging activating a neural network associated with identity processes (41).

Collaborating with the US Air Force, we found in studies in Palestine, Iraq, Morocco, and Spain that perception of personal spiritual strength is more strongly associated with willingness to sacrifice than physical formidability (30). Further study among Air Force cadets and replicated in a large sample of ordinary European citizens showed this effect mediated by a stronger loyalty to the group. Together with frontline studies in Iraq, also replicated among large samples of ordinary Europeans, these findings strongly suggest that spiritual formidability—whether of a person or a group—is a primary determinant of will to fight across cultures, and this motivates people to fight at great risk through loyal bonds.

Summarizing our previous studies, we have shown that identity fusion, commitment to core cultural values, and spiritual formidability are independent predictors of willingness to make costly sacrifices, including fighting and dying. In the studies below, we aim to reveal likely causal relationships between these factors, as well as the role of trust, which is intimated but not analyzed in our previous studies.

The notion of trust as a driver of will to fight, and of distrust as a brake on will to fight, spontaneously emerged in field interviews with combatant groups on the ISIS frontline (10, 11), in studies conducted below with imprisoned jihadists and Syrian refugees in Spain (studies 1 and 3, respectively), and with displaced persons in Iraq (studies 6 and 7). In field studies, trust was expressed in different ways: 1. with reference to groups, individuals, or values (e.g., PKK fighter: "I trust our leader, Abdullah Öcalan", "I trust in [the value of] Kurdeity"); 2. in a comparative context (e.g., Peshmerga fighter: "I trust in Kurdistan, not in Iraq because the Iraqi army collapsed and ran from ISIS without a fight"); or 3. as something that could compel individuals to abandon a group, leader, or value (ISIS fighter: "If the mujahedin [holy warriors] were to reject or compromise on Sharia [Islamic law], I would no longer trust them"). In each case, further expressions of trust highlighted the reliability, helpfulness, empathy, and faith in the group or individual trusted, and in the worth and truth of what the trusted group, individual, or value stands for. These aspects of trust are consistent with wide-ranging research from other sources (42).

We use fusion with values as a proxy for the more complex notion of sacred values (involving immunity to tradeoffs, resistance to social pressure, blindness to exit strategies, and disregard for temporal and spatial discounting) (43). Two previous findings justify this. First, in a study of 1,600 "prochoice" and "pro-life" advocates, fusion with values was a strong predictor of sacred values and vice versa (44). Second, in a recent study of convicted jihadists (29), violent Latino gang members, and Muslim and non-Muslim ordinary criminals in 35 Spanish prisons, we found that jihadists 1. unlike other inmates remained fused with their group and value over time in prison, 2. sacrifice more for group and value, 3. reveal shared value as a key enabling factor for fusion with group, and 4. show more sacrifices for value than for group. These findings closely track results with those frontline combatants in Iraq most ready to self-sacrifice for their sacred value even more than group, further justifying fusion with values as a proxy for sacred values.

Results

Here, we introduce, and test, a general linear model revealing the psychosocial pathways to the will to fight, applicable transculturally and functionally for groups, leaders, and core values. Using a mix of data collection strategies, we conducted 31 studies with nearly 12,000 participants from 9 countries to test our hypotheses that 1. identity fusion is more strongly associated with will to fight and costly sacrifices through spiritual than physical formidability; 2. spiritual formidability is associated with, and predicts, will to fight; 3. trust is positively associated with, and predicts, will to fight; 4. the positive relation between spiritual formidability and costly sacrifices is mediated by trust; 5. fusion is positively associated with trust; 6. fusion is positively associated with will to fight, first, through spiritual formidability, and second, through trust; and 7. finally, the linear model associating fusion with will to fight is applicable to groups (ingroups and allied outgroups), values (e.g., religion, honor, democracy, and freedom) and individual leaders in real-world conflicts and predicts expression of the will to fight but also consequent behaviors. Table 1 summarizes the characteristics of the samples and the main findings for each study.

We organize the studies into two sets. A first set of 14 studies examines the cross-sectional and causal relations between fusion, physical and spiritual formidability, trust, and the will to fight. Next, 17 studies test a linear model through which fusion predicts will to fight via spiritual formidability first, and trust second, applicable to groups, leaders, and values (see *SI Appendix* for measures for each study, alphas for each scale, and strategy for data collection using Qualtrics or the self-developed Artis Magi-Wise survey platform that enables combining traditional scales with dynamic measures; *SI Appendix*, Table S1 *A* and *B* provide main characteristics of studies).

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Table 1. Summary of studies, characteristics of the samples, sample sizes, and main findings

Study number	Characteristics of sample and Ns (between brackets)	Main findings
Studies 1 to 2 (Spain)	Jihadists vs. Latino gangs in prisons (122, 152)	Fusion is positively associated with will to fight more strongly through spiritual than physical formidability
Study 3 (Spain)	Syrian refugees in Spain (37)	Spiritual formidability of and will to fight for, Syrian refugees are positively associated
Study 4 (Spain)	Online, experiment. General population (476)	Spiritual formidability of the country predicts will to fight for the country
Study 5 (Spain)	Online, Cross-sectional. General population (583)	Examine the meaning features of trust for participants: reliability, support, delegation of responsibility, self-verification, and trustworthiness or being trustworthy
Study 6 (Iraq)	Internally displaced persons in Iraq (78)	Trust in the Iraqi Army is positively associated with will to fight for a Unified Iraq
Study 7 (Iraq)	Young people in Mosul after the defeat of ISIS (72)	Trust in the Iraqi Army is positively associated with will to fight for the Sunni Arab Community
Study 8 (Morocco)	Neighborhoods linked to terrorist campaigns (401)	Trust in Moroccans is positively associated with will to fight for Moroccans
Study 9 (Spain)	Online, Cross-sectional. General population (432)	Trust in the country is positively associated with will to fight for the country
Study 10 (Spain)	Online experiment (611)	Trust in the country predicts will to fight for country
Study 11 (Morocco)	Neighborhoods linked to terrorist campaigns (476)	Spiritual formidability of the country is positively associated with will to fight for the country through trust in the country
Study 12 (Palestine)	Palestine: Gaza and the West Bank (730)	
Study 13 (Spain)	Online, Cross-sectional. General population (350)	
Study 14 (USA)	Cadets from the U.S. Air force academy (120)	Fusion is positively associated only with trust in the target of fusion but not with other targets.
Studies 15 to 19 (Palestine, Lebanon, Turkey, UK, Palestine)	Studies 15-18, cross-sectional, General population (360, 377, 371, 499). Study 19, ethnographic fieldwork (470)	Fusion is positively associated with will to fight via spiritual formidability first, and trust second.
Studies 20 to 26 (Spain)	Online, Cross-sectional. General population (240, 249, 280, 233, 203, 200, 505)	Fusion is positively associated with will to fight via spiritual formidability first, and trust second.
Study 27 (Spain)	Online, Cross-sectional. General population (1910)	Fusion is positively associated with will to fight via spiritual formidability first, and trust second.
Studies 28 to 30 (Ukraine)	Online, Cross-sectional. General population. Before the conflict with Russia, during the initial offensive and 8 months after the beginning of the conflict (479, 574, 426).	Fusion is positively associated with the will to fight via spiritual formidability first, and trust second. The linear model is replicated for country, democracy, and freedom.
Study 31 (Spain)	Online, Cross-sectional. General population (717)	The linear model fusion-spiritual formidability-trust predicts behavior (donate money, welcome a refugee, send food, collaborate with a NGO)

For the first set, two field studies in Spanish prisons through face-to-face interviews with jihadists (study 1) and Latino gang members (study 2) examined whether these data replicate previous lab findings that fusion with a group (jihadists and gang members) is associated with will to fight through physical formidability (45), but this association is stronger through spiritual formidability. We also tested whether fusion with a core value (religion for Jihadists and honor for Latino gangs) predicts willingness to make costly sacrifices for that value. One field study (study 3) with refugees from Syria in Spain tested the relation between spiritual formidability of refugees from Syria, and will to fight, and a controlled online experiment (study 4) probed causal evidence of the effects of spiritual formidability on costly sacrifices.

Before examining the role of trust in the model, an online study in Spain explored what trust in people close to oneself means (study 5). Studies 6 to 7 inspected the relation between trust and will to fight for a group. These were conducted in the field through a series of individual face-to-face interviews with internally displaced persons in several camps in Iraq (study 6) and with young Iraqi participants displaced in Mosul just after liberation from

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ISIS control (study 7) (46). Next, two studies were aimed at replicating the relationship between trust and will to fight during ethnographic work in Jemaa Mezuak, a neighborhood in Tetuan, Morocco, associated with previous terrorist bombing campaigns (47), including the Madrid train bombings (15) (study 8), and an online study in Spain (study 9). An experimental study tested the causal effect of trust on will to fight (study 10).

Three cross-sectional studies tested whether the effect of spiritual formidability on will to fight is mediated by trust in the group: a field study in the Sidi Moumen neighborhood of Casablanca, associated with previous terrorist bombings (study 11), a field study with Palestinians across Gaza and the West Bank (study 12), and an online study with general population in Spain (study 13). Another field study with US Air Force Cadets examined the relation between fusion and trust in the group (study 14).

Once fusion, spiritual formidability, trust, and will to fight were examined separately, a second set of studies tested the full linear model. The model was first inspected online in four countries: Palestine (study 15), Lebanon (study 16), Turkey (study 17) and the United Kingdom (study 18), and in the field in Palestine (study 19).

After that, seven cross-sectional studies focused on an actual armed conflict and examined whether the linear model applies to the will to fight on behalf of an ally. Seven studies with Spaniards tested whether being fused with Ukraine was positively associated with the will to fight for Ukraine through spiritual formidability of, and trust in, Ukraine (studies 20 to 26). Studies 23 to 26 also tested whether formidability of, and trust in, Ukraine's President Zelenskyy also mediated between fusion and readiness to sacrifice for Ukraine. Another study (study 27) applied the model to sacrifices for values, examining whether fusion with democracy predicts sacrifices for democracy through spiritual formidability of, and trust in, democracy.

Three studies in Ukraine examined the roles of country and values (democracy and freedom) in predicting will to fight: a first study shortly before armed conflict with Russia began (study 28), a second study during Russia's initial offensive (study 29), and a third study eight months later during a large-scale Ukrainian counteroffensive (study 30). A final study (study 31) conducted with allies of Ukraine ten months into the conflict investigated whether the linear model predicts actual behaviors.

Studies 1 and 2: Fusion, Formidability, and Will to Fight among Prison Convicts. The first set of studies were conducted in Spanish prisons with individuals incarcerated for crimes related to their strong convictions toward a group or value, including extreme behaviors such as murder. For most participants, this was the first time they were solicited for scientific research. Spain's government provided access to all prisoners in the penal system under conditions conducive to candid observation. No one other than a member of our research team and a prisoner was present in the room, even with inmates kept in isolation. The research team did not have access to prisoner files for selection of participants. Authorized professionals (psychologists and social workers) selected inmates who satisfied the inclusion criteria and said that they wanted to collaborate in the research, even though there would be no consequences for them. Standard human subjects protections were acknowledged through informed consent (29). Participants were identified by a random code and responses anonymized. Authorities had no access to individual prisoner responses (*SI Appendix*).

Study 1 involved 122 interviews in 31 prisons with inmates from 16 countries implicated in jihadist terrorism. These included returning ISIS foreign fighters, participants in the 2004 Madrid train-bombing plot, or in the August 2017 vehicle attack on pedestrians in Barcelona. Study 2 involved 152 interviews in 23 prisons with inmates from 14 countries convicted of crimes associated with violent Latino gangs (e.g., Trinitarios and Latin Kings). Critical measures were fusion with their primary reference group (Muslim Community vs. own Gang), and their most cherished value (religion vs. honor); physical and spiritual formidability of their respective group; and costly sacrifices they are willing to make while in prison for their group and most cherished value (determined in previous research where they respectively choose religion and honor as values for which they would not accept any trade-off) (29). For Latino gangs, honor influences motivations, emotions, cognitions, and behaviors (48) and provides meaning and logic to gang violence (49) in interpersonal, intrapersonal, and intergroup relationships (50).

In studies 1 and 2, spiritual formidability correlated positively with fusion and sacrifices for the group more strongly than physical formidability (*SI Appendix*, Table S2). Testing the hypothesis that fusion with a group is more strongly associated with will to fight through spiritual formidability, we performed a mediation analysis using Hayes' PROCESS (Macro Model 4) (51). Controlling for time in prison, we included fusion as predictor, spiritual and physical formidability as parallel mediators, and costly sacrifices as outcome. In study 1, for fusion and sacrifices for the group, results indicated a significant indirect effect via both physical formidability, IE = 0.05, 95% CI = 0.0084 to 0.1141, and spiritual formidability, IE = 0.12, 95% CI = 0.0277 to 0.2170. For fusion and sacrifices for religion, spiritual formidability alone was significant, IE = 0.11, 95% CI = 0.0254 to 0.2309. For study 2, for fusion and sacrifices for the group, results showed significant indirect effects via both physical formidability, IE = 0.03, 95% CI = 0.0028 to 0.0562, and spiritual formidability, IE = 0.10, 95% CI = 0.0474 to 0.1548. For fusion and sacrifices for honor, only the indirect effect of spiritual formidability was significant, IE = 0.07, 95% CI = 0.0140 to 0.1420. In both studies, the indirect effect via spiritual formidability was stronger than via physical formidability (*SI Appendix*, Fig. S3).

Studies 3 and 4: Spiritual Formidability and Will to Fight. A decade ago, conflict in Syria left some seven million refugees distributed over more than 100 countries. Some traveled to Spain, where they faced language barriers, lack of employment, social exclusion, and suspicion from outsiders that Islamist terrorists were among them. Nonetheless, we were welcomed by those in our convenience sample, who allowed us to conduct study 3.

Study 3 (n = 37) consisted of interviews with refugees from Syria in Spain, including measures of physical and spiritual formidability of the refugees, and adapted scales of costly sacrifices and willingness to fight and die for Syrian refugees. Participants were recruited through a snowball procedure and interviewed by a psychologist with research experience among vulnerable populations. Interviews occurred in private or semiprivate spaces in which participants felt comfortable. Standard human subjects protocols were as in studies 1 and 2. When necessary, participants were also referred to organizations that promote refugee rights and their socio-psychological needs.

Study 4 (n = 476) was conducted online with Spanish participants using an experimental design (*SI Appendix*). They were randomly assigned to one of two conditions introducing the results of a fictitious investigation. Participants in the high spiritual formidability condition learned that most members of their country consider Spain strong spiritually; those in the low spiritual formidability condition learned that most members of their country consider Spain weak. Participants then responded to a

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questionnaire to rate the physical and spiritual formidability of their home country, to a scale of costly sacrifices for their country, and to a manipulation check.

In study 3, we anticipated that spiritual formidability of refugees would be positively associated with costly sacrifices and willingness to fight and die for their fellow refugees. In study 4, we expected that perception of spiritual formidability, and costly sacrifices, would be stronger in the high spiritual formidability condition. In addition, the experimental manipulation's effect on costly sacrifices should be mediated by increased personal perception of the group's spiritual formidability.

Results from studies 3 and 4 support our hypothesis (*SI Appendix*, Table S3 for means, SDs, and correlations). Study 3 showed that spiritual formidability significantly correlated with costly sacrifices and willingness to fight and die for fellow refugees. In contrast, physical formidability did not correlate significantly with these variables, $rs < 0.21$, $Ps > 0.23$. In study 4, a MANOVA yielded an effect of the experimental manipulation on perception of the group's spiritual formidability and costly sacrifices for the group. Participants displayed higher levels of spiritual formidability and costly sacrifices in the high spiritual formidability condition, $F(1,474) = 96.79$, $P < 0.001$, $\eta^2 = 0.17$, and $F(1,474) = 25.90$, $P < 0.001$, $\eta^2 = 0.05$, respectively. The effect of the experimental manipulation on perception of the group's physical formidability was not significant, $F(1,474) = 2.93$, $P = 0.088$, $\eta^2 = 0.01$.

To test whether the effect of the manipulation on costly sacrifices would be mediated by personal feelings of their group's spiritual formidability, we performed bootstrapped (n boots = 5,000) mediation analysis with PROCESS (Model 4) (51). Results reached significance only for the indirect effect via spiritual formidability, IE = 0.11, 95% CI 0.0627 to 0.1575 (*SI Appendix*, Fig. S4).

Study 5: The Meaning of Trust. After examining the positive association between fusion, spiritual formidability and will to fight, we move on to trust, a factor spontaneously evoked in the context of will to fight in previous frontline fieldwork, with refugees, and in prisons. Based in part on these spontaneous expressions, we conducted a study to examine what individuals may freely mean by trust.

Study 5 (n = 583) was conducted online with Spanish participants who were asked to indicate what trust in someone they know well or in a close group means for them. Qualitative analysis using NVivo software distributed the responses into five main categories: 1. Reliability = expectation of confidence and certainty (e.g., "knowing that such person/group will behave as you expect"); 2. Support = expectation of being cared and helped (e.g., "counting on their support in front of any adversity"); 3. Delegation of responsibility = delegate to others decisions that affect us personally or people we care about (e.g., "give up the ability to decide what affects you or who you care about"); 4. Self-verification = being understood and as one perceives themself (e.g., "I can be, think and behave as I am because I feel that they understand me"); and 5. Trustworthiness or being trustworthy = characteristics of the target of trust that make them trusted (e.g., "set of attitudes that a person or a group transmit unconsciously"). From the full sample, 530 participants provided valid responses. The results show that 36.78% of participants defined trust as reliability, 23.02% as support (helpful and caring), 13.02% as delegation of responsibility (faith in others deciding for me), 13.96% as self-verification (including others' ability to empathize), and 13.21% as being trustworthy (feelings of trustworthiness). These results converge with field expressions of trust.

Studies 6 to 10: Trust and Will to Fight. This package includes a sample of Syrians who, during the conflict with the Islamic State, remained in camps in Iraq as internally displaced persons (study 6), and a sample of young Iraqis displaced around Mosul after its liberation from ISIS (study 7). We also had face-to-face interviews with individuals under risk of radicalization from living in urban Moroccan neighborhoods associated with terrorist bombing campaigns (study 8) and two online studies with a general population sample to see whether findings replicate (studies 9 and 10).

Participants were asked about the following: in study 6 (n = 78), trust in the Iraqi Army, and costly sacrifices for them; in study 7 (n = 72), to what extent they trusted more in the Iraqi Army than other groups and willingness to fight and die for the Sunni Arab Community; in study 8 (n = 401), trust in Moroccans compared to other groups, and adapted versions of costly sacrifices and willingness to fight and die for Moroccans; and in study 9 (n = 432), trust in, and costly sacrifices for, their country.

Study 10 (n = 611) used an experimental design concerning participants' opinions regarding results of studies fictitiously conducted by the Spanish Sociological Research Center (CIS). Participants in the experimental condition learned that according to recent investigation, regardless of the current health situation (COVID) and leaving aside political issues, most Spaniards (78.3%) maintained high confidence in their country. Participants in the control condition read the report of an investigation indicating most Spaniards supported use of electric cars. Participants responded to a questionnaire including measures of trust in, and costly sacrifices for, their country. A final attention check asked participants to choose the content of the report they read.

Results from studies 6 to 10 supported the positive association between trust and willingness to fight (*SI Appendix*, Table S4 for means, SDs, and correlations). Study 6 showed that trust in the Iraqi Army significantly correlated with costly sacrifices for a unified Iraq. Study 7 indicated that trusting more in the Iraqi Army than in other militias significantly correlated with willingness to fight and die for the Sunni Arab Community. In study 8, trust in Moroccans significantly correlated with costly sacrifices and willingness to fight and die for Moroccans. In study 9, trust in the country significantly correlated with costly sacrifices for it.

Results from study 10 intimated a causal effect of trust on costly sacrifices, mediated by increasing personal feelings of trust in the country. A MANOVA yielded an effect of the experimental manipulation on trust in, and costly sacrifices for, the country. Participants displayed higher levels of trust and costly sacrifices in the experimental condition than control condition, $F(1,545) = 9.78$, $P = 0.002$, $\eta^2 = 0.02$, $M = 2.92$, $sd = 1.12$ vs. $M = 2.60$, $sd = 1.05$, and $F(1,545) = 9.56$, $P = 0.002$, $\eta^2 = 0.02$, $M = 1.08$, $sd = 1.33$ vs. $M = 0.74$, $sd = 0.88$, respectively. Trust and costly sacrifices were significantly though weakly correlated, $r(545) = 0.17$, $P = 0.001$.

To test whether the positive relation between trust and costly sacrifices is mediated by personal feelings of trust, we performed bootstrapped (n boots = 5,000) mediation analysis with PROCESS (Model 4) (51). Analyses showed a significant indirect effect via personal feelings of trust in the country, $IE = 0.04$, 95% CI 0.0096 to 0.0886 (*SI Appendix*, Fig. S5).

Studies 11 to 13: Spiritual Formidability Is Related to Will to Fight through Trust. These studies were conducted in Moroccan neighborhoods linked to previous terrorist campaigns, across Gaza and the West Bank in Palestine, and in Spain (Ns = 476, 730, and 350, respectively) to examine the association between spiritual

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formidability, trust, and will to fight in different cultures, using different methods. For studies 11 to 13, the questionnaire included measures of spiritual and physical formidability, trust in group, and will to fight for the group (*SI Appendix*). We anticipated that 1. spiritual formidability trust and will to fight are positively related, and 2. the positive relation between spiritual formidability and will to fight is mediated by trust.

Spiritual formidability positively correlates with physical formidability, trust, and will to fight for the group in the three studies (*SI Appendix*, Table S5 for means, SDs, and correlations), and trust positively correlates with will to fight in the three studies (physical formidability only correlates positively with trust and will to fight in studies 12 and 13). To test whether trust mediates the positive relation between spiritual formidability and will to fight (controlling for physical formidability), we performed a series of bootstrapped (n boots = 5,000) mediation analysis with PROCESS (Model 4) (51). Indirect effects were significant in the three studies (*SI Appendix*, Fig. S6), indicating that spiritual formidability is positively associated with will to fight through trust.

Study 14: Association between Fusion and Trust among US Air Force Cadets. While previous studies have included perpetrators of violence (studies 1 and 2), victims (studies 3, 5, and 6), individuals under risk of radicalization (studies 7 and 10), or the general population, (studies 4, 8, 9, 11, and 12), the present study was conducted with those who defend their country against potential enemies. Fusion is not a personality trait (52); hence, fusion should be related to trust but only on targets associated with the source of fusion. To test this, 120 US Air Force Academy cadets responded to a questionnaire including measures of fusion with cadets, their squadron, the Air Force, and friends outside Air Force; and trust in Cadets, Officers, and friends outside Air Force. All correlations among fusion with cadets, squadron and Air Force, as well as trust in Cadets and officers were significant (from 0,19, $P < 0.05$ to 0.71, $P < 0.001$); fusion with, and trust in, other friends was positively associated, $r\,(118) = 0.40$, $P < 0.001$ (*SI Appendix*, Table S6).

After examining the cross-sectional and causal relations among fusion, formidability, trust, and will to fight, we propose a linear model showing how fusion is positively associated with will to fight, first through spiritual formidability and second through trust. For all subsequent studies, we anticipated that 1) results would replicate findings concerning the positive association between variables; 2) the mediation pattern Fusion→Spiritual Formidability→Trust→Will to Fight would be the strongest linear path; and 3) this linear mediation would apply to different targets, including the ingroup (studies 15 to 19 and 28 to 30), an ally (studies 20 to 27 and 31), an individual leader (studies 21 to 26), and core cultural values such as freedom and democracy (studies 27 and 29 to 31). Finally, we tested the mediation in relation to an actual behavior (study 31).

Studies 15 to 19: Fusion Predicts Will to Fight through Spiritual Formidability and Trust. After separately examining the relations between candidate variables in the linear model, we conducted studies in different countries and socio-political contexts, using distinct methods. This package of studies represents a preliminary test of the full linear model. We conducted online studies in four countries: Palestine (study 15, n = 360), Lebanon (study 16, n = 377), Turkey (study 17, n = 371), and the United Kingdom (study 18, n = 499). An additional field study in Palestine was designed to ground truth the online studies (study 19, n = 470). We measured fusion, formidability, trust, and will to fight. The target for these measures was one's own country (except study 17 whose target was the Turkish Military). In addition, the questionnaires included physical and spiritual formidability of one outgroup (i.e., Israel for studies in Palestine and Lebanon and Russia for studies in Turkey and the United Kingdom). *SI Appendix*, Table S7 includes means, SDs, and correlations, confirming the relation between variables for all targets.

To examine the linear model, we performed a series of bootstrapped (n boots = 5,000) mediation analysis with PROCESS (Model 80) for each study (51). Fig. 1 shows that the indirect effect of fusion on the will to fight, first through spiritual formidability of the ingroup and second via trust in the ingroup, is significant for all studies. As anticipated, the indirect effect of the linear model through spiritual formidability of the ingroup was strongest (*SI Appendix*, Tables S8–S12).

Studies 20 to 27: Replicating the Linear Model for an Ally of Ukraine during the Ukraine–Russia War. After cross-culturally replicating the linear model, we examined whether it applied to will to fight for an ally at war. We conducted seven rolling online studies in Spain, which was a strong, early supporter of Ukraine's resistance to Russia's invasion (53). An initial study was conducted during the conflict's first week (study 20, n = 240) followed by six studies, one per week, corresponding to Russia's threat concerning nuclear weapons (study 21, n = 249), the early flight of women and children from Ukraine (study 22, n = 280), threats to extend the conflict to NATO countries (study 23, n = 233), the beginning of the conflict's second month and growing belief war would last for some time (study 24, n = 203), when Ukraine began receiving substantial weaponry from the US and EU and Russia was approaching China for diplomatic and economic support (study 25, n = 200), and when international media reported hundreds of Ukrainian civilians allegedly tortured and killed in Bucha and other towns as Russian troops abandoned the attempt to take Ukraine's capital, Kyiv (study 26, n = 505). We also collected data on a core value associated with the conflict by Ukrainian and Western leaders and publics, namely, democracy (study 27, n = 1,910).

The target of fusion, formidability, trust, and costly sacrifices was Ukraine. Participants also responded to the physical and spiritual formidability of Russia. Studies 21 to 26 asked participants to judge the physical and spiritual formidability of Ukraine's President Zelenskyy and Russia's President Putin and their trust in President Zelenskyy. Study 27 replaced the target of all variables and asked for fusion, physical and spiritual formidability, and sacrifices for democracy (*SI Appendix*, Tables S13 and S14 include means, SDs, and correlations, confirming the positive association between variables).

To examine whether fusion with an ally is associated with costly sacrifices through the physical and spiritual formidability of Ukraine and Russia, and trust in Ukraine, we performed a series of bootstrapped (n boots = 5,000) mediation analysis with PROCESS (Model 80) for each study (51). The indirect effect of fusion on sacrifices, first through spiritual formidability of Ukraine and second through trust, is significant for all the studies and stronger than the other paths (*SI Appendix*, Fig. S7 and Tables S15–S21).

Alternative analyses in studies 21 to 26 further tested the model by substituting perception of the physical and spiritual formidability of Zelenskyy and Putin for Ukraine and Russia per se and by replacing trust in Ukraine with trust in President Zelenskyy. Fusion with Ukraine was positively associated with sacrifices for Ukraine through spiritual formidability of, and trust in, President Zelenskyy, and this linear path had the strongest indirect effect (*SI Appendix*, Fig. S8 and Tables S22–S27).

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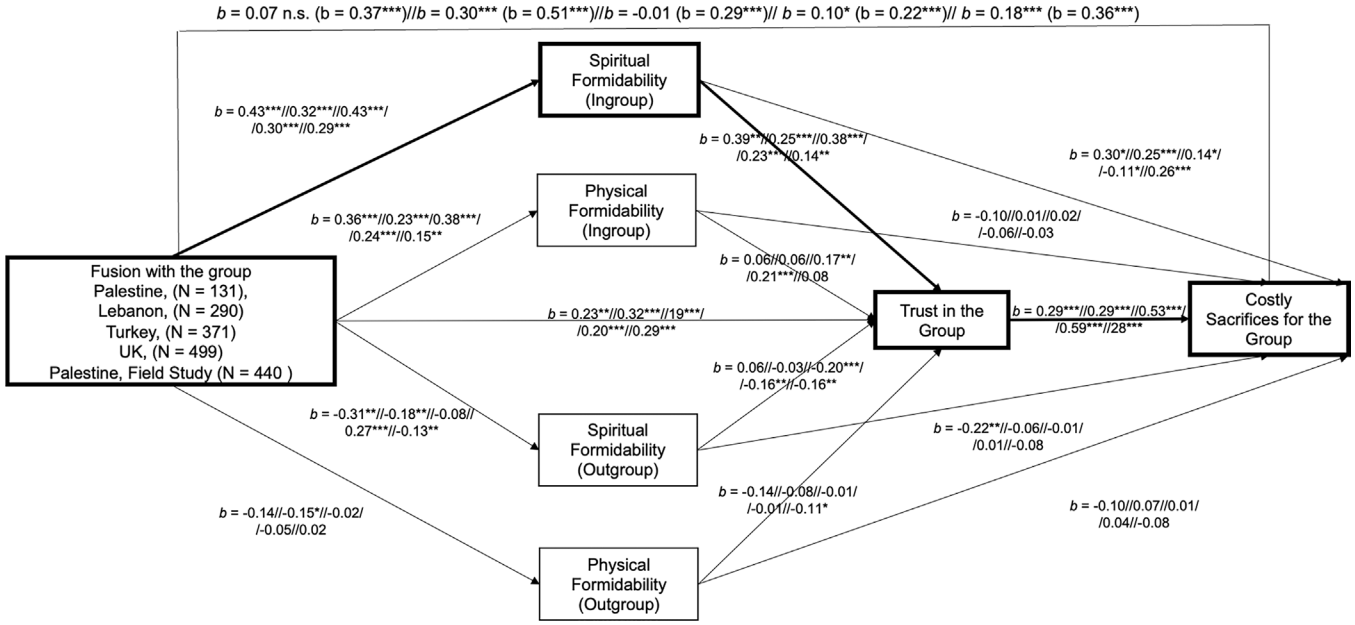

Fig. 1. Fusion with the group is positively associated with costly sacrifices through perceived spiritual formidability and trust (studies 15 to 19).

Study 27 focused on democracy as the target of fusion, formidability, trust, and costly sacrifices. The indirect effect of the full model trough spiritual formidability and trust was significant, IE = 0.25, CI 0.194, 0.308, and stronger than other linear paths, IE = 0.11, CI 0.082, 0.151 (*SI Appendix*, Fig. S9).

Studies 28 to 30: Pathways to the Will to Fight in Ukraine. We also tested the model among participants directly living the armed conflict, considering the country and values they purportedly fight for. We conducted three online studies in Ukraine (in coordination with Artis International personnel on the ground in Ukraine): shortly before armed conflict with Russia began (study 28, n = 479), during the initial Russian offensive (study 29, n = 574), and eight months later during a large-scale Ukrainian counteroffensive (study 30, n = 426). The target of fusion, formidability, trust, and costly sacrifices was Ukraine (*SI Appendix*, Table S28 include means, SDs, and correlations). Results replicated previous findings regarding the relation between variables and the linear model in all three studies when considering the group as target (*SI Appendix*, Tables S29–S31 and Fig. S10).

Once war broke out, President Zelenskyy and Western leaders declared that two core values were at stake, democracy and freedom (54). In study 29, participants also responded to measures of fusion with, and costly sacrifices for, democracy and freedom, and in study 30 for democracy. In study 29, the correlation between fusion with democracy and freedom was strong, $r(572) = 0.54$, $P < 0.001$, but we decided to consider these values separately by focusing on democracy in study 30.

We examined whether fusion with democracy is associated with will to fight for democracy (studies 29 and 30), and fusion with freedom is associated with will to fight for freedom (studies 29), through the physical and spiritual formidability of Ukraine and Russia and trust in Ukraine. For this, we performed a series of bootstrapped (n boots = 5,000) mediation analysis with PROCESS (Model 80) (51). Fig. 2 shows that fusion with democracy is positively associated with will to fight for democracy, and fusion with freedom is positively associated with will to fight for freedom, through the spiritual formidability of Ukraine and trust in Ukraine (*SI Appendix*, Tables S32–S34).

Study 31: Transcultural Pathways to the Will to Fight Predict Costly Behaviors. Here, we tested whether the model can predict behavior (n = 717). Participants in Spain responded to the same measures as in studies 20 to 26; however, we substituted the measure of will to fight by asking whether, since the war's beginning, they had acted to help Ukraine or its people. We added measures of fusion with President Zelenskyy and with freedom. We registered the percentage of participants who affirmatively responded to donate money (24.3%), welcome a refugee (2.2%), send food (26.5%), collaborate with a NGO (25.4%), or any other costly behavior (10.9%). We created a variable for those committed to a behavior versus those who were not. Of the full sample, 48% reported behavior.

Results replicate the positive association between the variables and indicate that behaviors for the sake of an ally were positively associated with fusion with the country, the leader, and a core value (freedom). To examine whether fusion is associated with behavior through the physical and spiritual formidability of Ukraine and Russia, and trust in Ukraine, we performed a series of three bootstrapped (n boots = 5,000) mediation analysis with PROCESS (Model 80) (51), including as predictors fusion with Ukraine, fusion with President Zelenskyy, or fusion with freedom. In the three models, the indirect effect through the linear path of spiritual formidability of Ukraine was significant and stronger than the other three linear paths (*SI Appendix*, Tables S35–S38 and Fig. S11 include means, SDs, correlations, and mediation analysis).

Discussion

Although in spring and summer 2022, members of Congress urged that attention and resources be committed to understanding will to fight, nothing has come of it, and efforts within the political and military establishment remain contentious, fragmented, and meager. As Senator Tom Cotton (R-AR) declared: "Will to fight is not a discrete area of intelligence you can go out and collect on it" (55). This may well remain so without awareness of what social, psychological, and biological research might reveal about will to fight. To help fill the gap, we conducted 31 studies with thousands of participants from dozens of nationalities in 9 countries. These

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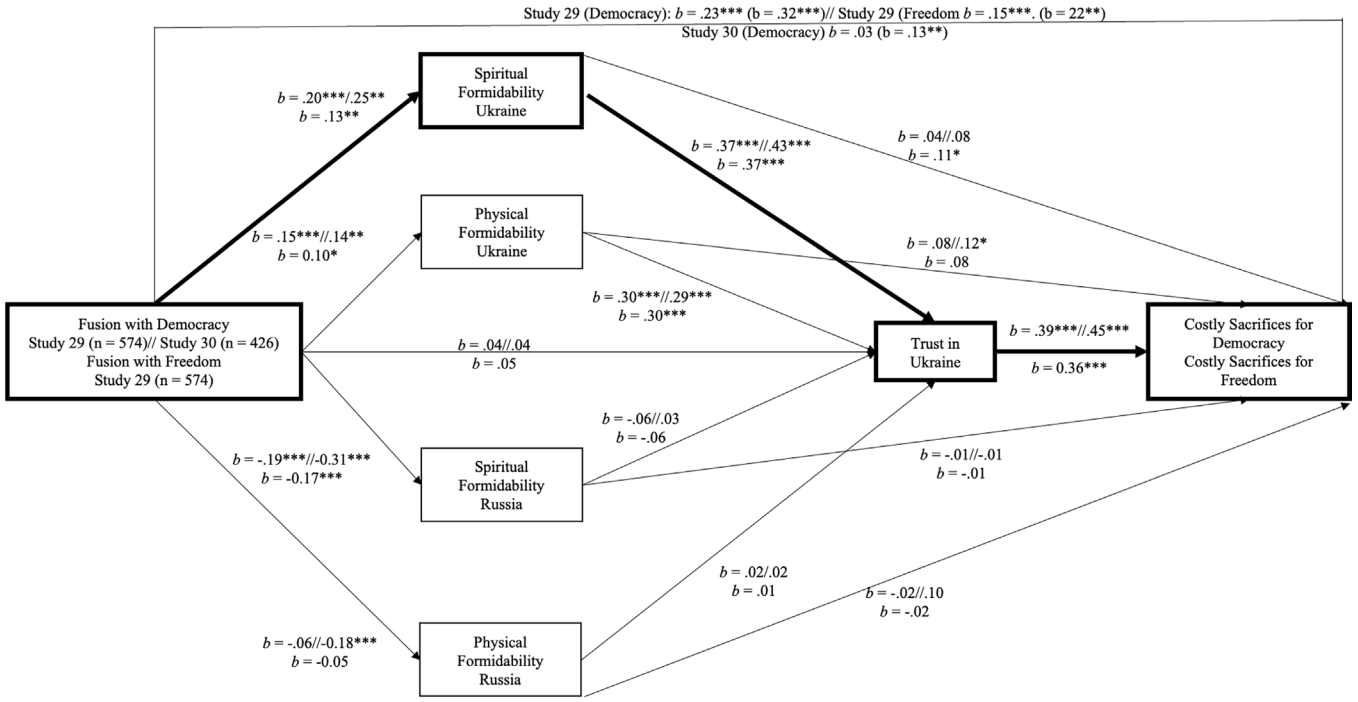

Fig. 2. Fusion with the values of democracy and freedom is associated with costly sacrifices for democracy (study 29) and freedom (studies 29 and 30) in Ukraine.

involved different data collection methods, including field and online studies with populations involved in armed conflict, such as war refugees, imprisoned jihadists, violent gangs, US military, and Ukrainian citizens, as well as samples from Palestine, Iraq, Turkey, Lebanon, the United Kingdom, and a Western European ally of Ukraine. Following initial studies to establish the relevant variables (fusion, formidability, and trust), results replicated 17 times in 7 countries to provide robust evidence for a mediation model of transcultural pathways to the will to fight. The model reveals fusion to be positively associated with will to fight, first through spiritual formidability and second via trust. The model applies to fusion with, and sacrifice for, primary reference groups and core values, while also implicating spiritual formidability of, and trust in, individual leaders.

The psychosocial pathways expressed in this transcultural linear model arguably involve cognitive capacities for cooperation that evolved to allow humans to compete even in physically asymmetric conflicts. Consider each of the model's components from an evolutionary perspective, recognizing this to be somewhat speculative and that each component may involve multiple evolutionary strands.

Identity Fusion. The potency and pervasiveness of identity fusion suggests an evolved function for extreme prosociality. Fusion with family is primary for people in most settings, and kin selection may help to explain empirical evidence that self-sacrifice for family is more likely than for other groups (56), whereas communities of "imagined kinship" (e.g., brotherhood and motherland) express and prime fusion with larger groups (15). As historian William Manchester described his US Marine Corps service in World War II: "Those men on the line were my family, my home" (57). As with fusion with groups, fusion with individual leaders carries a visceral attachment and readiness to sacrifice for the group or value that the leader represents (58). Evolutionary modeling suggests that "Leadership charisma and consistency, significant group costs, and the presence of enemies are the factors that most prominently influence group survival and success" (59). Adaptive reciprocity (mutualism) also has been invoked as an evolved aspect of identity fusion (60). If I will sacrifice for you and you for me, then we both may be less likely to die. For sociologist Charles Moskos who fought in Vietnam: "In ground warfare an individual's survival is directly related to the support—moral, physical, and technical—he can expect from his fellow soldiers… largely to the degree that he reciprocates" (61).

Core Values. From a strictly material vantage, people should prioritize kin or kin-like groups over abstract ideals and causes. Yet our previous findings with frontline combatants (10, 11) and imprisoned jihadists (29) indicate that commitment to a value can trump group as a motivation for self-sacrifice. Although core values of democracy and freedom that founded the moral framework of liberal societies had been receding for European and US citizens (43), our studies intimate that war in Ukraine may have again brought them into Western "collective conscience." Core values tend to carry an indefinitely long shadow into the future, often rooted in a somewhat mythic past, which tends to minimize clear and immediate risks of advancing or defending them for a promise (and evolutionarily advantageous possibility) of greater long-term survival or gain (62). As Darwin (20) and Durkheim (19) suggested, values that define society's moral framework, incarnated in heroes and martyrs, transcend evident mutualism. Although identity fusion and sacred values are somewhat independent predictors of will to fight, field studies indicate that their interaction can maximize willingness for costly sacrifices (49).

Spiritual Formidability. The evolutionary history of biological conflict between organisms, including humans, would likely privilege representations of physical assets. Yet physical strength and size as measures of relative formidability need not only reflect material factors (28). Indeed, research indicates that physical strength and size are deployed by a panhuman representational system to summarize material as well as nonmaterial factors (63). We find that spiritual formidability, even when represented in almost metaphorical terms of physical size and musculature, plays a greater role motivating sacrifice than physical formidability (30). Again, such spirit appears to provide initially low-power groups

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the ability to survive and thrive, as Saint Augustine noted long ago in explaining why Christianity's "Commonwealth of Spirit" survived while mighty Rome collapsed (64).

Trust. Research in several disciplines focuses on building trust to enhance cooperation (65). Ultimately, however, trust is not cooperation, but rather willingness to allow oneself to be vulnerable to the actions of others. Empathy and perspective-taking toward ingroup members enhance, and are enhanced by, trust (66). Especially in impersonal settings among Western populations, as in business management or political negotiation, integrity (honesty) and competence (ability) are robust predictors of reputation-based trust (67); however, in fused settings, as in family and friendship circles, benevolence as a costly signal that others will provide future aid when needed can be more important for maintaining trust in the long run, even when honesty and ability flag in the immediate. Indeed, for most known societies across history, nepotism and cronyism—considered untrustworthy and corrupt in Western society—are reliable constituents and consequences of trust in relatives, comrades, or close group members (68). An evolutionary rationale for faith in kith and kin (and in the "imagined kinship" of larger fused groups) is that it breeds loyalty transcending a transactional basis for a more visceral bond that endures in uncertain, risky, or dangerous conditions—a transcendence common to the other components and the whole model.

At the outset of WWII in 1939, the US army, some 174,000 strong (69), was 19th in the world ranking of armed forces. With US entry into war, President Roosevelt committed the nation to unconditional victory through the generation and application of overwhelming force, reprising in part actions taken by President Lincoln to win the Civil War. By war's end, US military forces increased 50-fold, and America accounted for half the world's wartime industrial production (70). This primary focus on military capacity resulted in destruction of Axis military infrastructure and the political regimes dependent on it, enabling transformation of authoritarian enemies into democratic friends, and arguably eventual victory in the Cold War. But with America's involvement in regional wars—in Vietnam, Iraq, and Afghanistan—this dedicated focus on military capacity and overwhelming force (71) to exclusion of "will to fight" has been severe in treasure and lives lost and failure of desired outcomes, and this also was nearly so in the case of Ukraine.

This failing does not simply owe to poor intelligence and imperfect information, but rather to little or no systematic gathering of intelligence or information on will to fight. For example, in a US Senate Armed Services Committee hearing, Gen. Berrier claimed: "the intelligence community did a great job." US Senator Angus King (I-ME), interrupted: "General, how can you possibly say that when were told explicitly that Kyiv would fall in three days and Ukraine would fall in two weeks?" (8). In fact, systematic gathering of information and intelligence assessment of initial Russian versus Ukrainian military capacity proved accurate, whereas there was no such assessment evident for will to fight. Similarly, in Iraq, Afghanistan, and Vietnam, although there were some failures assessing military capacity over the course of conflict, a deciding factor in the final outcome was failure to appreciate commitment to what Taliban (72), ISIS (73), and Viet Cong (74) were fighting for (75).

We have focused on the transcultural pathways of Fusion [group, leader, and value]→Spiritual Formidability→Trust→Will to Fight on the basis of theoretical arguments supported by extensive empirical research. However, inattention to other relevant influences on fighting spirit needs to be acknowledged: for example, boundary-crossing social ties and grievances that can undercut one side when outside support wanes (76), which can lead to cascading collapse, and differences in social formations and political cultures (77), which drive how people construct themselves and cast their adversaries (78). Also, most critically lacking is systematic assessment of the increasingly determinant role of social media in rapidly mobilizing, and reducing mobilization costs of, such factors of the will to fight, including components of our model.

Wars are fought in the material world but not necessarily won or lost through material commitment alone. Still, security strategy and policy remain telescoped on military capacity and instrumental deterrence through "cost imposition": "In confronting the range of security challenges it will face in the 21st century, the United States must constantly strive to minimize its own costs in terms of lives and treasure, while imposing unsustainable costs on its adversaries" (79). Even now, nearly all planning remains concentrated on cost imposition despite intermittent appeal to "hearts and minds" (80) and "soft power" (81). This optic tends to disregard what Darwin, in The Descent of Man, deemed the conviction of moral virtues "highly esteemed, or even held sacred" that "give an immense advantage" to one group over another when possessed by devoted actors who "by their example excite… in a high degree the spirit" in others to sacrifice for comrades and cause, for ill or good (20). There plausibly is an evolutionary logic to readiness to sacrifice when there is a great threat to the group and odds for survival appear slim; for then, only if sufficiently many group members are willing to self-sacrifice— and in the extreme with their "last full measure of devotion"—can the group resist and ultimately prevail against enemies more powerful but less willing to sacrifice. The studies reported here reveal specific psychosocial pathways, within a general causal framework, that may lead to such advantage across cultures.

Materials and Methods

Data from nearly 12,000 respondents in 9 different countries were used for analysis. After receiving the Institutional Review Board (IRB) approvals identified in *SI Appendix*, Table S39, participants from each country were recruited and contacted in their native language through face-to-face interviews (field studies) or online social media. Data were collected via the Artis Magi Wise Platform or Qualtrics. Consents from every participant were obtained verbally using an IRB-approved script or signed via an informed consent document. Transcripts and response sheets were anonymized. Information about the characteristics of the sample of each study is reported in *SI Appendix*. The main measures used (save trust) have been validated in previous publications (*SI Appendix* for details):

Identity Fusion merges individual with collective identity to predict extreme prosocial behavior and self-sacrifice (52). Fusion with values served as proxy for sacred values. We employed the three fusion measures available: 1. the original pictorial measure (82), where respondents choose one of a set of five paired circles, each pair includes a small circle representing "Self" and a big circle representing "Group," with pairs ranging from fully separated circles, through progressive stages of overlap, to a fully fused pair with the small circle entirely contained in the big circle; 2. the Dynamic Identity Fusion Index (83), showing a figure formed by two different sized circles separated on a screen representing "Self" (or "Me") and "Group" or "Value." Respondents placed a finger on the small circle and move it toward the big circle. Overlap between circles is from 0 (not fused at all = circles remain separate) to 100 (fully fused = small circle entirely within big circle); 3. the verbal measure of fusion (39), using a 7-item scale.

Formidability combines physical aspects of size and muscularity of a male body in a single dynamic scale that represents the minds-eye image of the ingroup, an allied outgroup, a leader, or a value ranging from large and strong to small and weak. This scale not only reflects a person's or group's material assets but, under distinct verbal framings, can represent nonmaterial aspects of formidability (28). We used the same visual measures for physical and spiritual formidability, distinguishing them only by different verbal frames. We operationalized spiritual formidability as conviction and immaterial resources (values,

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strength of beliefs, and character) of a person, leader, group, or value to endure in conflict (11, 30) and physical formidability as material capacity to inflict damage on an adversary.

Trust was not a prior concept of our research design but a subsequent codification of spontaneous and recurring expressions initiated by our combatant and prison populations. Trust in the group, leader, or value was measured using between 1 and 4 items depending on the study and adapted to the context.

Will to Fight was measured using different scales of costly sacrifices or the will to fight for a group, leader, or value, including between 2 and 7 items, and adapted to the nature of each study.

Data, Materials, and Software Availability. Anonymized human subjects data are deposited in the Open Science Framework https://osf.io/zdqbm/?view_only=1a74611bd9f84926a928a050335abfef (84). All study data are included in the article and/or *SI Appendix*.

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1. U. S. Congress, Will to fight act of 2022 (H.R. 8560). https://www.congress.gov/bill/117th-congress/house-bill/8560?s=1&r=8.
2. B. Connable *et al.*, *Will to Fight: Analyzing, Modeling, and Simulating the Will to Fight of Military Units* (RAND Corp., Santa Monica, 2018).
3. N. Merchant, U.S. misjudged Ukraine's will to fight, officials admit. *AP News*, 10 March 2022. https://apnews.com/article/russia-ukraine-putin-zelenskyy-nato-europe-fc52fa8b510fef79cb5505ebe8a841a8.
4. G. Lubold, N. Youssef, Gen., Milley calls Afghan withdrawal 'strategic failure' in heated Senate hearing. *Wall Street Journal*, 28 September 2021. https://www.wsj.com/articles/military-leaders-to-face-questions-over-afghan-withdrawal-evacuation-11632827812.
5. The White House, Remarks by President Biden on Afghanistan (16 August 2021). https://www.whitehouse.gov/briefing-room/speeches-remarks/2021/08/16/remarks-by-president-biden-on-afghanistan/.
6. S. Payne, Obama: U.S. misjudged the rise of the Islamic State, ability of Iraqi army. *Washington Post*, 28 September 2014. https://www.washingtonpost.com/world/national-security/obama-us-underestimated-the-rise-of-the-islamic-state-ability-of-iraqi-army/2014/09/28/9417ab26-4737-11e4-891d-713f052086a0_story.html.
7. D. Ignatius, James Clapper: We underestimated the Islamic State's 'will to fight'. *Washington Post*, 18 September 2014. https://www.washingtonpost.com/opinions/david-ignatius-we-underestimated-the-islamic-state-james-clapper-says/2014/09/18/f0f17072-3f6f-11e4-9587-5dafd96295f0_story.html.
8. K. Lillis, N. Bertrand, US intelligence community launches review following Ukraine and Afghanistan intel failings. *CNN*, 13 May 2022. https://edition.cnn.com/2022/05/13/politics/us-intelligence-review-ukraine/index.html.
9. Kyiv International Institute of Sociology, "Attitude of the population of Ukraine to Russia and the population of Russia to Ukraine, February 2021". https://kiis.com.ua/?lang=eng&cat=reports&id=1015&page=1.
10. S. Atran, The devoted actor: Unconditional commitment and intractable conflict across cultures. *Curr. Anthropol.* **57**, S192–S203 (2016).
11. Á. Gómez *et al.*, Devoted actors and the spiritual dimension of human conflict. *Nat. Hum. Behav.* **1**, 673–679 (2017).
12. W. Swann *et al.*, When group membership gets personal: A theory of identity fusion. *Psychol. Rev.* **119**, 441–456 (2012).
13. Á. Gómez *et al.*, Recent advances, misconceptions, untested assumptions, and future agenda for identity fusion theory. *Soc. Personal. Psychol. Compass* **14**, e12531 (2020), 10.1111/spc3.12531.
14. H. Whitehouse, B. McQuinn, M. Buhrmester, W. Swann, Brothers in arms: Libyan revolutionaries bond like family. *Proc. Natl. Acad. Sci. U.S.A.* **111**, 17783–17785 (2014).
15. S. Atran, *Talking to the Enemy: Sacred Values, Violent Extremism, and What it Means to Be Human* (Penguin, 2010).
16. S. Atran, J. Ginges, Religious and sacred imperatives in human conflict. *Science* **366**, 855–857 (2012).
17. J. Ginges, S. Atran, D. Medin, K. Shikaki, Sacred bounds on rational resolution of violent political conflict. *Proc. Natl. Acad. Sci. U.S.A.* **104**, 7357–7360 (2007).
18. E. Durkheim, *De la division du travail social* (Felix Alcan, Paris, 1893).
19. E. Durkheim, *Les formes élémentaires de la vie religieuse* (Felix Alcan, Paris, 1912).
20. C. Darwin, *The Descent of Man* (John Murray, London, 1871).
21. A. Varmann *et al.*, How identity fusion predicts extreme pro-group orientations. *Eur. Rev. Soc. Psychol.*, 10.1080/10463283.2023.2190267 (2023).
22. M. Wolfowicz, V. Litmanovitz, D. Weisburd, B. Hasisi, Cognitive and behavioral radicalization. *Campbell Syst. Rev.* **17**, e1174 (2021), 10.1002/cl2.1174.
23. P. Tetlock, Thinking the unthinkable: Sacred values and taboo cognitions. *Trends Cognit. Sci.* **7**, 320–324 (2003).
24. J. Baron, M. Spranca, Protected values. *Organ. Behav. Decis. Processes* **70**, 1–16 (1997).
25. M. Pincus, L. La Viers, M. Prietula, G. Berns, Conforming brain and deontological resolve. *PLoS One* **9**, e106061 (2014). 10.1371/journal.pone.0106061.
26. H. Sheikh, J. Ginges, S. Atran, Sacred values in intergroup conflict: Resistance to social influence, temporal discounting, and exit strategies. *Ann. N. Y. Acad. Sci.* **1299**, 11–24 (2013).
27. D. M. Fessler, C. Holbrook, J. K. Snyder, Weapons make the man (larger): Formidability is represented as size and strength in humans. *PLoS One* **7**, e32751 (2012).
28. C. Holbrook, D. M. Fessler, J. Pollack, With God on our side: Religious primes reduce the envisioned physical formidability of a menacing adversary. *Cognition* **146**, 387–392 (2016).
29. Á. Gómez *et al.*, Willingness to sacrifice among convicted Islamist terrorists versus violent gang members and other criminals. *Sci. Rep.* **12**, 2596 (2022).
30. C. Tossell *et al.*, Spiritual over physical formidability determines willingness to fight and sacrifice through loyalty in cross-cultural populations. *Proc. Natl. Acad. Sci. U.S.A.* **119**, e2113076119 (2022).
31. E. Ostrom, A behavioral approach to the rational choice theory of collective action. *Am. Polit. Sci. Rev.* **92**, 1–22 (1998).
32. J. Simpson, "Foundations of interpersonal trust" in *Social psychology: Handbook of Basic Principles* (Guilford Press, ed. 2, 2007), pp. 587–607.
33. D. De Kremer, M. van Dijke, D. van Knippenberg, A. Bos, Self-sacrificial leadership and follower self-esteem: When collective identification matters. *Group Dyn.: Theory Res. Practice* **10**, 233–245 (2006).
34. L. Wong, T. Kolditz, R. Millen, T. Potter, *Why They Fight: Combat Motivation in the Iraq War* (U.S. Army War College, 2003), p. 10.
35. T. Besta, Á. Gómez, Á. Vázquez, Readiness to deny wrongdoing and willingness to fight for its members. *Curr. Issues Pers. Psychol.* **2**, 49–54 (2014).
36. N. Hamid *et al.*, Neuroimaging 'will to fight' for sacred values: An empirical case study with supporters of an Al Qaeda affiliate. *R. Soc. Open Sci.* **6**, 181585 (2019), 10.1098/rsos.181585.
37. C. Pretus *et al.*, Ventromedial and dorsolateral prefrontal interactions underlie will to fight and die for a cause. *Soc. Cogn. Affect. Neur.* **6**, 569–577 (2019).
38. G. Berns *et al.*, The price of your soul: Neural evidence for the non-utilitarian representation of sacred values. *Philos. T. Roy. Soc. B* **367**, 762–764 (2012).
39. Á. Gómez *et al.*, On the nature of identity fusion. *J. Pers. Soc. Psychol.* **100**, 918–933 (2011).
40. M. Dehghani *et al.*, Sacred values and conflict over Iran's nuclear program. *Judgm. Dec. Mak.* **5**, 540–546 (2010).
41. C. Pretus *et al.*, The role of political devotion in sharing partisan misinformation. arXiv [Preprint] (2022). https://psyarxiv.com/7k9gx (Accessed 17 May 2023).
42. E. Shockley, T. Neal, L. PytlikZillig, B. Bornstein, Eds., *Interdisciplinary Perspectives on Trust* (Springer, 2016).
43. S. Atran, Psychology of terrorism and extreme political conflict. *Annu. Rev. Psychol.* **72**, 471–501 (2021).
44. S. Atran, J. Ginges, "Devoted actors and the moral foundations of intergroup conflict" in *The Moral Brain*, J. Decety, T. Wheatley, Eds. (MIT Press, 2015), pp. 69–86.
45. Á. Vázquez *et al.*, Threat enhances aggressive inclinations among devoted actors via increase in their relative physical formidability. *Pers. Soc. Pyschol. Bull.* **46**, 1461–1475 (2020).
46. S. Atran *et al.*, The Islamic State's lingering legacy among young men in the Mosul area. *CTC Sentinel (West Point)* **11**, 15–22 (2018), https://ctc.westpoint.edu/islamic-states-lingering-legacy-among-young-men-mosul-area/.
47. H. Sheikh, Á. Gómez, S. Atran, Empirical evidence for the devoted actor model. *Curr. Anthropol.* **57**, S204–S209 (2016).
48. P. Rodriguez Mosquera, In the name of honor: On virtue, reputation and violence. *Group Process. Intergroup Relat.* **16**, 271–278 (2013), 10.1177/1368430212472590.
49. J. Ordóñez Valverde, El sistema cultural del honor en las pandillas. *Análisis Político* **34**, 76–94 (2021), 10.15446/anpol.v34n102.99936.
50. A. Uksul, S. Cross, C. Gunsoy, The role of honour in interpersonal, intrapersonal and intergroup processes. *Social Pers. Psychol. Compass* **17**, e12719 (2022), 10.1111/spc3.12719.
51. A. Hayes, *Introduction to Mediation, Moderation, and Conditional Process Analysis* (Guilford, 2017).
52. Á. Gómez, A. Vázquez, The power of 'feeling one' with a group: Identity fusion and extreme pro-group behaviours. *Int. J. Soc. Psychol.* **30**, 481–511 (2015).
53. El Panel, Encuesta europea para Sigma Dos: Los españoles los más movilizadas de Europa contra la invasión de Ucrania. *El Mundo*, 18 March 2022. https://www.elmundo.es/espana/encuestas/2022/03/17/6233830efdddffb3418b45d7.html.
54. C. Edmonson, Annotated transcript: Zelensky's speech to Congress. *New York Times*, 16 March 2022, https://www.nytimes.com/2022/03/16/us/politics/transcript-zelensky-speech.html.
55. J. Barnes, Why the U.S. was wrong about Ukraine and the Afghan War. *New York Times*, 24 March 2022. https://www.nytimes.com/2022/03/24/us/politics/intelligence-agencies-ukraine-afghanistan.html.
56. W. Swann *et al.*, Contemplating the ultimate sacrifice: Identity fusion channels pro-group affect, cognition, and moral decision-making. *J. Pers. Soc. Psychol.* **106**, 713–727 (2014).
57. W. Manchester, *Goodbye Darkness: A Memoir of the Pacific War* (Random House, 1988), p. 451.
58. J. Stern, *My War Criminal: Personal Encounters with an Architect of Genocide* (Ecco, 2020).
59. W. Wildman, R. Sosis, Stability of groups with costly beliefs and practices. *J. Artif. Soc. Soc. Simul.* **14**, 6 (2011). http://jasss.soc.surrey.ac.uk/14/3/6.html.
60. H. Whitehouse, *The Ritual Animal: Imitation and Cohesion in the Evolution of Social Complexity* (Oxford University Press, 2022).
61. C. Moskos, "Surviving the War in Vietnam" in *Stranger at Home: Vietnam Veterans Since the War*, C. Figley, S. Leventman, Eds. (Praeger, 1980), pp. 71–85.
62. S. Atran, R. Axelrod, Reframing sacred values. *Negotiation J.* **24**, 221–246 (2008).
63. C. Holbrook, K. Izuma, C. Deblieck, D. M. Fessler, M. Iacoboni, Neuromodulation of group prejudice and religious belief. *Soc. Cogn. Affect. Neurosci.* **11**, 387–394 (2016).

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64. R. Stark, *The Rise of Christianity: How the Obscure, Marginal Jesus Movement Became the Dominant Religious Force in the Western World in a Few Centuries* (HarperSanFrancisco, 1997).
65. H. Gintis, S. Bowles, R. Boyd, E. Fehr, *Moral Sentiments and Material Interests* (MIT Press, 2005).
66. C. Lamm, C. Batson, J. Decety, The neural substrate of human empathy. *J. Cogn. Neurosci.* **19**, 42–58 (2007).
67. R. Mayer, M. B. Gavin, Trust in management and performance. *Acad. Manage. J.* **48**, 874–888 (2005).
68. J. Henrich, *The WEIRDest People in the World: How the West Became Psychologically Peculiar and Particularly Prosperous* (Farrar, Straus and Giroux, 2020).
69. A. Vannoy, U.S. involvement in WWII: How (and how much) the military grew. *Warfare History Network* (2020) https://warfarehistorynetwork.com/us-involvement-in-wwii-how-the-military-grew/.
70. D. Vergun, During WWII, industries transitioned from peacetime to wartime production. *DOD News*, 27 March 2020. https://www.defense.gov/News/Feature-Stories/story/Article/2128446/during-wwii-industries-transitioned-from-peacetime-to-wartime-production/.
71. P. Ulrich, *Overwhelming Force–A Persistent Concept of US Military Thinking* (Royal Danish Defence College, Copenhagen, 2013).
72. S. Atran, A question of honor: Why the Taliban fight and what to do about it. *Asian J. Soc. Sci.* **3**, 341–361 (2010).
73. S. Atran, ISIS is a revolution, *AEON* (15 December 2015). https://aeon.co/essays/why-isis-has-the-potential-to-be-a-world-altering-revolution.
74. A. Isaacs, William Colby's Vietnam. *Washington Post*, 24 December 1989. https://www.washingtonpost.com/archive/entertainment/books/1989/12/24/william-colbys-vietnam/2c931967-01d7-4b20-af46-142bdb98533d/.
75. B. Connable *et al.*, *Will to Fight: Returning to the Fundamentals of War* (Rand Corp, Santa Monica, 2019).
76. G. Dorronsoro, *The Taliban's Winning Strategy in Afghanistan* (Carnegie Endowment for International Peace, Washington DC, 2009). https://carnegieendowment.org/files/taliban_winning_strategy.pdf.
77. J. Strakes, Fourth generation conflict? Local social formations and insurgencies in Post-Ba'ath Iraq. *J. Third World Stud.* **34**, 27–44 (2007).
78. M. Bloom, How fairy tales shape fighting spirit. *The Telegraph*, 31 March 2023, https://www.thetelegraph.com/news/article/how-fairy-tales-shape-fighting-spirit-ukraine-s-17872418.php.
79. U.S. Dept. of Defense, "Quadrennial defense review report" (2006), p. 18. https://www.globalsecurity.org/military/library/policy/dod/qdr-2006-report.htm.
80. M. Fischerkeller, R. Harknett, Persistent engagement and cost imposition. *Lawfare* (6 February 2020). https://www.lawfareblog.com/persistent-engagement-and-cost-imposition-distinguishing-between-cause-and-effect.
81. J. Nye, The information revolution and soft power. *Curr. Hist.* **113**, 19–22 (2014).
82. W. Swann *et al.*, Identity fusion: The interplay of personal and social identities in extreme group behavior. *J. Pers. Soc. Psychol.* **96**, 995–1011 (2009).
83. J. Jiménez *et al.*, The dynamic identity fusion index. *Soc. Sci. Comput. Rev.* **34**, 215–228 (2015).
84. A. Vázquez, Á. Gómez, S. Atran, Open Science Framework Data Storage for "Transcultural pathways to the will to fight". Open Science Framework (OSF). https://osf.io/zdqbm/?view_only=1a74611bd9f84926a928a050335abfef. Accessed 17 May 2023.

Downloaded from https://www.pnas.org by 92.184.112.155 on June 6, 2023 from IP address 92.184.112.155.