Hierarchical cultural values predict success and mortality in high-stakes teams

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Functional accounts of hierarchy propose that hierarchy increases group coordination and reduces conflict. In contrast, dysfunctional accounts claim that hierarchy impairs performance by preventing low-ranking team members from voicing their potentially valuable perspectives and insights. The current research presents evidence for both the functional and dysfunctional accounts of hierarchy within the same dataset. Specifically, we offer empirical evidence that hierarchical cultural values affect the outcomes of teams in high-stakes environments through group processes. Experimental data from a sample of expert mountain climbers from 27 countries confirmed that climbers expect that a hierarchical culture leads to improved team coordination among climbing teams, but impaired psychological safety and information sharing compared with an egalitarian culture. An archival analysis of 30,625 Himalayan mountain climbers from 56 countries on 5,104 expeditions found that hierarchy both elevated and killed in the Himalayas: Expeditions from more hierarchical countries had more climbers reach the summit, but also more climbers die along the way. Importantly, we established the role of group processes by showing that these effects occurred only for group, but not solo, expeditions. These findings were robust to controlling for environmental factors, risk preferences, expedition-level characteristics, country-level characteristics, and other cultural values. Overall, this research demonstrates that endorsing cultural values related to hierarchy can simultaneously improve and undermine group performance.

hierarchy | culture | groups | coordination | psychological safety

Hierarchy helps groups conquer many of the challenges and threats that they face. For example, hierarchical differentiation can increase group performance by clearly defining roles that facilitate coordination (1) and the integration of information (2, 3) and by creating patterns of deference that reduce intragroup conflict, especially when group members are interdependent (4, 5).

Hierarchy, however, also has the potential to kill. Rigid hierarchies limit low-ranking group members from voicing their opinions and concerns. This lack of participative voice can produce negative outcomes, including greater mortality (6, 7). Hierarchy can also reduce feelings of psychological safety (8), thereby impairing group communication (9) and performance (10). In contrast, when hierarchies allow lower ranked individuals to speak up and share relevant information, groups can effectively identify critical errors and prevent them from having adverse consequences (11).

The above research suggests that hierarchy can produce both the best and the worst outcomes for groups and organizations. Our research seeks to establish the dual role of hierarchy by drawing on experimental data from an international sample of expert mountain climbers and over 100 y of archival data from mountain-climbing expeditions in the Himalayas. We show that expert climbers believe that the cultural value of hierarchy is a significant determinant of a number of group processes that are critical to expedition success and failure. Additionally, we demonstrate that cross-national variation in the cultural value of hierarchy predicts both summit and fatality rates during mountain-climbing expeditions in the Himalayas. Expeditions from countries that value hierarchy are more likely to achieve the best possible outcome—summiting the mountain—and the worst possible outcome—suffering fatalities. Importantly, we show that these results emerge only for group, but not solo, expeditions, demonstrating that group processes are essential for the effects of hierarchy to emerge.

In their seminal work on culture, based on samples of more than 70,000 respondents from over 70 countries, Schwartz (12) and Hofstede (13, 14) each articulated a cultural value relevant to the present work—hierarchy and power distance, respectively. Schwartz defined the cultural value of hierarchy as "A cultural emphasis on the legitimacy of an unequal distribution of power, roles and resources" (ref. 12, p. 27). He argues that people in hierarchical societies are socialized to comply with the obligations and rules attached to their hierarchical roles and show deference to superiors (12). This cultural value leads highly ranked individuals to expect deference from lower ranked individuals and makes it difficult for lower ranked members to speak up and raise their concerns when necessary. Hofstede used the concept of power distance to describe cultural variation in hierarchy, which he defined as "the extent to which members of society accept the fact that power in institutions and organizations is distributed unequally" (ref. 13, p. 45). He argued that lower ranked members in high-power-distance cultures are not expected to disagree with higher ranked members and that higher ranked members are not required to consult lower ranked members in the decision-making process (13, 14).

Even though many expedition members climbing in the Himalayas are far removed from their cultural context, we predicted

Significance

Functional accounts of hierarchy propose that hierarchy increases group coordination whereas dysfunctional accounts claim that hierarchy impairs performance by preventing low-ranking team members from voicing their perspectives. This research presents evidence for both accounts within the same dataset. Analysis of archival data from 30,625 Himalayan mountain climbers from 56 countries on 5,104 expeditions demonstrate that expeditions from countries with hierarchical cultural values had more climbers reach the summit, but also more climbers die along the way. Importantly, we established the role of group processes (i.e., coordination, psychological safety, information sharing) by showing that these effects occurred only for group, but not solo, expeditions. These results establish that endorsing cultural values related to hierarchy can simultaneously improve and undermine group performance.

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that the hierarchical values of one's country of origin would still exert influence over climbing outcomes because individuals carry their culture with them even when they are far from home (15). For example, the cultural attitudes of one's home country toward corruption predict parking violations among United Nations diplomats working in the United States (16) and tax evasion levels among foreign business owners in the United States (17). These findings demonstrate that the cultural values of one's home country predict behavior even when people are abroad.

The predictive power of cultural values is likely to be even stronger when people also face uncertainty. Consistent with this idea, researchers have argued that, when individuals are in an unfamiliar and uncertain context, they use past experiences and cultural assumptions to make sense of the novel environment (18).

Our research examines the effect of cross-national variation in hierarchical cultural values on the performance of mountain-climbing teams. Mountain climbing is an ideal context in which to study hierarchy. Teams of climbers must make decisions regarding navigation, climbing speed, and climbing route (19) in an uncertain context. Expedition members must coordinate their activities, monitor their progress and health status, and listen and respond to feedback (19). Thus, to be successful and avoid potentially fatal errors, climbers need to communicate frequently and coordinate effectively. We predicted that hierarchical values could have both beneficial and detrimental consequences for these processes.

We predicted that climbing teams from more hierarchical cultures would be more likely to summit in real climbing expeditions. A clear chain of command within a climbing team is critical for success because it clarifies each member's role and responsibilities during both ascent and descent and helps to avoid coordination errors such as "traffic jams" and bottlenecks on the mountain. This aspect is consistent with the functional perspective on hierarchy that emphasizes how hierarchy facilitates coordination and reduces conflict (3). Research has found that the benefits of hierarchy are especially pronounced under conditions of high interdependence (5), such as the conditions faced by high-altitude climbers.

However, climbing teams need to use the different perspectives of all of the team members to avoid catastrophic failure. If hierarchical cultures create a climate that prevents low-ranking members from voicing their perspectives or expressing their safety concerns, the group may encounter life-threatening conditions that could have been avoided (20). Even when the entire group's safety is jeopardized, low-ranking members of hierarchical cultures may suppress their perspectives to avoid challenging authority (21). Therefore, even in extreme and hazardous conditions, strong hierarchical values may stifle group psychological safety and information sharing and increase the risk of producing the worst possible group outcome: fatalities. Thus, we also predicted that climbing teams from more hierarchical cultures would be more likely to suffer fatalities.

In study 1, we sought to establish the importance of group processes in mountain-climbing outcomes. Additionally, we wanted to determine whether expert climbers believed that a hierarchical culture would improve group coordination in climbing teams, but undermine psychological safety and information sharing relative to an egalitarian culture.

We conducted an online experiment with highly experienced mountain climbers from 27 different countries (see *Methods* and *SI Text* for additional study details). Respondents first reported on the team-level factors that were most important for expedition success and failure using free response. A majority of respondents indicated in their free responses that team coordination, psychological safety, or information sharing were critically important to expedition success (68.3% of responses) and expedition failure (55.0% of responses; see Table S1 for sample responses). When asked to indicate the importance of team processes (e.g., communication, coordination) for the success or failure of a climbing expedition (1 = not at all important, 7 = very important), respondents confirmed their significance (M = 6.50, SD = 0.68).

Next, participants rated the relative importance of team processes versus individual climber characteristics for the success or failure of climbing expeditions (1 = not at all important, 7 = very important). These experienced climbers rated team processes as more important than individual characteristics [M = 4.87, SD = 1.64, significantly greater than the scale midpoint, $t(128) = 26.85$, $P < 0.001$]. Thus, highly experienced mountain climbers reported that team processes are critically important for the success and failure of climbing expeditions and also reported that team processes are more important than individual climber characteristics.

Next, respondents were instructed to think about a climbing team that was about to climb one of the 8,000-m (26,257-ft) peaks in the Himalayas. They were randomly assigned to one of two experimental conditions: the team they thought about was described as having either a hierarchical culture or an egalitarian culture. They then answered nine questions about the team's expected level of coordination, psychological safety, and information sharing.

To test our hypothesis that the hierarchy manipulation would have opposing effects on coordination versus psychological safety and information sharing, we conducted a 2 (condition: hierarchy vs. egalitarianism) × 3 (measure: coordination vs. psychological safety vs. information sharing) mixed-model analysis of variance (ANOVA) with repeated measures on the second factor. As predicted, the condition × repeated measures interaction was significant [$F(1, 128) = 16.16$, $P < 0.001$]; respondents thought that a hierarchical culture would have opposing effects on coordination versus psychological safety and information sharing. [The interaction remained significant after controlling for the number of previous team expeditions, number of previous solo expeditions, highest altitude reached, number of serious injuries experienced, number of deaths experienced, gender, and age; $F(1, 102) = 14.92$, $P < 0.001$.] Respondents in the hierarchical-culture condition (M = 5.17, SD = 1.08) indicated that the team would be able to coordinate their actions more effectively than those in the egalitarian-culture condition [M = 4.71, SD = 1.51, $t(128) = 2.03$, $P = 0.044$]. However, respondents in the hierarchical-culture condition also thought that the team would experience less psychological safety (M = 4.68, SD = 1.46) and information sharing (M = 4.96, SD = 1.41) than respondents in the egalitarian-culture condition [psychological safety: M = 5.45, SD = 1.16; information sharing: M = 5.49, SD = 1.12; $t(128) = -3.34$, $P = 0.001$ and $t(128) = -2.33$, $P = 0.021$, respectively] (Fig. 1).

Study 1 demonstrates that expert mountain climbers believed that climbing teams with a hierarchical culture would be more likely to engage in group processes that both improve and harm their chance of success compared with climbing teams with an egalitarian culture. Overall, highly experienced climbers validated our prediction that a hierarchical culture may improve team coordination, but harm team psychological safety and information sharing. Importantly, these group processes are the same group processes that respondents identified as being critically important to the success or failure of the expedition.

In study 2, we sought to observe the consequences of hierarchical cultural values on actual team performance in a rich empirical context. Using Himalaya mountain-climbing data from 5,104 group expeditions involving 30,625 climbers from 56 countries (22) (see *Methods* for additional sample and variable details), we tested whether expeditions from more hierarchical cultures had more climbers reach the summit than expeditions from less hierarchical cultures. We also tested whether expeditions from more hierarchical cultures suffered more fatalities than expeditions from less hierarchical cultures. In sum, we

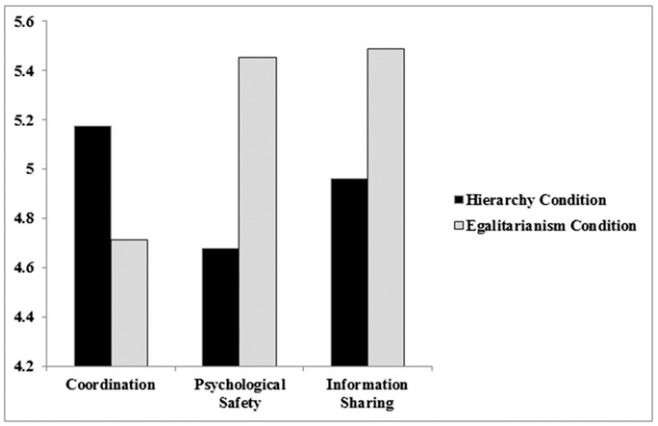

Fig. 1. Respondents in the hierarchy condition indicated that the team they read about would be able to coordinate their actions more effectively, but would also be more likely to experience less psychological safety and less information sharing, than respondents in the egalitarianism condition (study 1).

attempted to capture both the beneficial and detrimental effects of hierarchy in the same empirical context.

Our measure of expedition success was the number of climbers who reached the summit. Our measure of expedition failure was the number of climbers who died during the expedition. We used three different measures of cultural hierarchy as predictors to test our hypotheses—Schwartz's hierarchy index [based on his hierarchy and egalitarianism values (reverse-coded)] (12), Hofstede's power distance measure (13, 14), and a combined hierarchy measure that included all three.

To demonstrate that our findings are robust to factors that could influence success and failure at high altitude, we controlled for (*i*) environmental factors, (*ii*) risk preference factors, (*iii*) expedition-level characteristics, (*iv*) country-level characteristics, and (*v*) other cultural values identified by Schwartz and Hofstede (12–14, 23). Variables with substantive skew were log-transformed (24). We used econometric procedures to analyze our data by including clustered robust SEs, which take into account the nestedness of expeditions within countries (see Tables S2–S4 for variable details and correlations among variables).

To test our first hypothesis that expeditions from hierarchical cultures will have more climbers reach the summit, we ran a series of zero-inflated negative binomial regressions. As predicted, the combined hierarchy measure was significantly associated with the number of climbers who reached the summit in all six regression steps ($P < 0.001$ in steps 1, 2, 3, and 6; $P < 0.01$ in steps 4 and 5). The same pattern of results emerged when using the Schwartz hierarchy measure and the Hofstede power distance measure individually. (See Table 1 for regression results with all control variables and Table S5 for coefficients and clustered robust SEs for all other summit models.) Consistent with the functional perspective on hierarchy, expeditions consisting of climbers from countries whose culture strongly embraced hierarchy had more climbers reach the summit.

We tested our second hypothesis that expeditions from hierarchical cultures will suffer more fatalities on the mountain using the same analytic strategy. As predicted, the combined hierarchy measure was significantly associated with the number of deaths in all six regression steps ($P < 0.001$ in steps 3 and 6; $P < 0.01$ in steps 1, 2, 4, and 5). The same pattern of results emerged when using the Schwartz hierarchy measure and the Hofstede power distance measure individually. (see Table 1 for regression results with all control variables and Table S6 for coefficients and clustered robust SEs for all other death models). Consistent with the dysfunctional perspective on hierarchy, expeditions consisting of climbers from countries whose culture strongly embraced hierarchy had more climbers die while climbing. (See Tables S7–S9 for the results of robustness checks related to our first two hypotheses.)

To test for the role of group processes, we also analyzed solo expeditions (i.e., expeditions with only one nonhired climber; $n = 1{,}079$). We predicted that, if group processes drive the effects of hierarchy on group outcomes, then cultural hierarchy would not predict summiting and fatality rates among solo expeditions. This prediction was supported because the direct effect of the combined hierarchy measure was not significantly associated with either summiting (b = –0.061, SE = 0.124, $P = 0.621$) or dying (b = –0.105, SE = 0.246, $P = 0.670$) for solo expeditions (see *SI Text* for additional analyses comparing the outcomes of real and pseudo groups).

In sum, hierarchical cultural values predicted summiting and fatality rates only for group expeditions. Hierarchy did not predict summiting or fatality rates in solo expeditions, providing evidence that group processes are a critical driver of the observed effects.

The present findings contribute to the cross-cultural literature by demonstrating that variation in hierarchical values has important consequences for team performance (25). This finding is particularly important because prior research has shown that, once adopted, hierarchical values are hard to change and exert their influence over long periods of time (26, 27). Furthermore, in contrast to structural hierarchies, cultural values may be harder to detect given culture often influences people at an unconscious level (28). By examining the effects of hierarchical cultural values in a high-stakes context, our research responds to the recent call to deeply examine cultural values other than individualism–collectivism (25).

This research also contributes to the hierarchy literature by showing that models of hierarchy that have been applied to teams are also relevant for country-level values. Indeed, we found cultural measures of hierarchy had very similar effects within teams that previous research has found in relation to structural forms of hierarchy (5, 29). Hierarchy, structurally and as a cultural value, can both help and hurt team performance.

Importantly, the current effects are likely occurring not because cultural values alter group structure but because these values affect group processes. As Gordon Janow, the Director of Programs at Alpine Ascents International, described in an interview with us, "Expeditions don't differ much in how they are structured. What varies is how people interact within those structures. And culture is one factor that influences those interactions and communication patterns."

For better or worse, hierarchy exerts strong influence over group outcomes. Strong hierarchical values pave the way for coordinated effort, but, at the same time, these values can mute the voice of others in the face of threat. Our results suggest that, to avoid errors, strong hierarchical cultures need to implement mechanisms geared toward encouraging low-ranking members to voice their perspectives and for high-ranking members to integrate this feedback. Hierarchy, it turns out, can elevate climbers to the summit, but at a potentially steep cost.

Methods

Study 1.

Sample details. Overall, 146 climbers from 27 different countries completed the survey. [Sixteen respondents were excluded from all analyses because they provided the exact same response to all nine coordination, psychological safety, and information sharing measures (e.g. all 7s on a 7-point scale), which indicated a lack of attention or engagement (for a description of why nonvariance in response sets is a problem, see refs. 30–32). Nationalities represented in our sample included the following: Argentina ($N = 1$), Australia ($N = 2$), Belgium ($N = 2$), Belarussia ($N = 1$), Brazil ($N = 3$), Canada ($N = 7$), Denmark ($N = 2$), England ($N = 12$), Germany ($N = 1$), Ireland ($N = 1$), Italy ($N = 1$), Luxembourg ($N = 1$), Mexico ($N = 1$), Mongolia ($N = 1$), Nepal ($N = 21$),

Table 1. Group expeditions (summits and deaths)

Row	Variable	DV: no. of summits	DV: no. of deaths
1	Hierarchy (Schwartz and Hofstede combined)	0.203*** (0.049)	0.669*** (0.135)
2	Region fixed effect	Included	Included
3	Season fixed effect	Included	Included
4	Year	0.005 (0.003)	−0.029** (0.011)
5	Standard route dummy (1 = yes, 0 = no)	0.083 (0.059)	−0.475* (0.205)
6	Illegal expedition dummy (1 = yes, 0 = no)	0.033 (0.082)	Summit model only
7	Terminated because too risky (1 = yes, 0 = no)	Death model only	0.143 (0.261)
8	Average age of climbers	−0.002 (0.002)	−0.017 (0.016)
9	No. of expedition members	0.042*** (0.006)	−0.011 (0.015)
10	No. of hired Sherpas	0.130*** (0.015)	0.102 (0.065)
11	No. of hired non-Sherpas	0.019*** (0.005)	0.222* (0.105)
12	Unique expedition roles	−0.020 (0.016)	0.160* (0.071)
13	Leader experience	0.008* (0.003)	0.013 (0.018)
14	Average climber experience	−0.007 (0.008)	−0.067 (0.063)
15	SD of climber experience	0.011** (0.004)	0.040 (0.042)
16	No. of camp sites	0.069*** (0.020)	−0.071 (0.036)
17	No. climbers using O_2	0.009 (0.008)	−0.007 (0.029)
18	No. of women on expedition	0.005 (0.010)	−0.043 (0.040)
19	Peak height in meters (log)	−2.654*** (0.213)	5.023*** (1.427)
20	High point reached (log)	Death model only	−0.497 (0.568)
21	No. of climbers summited	Death model only	−0.093* (0.041)
22	Gini index	0.007 (0.004)	−0.003 (0.011)
23	GDP per capita (log)	0.057 (0.056)	0.176 (0.127)
24	Population (log)	−0.020 (0.017)	−0.007 (0.071)
25	Climatic demands index	0.001 (0.002)	0.004 (0.007)
26	Mean elevation native country (log)	0.016 (0.021)	−0.161* (0.081)
27	Mean years of schooling	−0.011 (0.019)	0.001 (0.052)
28	Industrial performance index	0.026 (0.176)	−0.975 (0.647)
29	Democracy index	−0.035** (0.013)	−0.091 (0.074)
30	Mastery (Schwartz)	0.272* (0.136)	0.705 (0.721)
31	Harmony (Schwartz)	0.251** (0.094)	1.158** (0.375)
32	Embeddedness index (Schwartz)	−0.121** (0.042)	−0.056 (0.104)
33	Individualism (IDV; Hofstede)	0.000 (0.001)	0.009 (0.006)
34	Masculinity (MAS; Hofstede)	−0.001(0.001)	−0.007 (0.004)
35	Uncertainty avoidance (UAI; Hofstede)	−0.002 (0.001)	0.003 (0.006)
36	Observations	4,025	4,001
37	Mean VIF[†]	3.99	4.17

*$P \leq 0.05$; **$P < 0.01$; ***$P < 0.001$. Results from zero-inflated negative binomial regression. DV, dependent variable; IDV, individualism; MAS, masculinity; UAI, uncertainty avoidance; VIF, variance inflation factor. Schwartz refers to ref. 12. Hofstede refers to refs. 13 and 14.

[†]Although present, VIF was not severe in most models. Max VIF was less than 10 in all models, which is the recommended cutoff value for acceptable levels of VIF (50).

The Netherlands ($N = 1$), New Zealand ($N = 5$), Poland ($N = 1$), Russia ($N = 1$), Scotland ($N = 3$), Serbia ($N = 1$), Singapore ($N = 1$), Slovenia ($N = 1$), South Africa ($N = 1$), Spain ($N = 1$), Switzerland ($N = 3$), and the United States ($N = 45$). Nine respondents did not provide their nationality.] Respondents were, on average, 41.80 y old (SD = 13.99; age range 18–80), had participated in 30.80 expeditions (SD = 50.66; expedition range 1–335), and had served as the leader or coleader on roughly one third of those expeditions (M = 10.87, SD = 22.35; led expedition range 0–130). Respondents reached their summit or altitude goal on over two thirds of the expeditions in which they participated (M = 22.86, SD = 41.78; summit range 0–300). Additionally, 43 respondents (33.1%) reported that at least one serious injury occurred during an expedition in which they participated (number of serious injuries range 0–10), and 17 respondents (13.1%) indicated that at least one fatality occurred during an expedition in which they participated (number of fatalities range 0–5). Respondents reported reaching an average maximum altitude of 5,834 m across all of the expeditions in which they had participated (19,140 ft; SD = 1,886 m/6,188 ft; max altitude range 200–8,850 m/656–29,035 ft). Twenty respondents (15.4%) had climbed above the symbolically significant and particularly dangerous threshold of 8,000 m (26,257 ft). Fourteen respondents (10.8%) were female.

Respondents first answered two free-response questions: "According to your own personal views, what are the specific team-level factors that contribute to a successful [failed] climbing expedition?" and then answered the following two questions: "How important are team processes (e.g. communication, coordination) for the success or failure of a climbing expedition?" (from 1 = "Not at all important" to 7 = "Extremely important") and "How important are team processes (e.g. communication, coordination) relative to the individual characteristics of team members (e.g. age, strength) for the success or failure of a climbing expedition?" (from 1 = "Individual characteristics are much more important than team processes" to 7 = "Team processes are much more important than individual characteristics").

Experimental manipulation. Participants were next randomly assigned to one of two experimental conditions: a hierarchy condition or an egalitarianism condition. To manipulate hierarchy, respondents read a short scenario. Respondents read:

> One of our interests is the extent to which the endorsement of hierarchy [egalitarianism] affects the performance of mountain climbing expeditions. Hierarchical [Egalitarian] groups value and support rank-order differences [equality] among group members. Thus, hierarchical [egalitarian] groups emphasize norms and values specifying that some group members have higher rank than others [that group members are equal in rank].
>
> Now imagine that a team with a hierarchical [an egalitarian] culture is about to climb one of the 8,000-meter (26,257-ft) peaks in the

Himalayas. Please respond to the statements below based on your knowledge of and experience with mountain climbing.

We then assessed how effectively respondents thought the group would be able to coordinate their actions, the extent to which respondents thought the group would experience a psychologically safe communication climate, and the extent to which respondents thought the group would effectively share information among team members (see *SI Text* for a description of all items used in study 1).

Study 2. Our data represent all expeditions that have climbed in the Himalayas between 1905 and 2012 from the Himalaya Database (22), a rich compilation of records based on detailed expedition archives, books, alpine journals, and correspondence with Himalayan climbers. We used expedition-level as well as aggregated individual-level data to create the dataset for our study.

The average number of climbers per expedition in our sample was 7.16 (SD = 5.29), and the average number of climbers who successfully reached the summit per expedition was 2.26 (SD = 3.35). Furthermore, across all of the expeditions in our sample, 549 climbers died (i.e., 1.8% of all climbers). At least one death occurred on about 1 in 12 expeditions (343 expeditions; 8.1% of all expeditions).

Our main analyses focused exclusively on group expeditions. To isolate the effect of shared cultural values on group performance, we restricted our sample to include only monocultural expeditions (i.e., all expedition members shared the same nationality). We also excluded expeditions originating from presently defunct countries (e.g., Czechoslovakia, Soviet Union, etc.) because the cultural values or control variables crucial to our analyses did not exist for these countries.

Independent Variable Details.

Schwartz value inventory. The Schwartz Value Inventory measures are based on responses from more than 70,000 teachers and students in 75 different countries (23) and consist of five items measuring hierarchy such as "As a guiding principle in my life, authority (the right to lead or command) is of supreme importance" and six items measuring egalitarianism on a 7-point scale, such as "As a guiding principle in my life, equality (equal opportunity for all) is of supreme importance." Because the measures of hierarchy and egalitarianism were at opposite ends of a single dimension and highly correlated, we created a single Schwartz hierarchy index by standardizing both the hierarchy and egalitarianism scales, multiplying the egalitarianism scale by −1, and averaging the two standardized subscales together ($\alpha = 0.70$). Higher scores indicate stronger hierarchical values.

Hofstede cultural values. Hofstede (13, 14) developed his influential cultural dimensions after factor analyzing an international survey completed by more than 88,000 employees at IBM. Currently, cultural dimensions are available for 101 countries. The measure consists of three items: e.g., "How frequently, in your experience, are employees afraid to express disagreement with their managers." Higher scores on the power distance index indicate stronger hierarchical preferences.

Overall, we used three different measures of cultural hierarchy to test our hypotheses. First, we used Schwartz's hierarchy measure (i.e., hierarchy and reverse-coded egalitarianism). Second, we used Hofstede's (13, 14) power distance cultural dimension. Third, we created an overall index of hierarchy that combined the standardized Schwartz and standardized Hofstede measures ($\alpha = 0.71$). Higher scores indicate stronger hierarchical values for all three measures.

Control Variable Details.

Environmental control variables. Heterogeneity in Himalayan region, weather, and year of expedition can affect high altitude climbing safety (33). To conservatively control for this heterogeneity in environmental factors in our regression models, we included fixed effects for Himalayan region (i.e., each expedition is identified in the dataset as occurring in one of 20 different areas in the Himalayas) and season (34). We also controlled for the year of the expedition (as a continuous variable) because climber equipment and the commercialization of climbing have changed over time. Treating year as a continuous variable in this type of situation is common (35–41).

Risk preference control variables. To establish that the observed effects were not driven by differences in risk preferences, we controlled for several risk preference variables provided by the Himalaya Database. First, we controlled for whether or not the expedition used a standard climbing route because using a nonstandard climbing route can be inherently risky because less traversed and less patrolled areas of the mountain are often more technically difficult and removed from forms of expeditionary support (e.g., medical aid). Therefore, we acquired data on the type of route that the expedition used. The "standard route" variable was coded as 1 for expeditions that used a standard route and 0 for expeditions that used a nonstandard route.

Second, we controlled for whether the expedition was authorized/legal or unauthorized/illegal because unauthorized expeditions are inherently more risky (included in summit models only because there was no variance in deaths on this variable for group expeditions). Unauthorized or illegal expeditions were coded 1, and authorized or legal expeditions were coded 0.

Third, we controlled for whether or not the expedition responded to increased risk by terminating the expedition. An important measure of an expedition's tolerance of risk is how its members respond to dangerous situations on the mountain. Expeditions were identified in the dataset as being terminated for 1 of 15 different reasons: unknown, success (main peak), success (subpeak), success (claimed), **bad weather, bad conditions, accident, illness, AMS, exhaustion, or frostbite, lack (or loss) of supplies or equipment, lack of time, route technically too difficult, lack of experience, strength, or motivation**, did not reach base camp, did not attempt climb, attempt rumored, and other. We coded the reasons in bold above as 1 = relating to risk preferences and all of the reasons not in bold as 0 = unrelated to risk preferences.

Expedition control variables. We also controlled for a number of expedition-specific variables including (*i*) the average climber age per expedition because age may negatively relate to climber fitness and because the predictive power of cultural values is stronger for older people (39); (*ii*) the total number of climbers because more climbers make bottlenecks more likely and coordination more difficult; (*iii*) the number of hired Sherpas (i.e., local support climbers/guides) on each expedition because Sherpas typically have a wealth of experience and intimate knowledge of particular peaks and routes; (*iv*) the number of hired people who were not Sherpas because other hired individuals support various needs and may have specific knowledge related to the mountain; (*v*) the number of unique roles on the expedition (e.g., cook, porter, etc.) because coordinating the actions of individuals with many different responsibilities may be more difficult than coordinating the actions of individuals with similar responsibilities; (*vi*) the number of previous expeditions led by the same leader because leaders who have led other expeditions in the Himalayas have considerable knowledge of the mountain and challenges from which to draw, making them potentially more valuable than novice leaders; (*vii*) the average number of previous expeditions members had participated in before the current expedition because, as with leader experience, individuals who have participated in multiple expeditions in the past have more knowledge to draw on that may increase their chances of summiting and decrease their chances of dying; (*viii*) the SD of climber experience because differences in experience and ability within a group may lead to coordination challenges and conflict; (*ix*) the number of camp sites established during the expedition because camp sites can shelter climbers from extreme weather conditions and allow climbers to recover from physical and mental fatigue and because successful expeditions summit faster than unsuccessful ones (33); (*x*) the number of climbers using oxygen because oxygen use may affect physiological responses to high altitude; (*xi*) the number of women on the expedition because the presence of women can increase male risk-taking (42), collective intelligence is higher in groups with more women (43), and men outperform women on motor behaviors and physical tasks such as mountain climbing (44); (*xii*) peak height (log-transformed) because higher elevation is associated with greater health risks (45); (*xiii*) the high point on the mountain reached by the expedition (log-transformed, death models only) because climbers that reached higher points may have been more vulnerable to danger; and (*xiv*) the number of climbers who summited (death models only) because summiting could expose a team to more risks (33).

Country-level control variables. We also controlled for a number of country-level variables. We controlled for (*i*) income inequality (Gini, CIA World Factbook) to control for macroeconomic differences in social hierarchies because economic inequality is associated with greater power distance (14, 46); (*ii*) GDP per capita (log-transformed, World Bank) because climbers from wealthier countries may have better climbing equipment than climbers from poorer countries and because past research has shown that GDP per capita is negatively associated with hierarchy values (47); (*iii*) population size (log-transformed, World Bank) because more populous countries have a bigger talent pool that may produce better climbers; (*iv*) Climatic Demands Index (48) because more demanding climates are positively associated with more hierarchical institutions (48), and (*v*) the mean elevation of the expedition's native country (Portland State University Economics Database, log-transformed) because climbers from countries with a higher mean elevation are more likely to be acclimated to high altitudes and may have more opportunities to practice mountain climbing. To further account for concerns

related to country selection bias (49), we also controlled for (*vi*) the mean number of years of schooling for adults (United Nations Human Development Indicator); (*vii*) the United Nations Competitive Industrial Performance Index score (United Nations Industrial Development Organization); and (*viii*) Democracy Index Values (Economist Intelligence Unit).

Other cultural values. Finally, we controlled for other cultural values as originally identified by Schwartz (harmony, embeddedness, mastery, affective autonomy, and intellectual autonomy) and Hofstede (individualism, masculinity, and uncertainty avoidance) (13, 14, 23) to demonstrate that the effect of hierarchy on summiting and deaths was robust to other cultural dimensions on which societies differ. Mastery and harmony (reverse-coded) did not demonstrate sufficient reliability ($\alpha = 0.55$) so we treated each as a separate variable in our models. However, we standardized and combined Schwartz's measures of embeddedness, affective autonomy (multiplied by −1), and intellectual autonomy (multiplied by −1) to create a single statistically reliable Schwartz embeddedness index ($\alpha = 0.94$).

Our independent and control variables were always entered in six steps: (*i*) hierarchical cultural value only, (*ii*) fixed effects for region and season and year added, (*iii*) risk preference variables added [standard route dummy (1 = yes, 0 = no), illegal expedition dummy (1 = yes, 0 = no; summit models only)], and terminated because too risky dummy (1 = yes, 0 = no; death models only), (*iv*) expedition characteristics added [average age, total members, total hired Sherpas, total hired non-Sherpas, unique expedition roles, leader experience, average climber experience, SD of climber experience, total camp sites, number of climbers using oxygen, number of female climbers, peak height (log-transformed), high point reached (log-transformed; death models only), number of members who summited (death models only)], (*v*) country-level variables added [Gini, GPD per capita (log-transformed), population (log-transformed), Climatic Demands Index, mean elevation of native country (log-transformed), mean years of schooling, industrial performance index, and democracy index], and (*vi*) other cultural values added (mastery, harmony, embeddedness index, individualism, masculinity, uncertainty avoidance).

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