Cultural Orientation and Risk Perception: Development of a Scale Operating in a French Context

Bruno Chauvin* and Ianis Chassang

Cultural theory has often been invoked to explain risk preferences, yet empirical evidence for that influence has regularly been challenged. This research addresses this issue by reassessing the role of cultural orientation in understanding risk perception through the development of an alternative assessment tool of worldviews operating in a French context. Using data from two samples of French citizens (\(N = 192\) and \(N = 631\)), study 1 conducted exploratory and confirmatory factor analyses which provided support for a three-factor scale of worldviews: hierarchy-individualism, egalitarianism, and fatalism. Based on data from two other independent samples (\(N = 111\) and \(N = 422\)), study 2 affirmed, for each worldview, its convergent validity (with its counterpart in another worldview measure), discriminant validity (from all other subscales), and predictive validity (for specific patterns of risk perception). Of particular interest is that culturally diverse individuals hold divergent positions on risk (skepticism, sensibility, neutrality) depending on, and in proportion to, the (in)compatibility of the hazardous activity to their preferred worldview. Implications for risk management and communication are discussed.

KEY WORDS: Alternative measurement scale; cultural theory of risk; exploratory and confirmatory factor analyses; risk preferences; worldviews

1. INTRODUCTION

Research designed to address why individuals differ in their perceptions of the same hazard followed various paths, including cultural orientation (Slovic, 1999, 2000; see also Chauvin, 2018, for a recent overview). The relationships between cultural orientation and risk perception, however, remain a very debated issue—which is most probably due to the idiosyncrasies of the most dominant approach used to analyze social and cultural influences on risk perception; namely, the cultural theory of risk developed by Douglas and Wildavsky (1982) (Johnson & Swedlow, 2019a; Rippl, 2002).

The current research directly addresses this issue by reexamining the associations between cultural orientations and risk preferences, through the development and validation of an alternative assessment tool of cultural worldviews operating in a French context. The present article begins with a basic overview of the cultural theory of risk focused on features that serve the present study. This brief overview is followed by a short presentation of various approaches to operationalize cultural theory in survey research including a discussion of the methodological impediments they exhibited and the empirical relationship with risk perception they provided. The article proceeds then with two empirical studies dealing with the development (study 1) and the validation (study 2) of an innovative scale for measuring cultural worldviews; whether and to what degree distinct cultural worldviews are associated with distinct patterns of risk perception is part of study 2. Finally, a
general discussion highlights the main contributions of the present research, discusses its implications for risk management, and suggests directions for further research interested in “dissecting” the impact of cultural orientations on risk judgments.

1.1. The Cultural Theory (of Risk)

Cultural theory is originated in Douglas’ anthropological field work on the organization of social relations in tribal societies (e.g., Douglas, 1966). According to Tansey and O’Riordan (1999), the formalization of her observations came with the development of a typology based on two dimensions of sociality: grid and group (e.g., Douglas, 1978, 1999). The grid dimension refers to the degree of social regularizations and prescriptions while the group dimension taps the extent to which the individual’s life is absorbed in and sustained by group membership (see Thompson, Ellis, & Wildavsky, 1990, for details). When crossed, the grid and group dimensions generate a cultural map on which four quadrants are located, reflecting four distinct and competing cultural types or ways of life labeled hierarchy (high-grid, high-group), individualism (low-grid, low-group), egalitarianism (low-grid, high-group), and fatalism (high-grid, low-group) (following the most conventional terms; Mamadouh, 1999a). Each cultural type corresponds to a viable combination of social relations (pattern of privileged interpersonal relations) and cultural biases or worldviews (shared beliefs and values regarding society and how the world works and should work, including ideas about the functioning of nature1) that reinforce each other (Douglas, 1999; Thompson et al., 1990). The present study focused on cultural bias or worldviews held by individuals, but not on social relations they experience or prefer, since the former are the primary explanatory variables in the cultural theory account of risk perceptions (Kahan, 2012; Steg & Sievers, 2000). This is also in line with Rippl (2002) who argued for the possibility to infer cultural aspects from individual-level data (and connect them to risk perception).2

1See Schwarz and Thompson (1990) for a detailed approach connecting different views of nature to each cultural bias. See also Dake (1992) or Thompson, Ellis, and Wildavsky (1990) for further explanations regarding the incorporation of the so-called myths of nature (originated from ecological research) into the grid-group typology.

2See Johnson and Swedlow (2019a) or Mamadouh (1999a) about the importance of this issue.

Introduced to risk analysis in the early 1980s with the help of Wildavsky (e.g., Douglas & Wildavsky, 1982), cultural theory strongly challenged the dominating cognitive approach of risk perception at the time. “Mental models of risk, [in this view], are not solely matters of individual cognition, but also correspond to worldviews entailing deeply held beliefs and values about society” (Dake, 1991, p. 62; see also Wildavsky & Dake, 1990). More specifically, according to Dake (1991, 1992), worldviews provide powerful cultural lenses encouraging individuals to selectively highlight some hazards and disregard others. Why? Because like cultural (shared) values, worldviews strongly contribute to cultural group identities. As such, every affiliated member inherently intends to defend this identity each time it is perceived under threat, in proportion to the degree to which he/she has incorporated group’s cultural values as being central for him/herself (Kahan, 2012; Rokeach, 1973; Schwartz, 1999). How? As cultural (shared) values, worldviews are orienting dispositions that guide the evaluation of hazardous events in a manner supportive of individuals’ cultural identities. By conferring specific meaning to risky situations, by polarizing attention either on the attractiveness or the costs of new technologies, or else by influencing the weight of information related to hazardous activities—in a value-friendly direction in every case—cultural values contribute to construct individuals’ risk preferences (Douglas & Wildavsky, 1982; Kahan, 2012; Verplanken & Holland, 2002).3 Supporting evidence for this view has been provided by Gastil, Braman, Kahan, and Slovic (2011) for example, who found that cultural orientations were able to predict support for—or opposition to—stricter gun control in the United States or stricter carbon emission standards.

Persons with a hierarchic orientation are part of the establishment (Douglas & Wildavsky, 1982; Thompson et al., 1990). As such, they are committed to maintaining existing power structures that protect their interests and go along with their values of authority and social order. Their favored way to get there is to privilege trust in experts (who are also members of the establishment). Accordingly, providing technology is certified safe by experts, they approve it and regard nature as being tolerant to its

3For an extensive approach about the (social and psychological) mechanisms that explain how cultural worldviews shape individuals’ perceptions of risk, see the cultural cognition thesis developed by Kahan and coworkers (e.g., Kahan, 2012; Kahan, Braman, Gastil, Slovic, & Mertz, 2007; Kahan, Jenkins-Smith, & Braman, 2011).
adverse effects—viewing technology as a way to improve the quality of life (Dake, 1991, 1992). Persons who have an individualistic orientation are also part of the establishment; along with the hierarchists, they form the establishment coalition (Wildavsky & Dake, 1990; see Mamadouh, 1999a, for details). They want to maintain the system in power because it fits their values well: it allows market relationships and ensures the freedom to bid and bargain as well as to benefit from such activities (Dake, 1991; Jenkins-Smith & Herron, 2009). As a consequence, individualists hold a positive view of technological innovation and see the nature as being resilient to exploitation—regarding benefits as more than compensating for any environmental damage that is created (Dake, 1992; Thompson et al., 1990). Individualists, as hierarchists, are “technologically optimistic” (Wildavsky & Dake, 1990, p. 169). People who hold an egalitarian orientation value fairness and social justice. They exhibit strong support for participatory democracy and consensus-based decision making (Wildavsky & Dake, 1990). Accordingly, egalitarians are critical of every putative source of social inequality—like free commerce and industry, and suspicious of the system in power because they see it as working for its own ends. An emblematic case for egalitarians is about technologies (a) whose hazards are often imposed on citizens, (b) which tend to maintain or even create inequalities between citizens, and (c) that are likely to provoke large-scale environmental damage to nature—viewed by egalitarians as being fragile, vulnerable, and limited in resources (Steg & Sievers, 2000; Wildavsky & Dake, 1990). Only structural change in society can bring about change in the ways hazards are dealt with, and the evolution of democratic processes and public participation is seen as part of this change (Tansey & O’Riordan, 1999). Persons with a fatalistic orientation are resigned and disengaged (Thompson et al., 1990). They believe they have only limited control over their own life and the outcomes they will face. They also tend to be very skeptical, or even mistrustful, about the ability of authorities to manage hazardous activities properly (e.g., Ripberger, Gupta, Silva, & Jenkins-Smith, 2014; Van de Graaf, 2016). Based on this profile, some authors decided to leave fatalists out of the risk story (e.g., Kahan, 2012), while others considered that fatalists, for the most part, were indifferent to risk (e.g., Xue, Hine, Loi, Thorsteinssson, & Phillips, 2014), or inconsistent in their risk perceptions (e.g., Steg & Sievers, 2000; Verweij, Luan, & Nowacki, 2011). Recent findings, however, showed that fatalists exhibited high risk ratings on a variety of hazards, particularly in relation to personal health and security issues (e.g., abortion, viruses, airplane crashes)—thus possibly reflecting the great relevance of those risks to fatalists (Johnson & Swedlow, 2019b). By and large, this suggests that fatalists tend to adopt a strategy of personal survival, coping with erratic events and capricious nature as best they can, focusing on taking care of themselves and staying largely out of societal and environmental risk issues (Dake, 1992; Thompson et al., 1990; Xue et al., 2014).

Thus, through processes of value identification and defense of convictions, cultural theory was claimed to be helpful to understand why culturally diverse individuals perceive the same activity as risky or conversely safe, and, by and large, report distinctive patterns of risk perception. To empirically test basic claims made by cultural theory, various operationalizations have been conceived and related to risk perception. We now turn to the presentation of some of them, focusing mainly on attempts to measure worldviews in survey research.

1.2. Measuring Worldviews

The initial effort to operationalize cultural theory in survey research was provided by Dake and colleagues (e.g., Dake, 1991, 1992; Wildavky & Dake, 1990). They were interested in assessing the cultural bias component of cultural theory. Therefore, they created four sets of agree–disagree items in order to measure values and beliefs associated with each worldview. Dake’s scales for measuring worldviews (and their relationship to risk judgments) have been used in many studies thereafter (see Xue et al., 2014, for a review)—whether it be in the original version (e.g., Palmer, 1996; Sjöberg, 1997) or in a slightly modified version (e.g., Brenot, Bonnefous, & Marris, 1998; Marris, Langford, & O’Riordan, 1998; Peters & Slovic, 1996). This measurement strategy, however, suffered serious shortcomings; more specifically, the separate scales used to measure the respective worldviews have repeatedly been criticized for performing poorly, in terms of scale reliability, discriminant validity, as well as predictive validity (Kahan, 2012; Van der Linden, 2015). Reliability as measured by Cronbach’s alpha regularly failed to display acceptable values (i.e., $\geq 0.60–0.70$) for each worldview scale (e.g., Brenot et al., 1998; Peters & Slovic, 1996; Sjöberg, 1997; see also Xue et al., 2014, for a review). Using Dake’s measures, researchers have often observed that their participants exhibited
high scores on competing scales. This is problematic, since in theory, individuals cannot be characterized by mutually inconsistent worldviews (Kahan, 2012; Marris et al., 1998; Rippl, 2002). This lack of discriminative power is especially true for hierarchy and individualism for which high positive correlations were usually observed (e.g., $r_s = 0.54$, 0.53, 0.63, in studies by Dake, 1991; Johnson & Swedlow, 2019b; Kim & Kim, 2019, respectively). Finally, empirical research aimed at testing the cultural theory of risk provided mixed support for the use of cultural worldviews in understanding risk perception (see Chauvin, 2018, or Xue et al., 2014, for reviews). Some authors lent credence to the theory (e.g., Dake, 1991; Kim & Kim, 2019; Peters & Slovic, 1996; Slovic & Peters, 1998)—reporting relationships between worldviews and risk perception that were consistent with cultural theory’s claims. Some others also observed consistent patterns (e.g., Brenot et al., 1998; Marris et al., 1998) but they tended to be less convinced than the former because of the weakness of their correlations ($r_s \approx 0.10$–0.15)—suggesting that cultural worldviews explain only a modest variability in risk judgments. Still others have heavily criticized the cultural theory of risk, dismissing it on the basis of its conceptual and/or empirical weaknesses (e.g., Boholm, 1996; Sjöberg, 1997, 2003)—claiming that “cultural theory is simply wrong [and] cultural biases are not major factors in risk perception” (Sjöberg, 1998, p. 150). 4 Thus, although it is the dominant approach for measuring worldviews, Dake’s scales and refinements thereof should be seen as less than satisfactory attempts to operationalize cultural theory (Kahan, 2012). Undoubtedly, this is leading a number of scholars to experiment with alternative measurement strategies (and conceptions) of cultural theory.

Jenkins-Smith and coworkers are part of them (e.g., Jenkins-Smith & Herron, 2009; Jenkins-Smith & Smith, 1994). During two decades, they revised the original formulations of the worldview measures developed by Dake, through an iterative process, until they reached a set of four psychometrically robust worldview scales (e.g., $0.66 < \alpha < 0.77$; Ripberger et al., 2014). Several cultural theory scholars then used Jenkins-Smith’s revised measures for understanding perceptions of risks in the United States of specific concerns such as climate change (Jones, 2011; Nawlin & Rabovsky, 2020), vaccination (Slovic, 2014), high-voltage power line installations (Moyer & Song, 2016), or hydraulic fracturing (Tumlinson & Song, 2019). Recently, Johnson and colleagues also employed these revised measures, still in the U.S. context, to explain risk perceptions of a battery of hazards (Johnson & Swedlow, 2019b; Johnson, Swedlow, & Mayorga, 2019). Thereafter, Jenkins-Smith and coworkers adopted a new strategy for operationalizing cultural theory in a more comprehensive way. They developed short paragraphs describing each cultural type (as a whole) using agree–disagree ratings as well as rankings (see Swedlow et al., 2020, for details). However, as recently notified by Johnson and Swedlow (2019a, p.6), “these measures have been little noticed by the formal risk analysis discipline.”

In the early 2000’s, Rippl (2002) innovated in cultural theory measurement design by relying on structural equation modeling to develop a model in which each cultural bias is constructed according to a scheme that complies with the grid and group dimensions. As a result, she devised an instrument where individualism, for example, is negatively correlated with hierarchy but shares no relation with egalitarianism or fatalism. Despite a good discriminant validity, the overall power of cultural biases for explaining risk perception was not improved by using this instrument (Rippl, 2002; Van der Linden, 2015).

More recently, Kahan and coworkers implemented a new approach for testing (and interpreting) the cultural theory of risk (referred to as the cultural cognition thesis—which holds that people base their beliefs about the risks and benefits of a putatively dangerous activity on their cultural appraisal of this activity; e.g., Kahan, 2012; Kahan, Braman, Gastil, Slovic, & Mertz, 2007; Kahan, Jenkins-Smith, & Braman, 2011). They introduced an alternative set of two agree–disagree continuous scales, labeled hierarchy–egalitarianism and individualism–communitarianism, which are respectively patterned on the grid dimension and the group dimension. Throughout a variety of studies, Kahan argued that its cultural cognition scales have several advantages relative to Dake’s measures, in particular (a) higher levels of reliability (e.g., $0.81 < \alpha < 0.83$; Kahan, Braman, Slovic, Gastil, & Cohen, 2009), (b) fewer opportunities for a single individual to display some competing orientations, for example to be simultaneously a hierarchist (high grid) and an egalitarian (low grid) (Kahan, 2012),

---

4To draw such a different conclusion, Sjöberg argued that the correlations between cultural worldviews and risk perceptions were mostly very weak (although abundant and statistically significant), resulting in a very low average proportion of explained variance in risk perception ($r^2 \approx 0.05$). So, part of the opposition between him and others, he admitted, may be due to different ways of using and interpreting statistics.
and (c) stronger effect sizes (e.g., \( r = -0.46 \) between hierarchy-egalitarianism and climate change risk perception; Kahan et al., 2011; see also Shi, Visschers, & Siegrist, 2015, for similar results in Switzerland). However, Kahan’s approach also provoked substantial criticism (Johnson et al., 2019; Xue, Hine, Marks, Phillips, & Zhao, 2016; see also De Witt, Osseweijer, & Pierce, 2017). For example, Kahan’s claim that cultural cognition scales prevent respondents from yielding high scores for competing cultural orientations is only half true (Johnson & Swedlow, 2019a). In particular, using Kahan’s two continuous measures could in fact result in high ratings of both hierarchy (high group) and individualism (low group). And it actually did. Correlations between the two scales, when reported, were high (e.g., \( r = 0.65 \); Johnson & Swedlow, 2019b). Moreover, from the outset, Kahan himself did not deal with hierarchy and individualism independently from each other. What he did instead was to classify respondents as hierarchical individualists (or hierarchical communitarians, egalitarian individualists, egalitarian communitarians—depending on their scores). Another objection that Kahan’s approach encounters is that it ignores fatalism. In spite of the ‘so?’ response Kahan gave to that objection (Kahan, 2012)—in particular pointing out that Dake’s original work itself did not include a measure of fatalism (as though U.S. fatalists could not hold a specific stance toward risk), recent findings showed significant relationship between fatalism and risk ratings suggesting that this worldview does not play a trivial role in determining risk preferences (e.g., Johnson & Swedlow, 2019b; Kim & Kim, 2019; Song, 2014). Another point concerns the American feel of the cultural cognition scales—and Dake’s measures too—put forward by some authors like Douglas (2003). However, it does not seem like a problem for those who bear upon this issue. Kahan (2012) mentioned that its scales were developed using U.S. citizens, with U.S. concerns and U.S. history in mind. In the same vein, Thompson et al. (1990) earlier argued for cultural variations in the way worldviews are represented or occur within a single country. Accordingly, neither cultural cognition scales nor Dake’s measures were supposed to work everywhere and forever or generalize to all cultural contexts. As a matter of fact, both scales did perform more poorly in non-U.S. samples, failing to display construct validity (for Kahan’s scales; e.g., Xue et al., 2016) or predictive validity regarding risk perceptions (for Dake’s scales; see Xue et al., 2014, for a review). The last point is also true for measures developed by Jenkins-Smith and colleagues, recently used by Liu (2020), who reported that “the explanatory power of cultural theory on environmentalism is solid and strong in the survey collected in the U.S. context but unsatisfactory in other contexts, such as Taiwan” (p.226). Thus, developing more culturally appropriate worldview measures created to be used in other cultures is certainly warranted (Kim & Kim, 2019; Liu, 2020).

All together, these findings suggest that the deficient features of extant and current approaches leaves room to offer an alternative measure of worldviews. This could ultimately allow to assess the role of cultural orientations in understanding risk perception under proper conditions. In our view, the key issues are related to how hard (and unsuitable?) it is to disentangle hierarchy and individualism, how helpful it is to fully integrate fatalism, and how important it is to involve the cultural context in which worldviews should be assessed. Developing a variant of worldview scales which encompasses all these issues is the goal of our first study. In turn, the goal of our second study is to use this assessment tool of worldviews in a French context in order to test how strong and distinct their relationships with risk perception are.

2. STUDY 1

2.1. Background

2.1.1. The Hierarchy-Individualism Combination

The connivance between seemingly competing orientations has often been underlined in the past literature (see Mamadouh, 1999a, for details). More so, cultural theory itself values cultural pluralism, arguing that cultural coalitions are dynamic alliances driven by mutual interests and suitable sociopolitical conditions (Thompson et al., 1990; Wildavsky, 2006). It does not mean that the allied cultural types should be merged altogether, permanently, as if they are conceptually equivalent (as reminded above, cultural theory posits four conceptually distinct cultural types; Douglas, 1999)—especially as such coalitions are historically contingent for the most part (Favre, Swedlow, & Verweij, 2019; Lockhart, 2001). In other words, cultural coalitions are shifting: they are made, then they are broken, at key points in history. For example, the war of 1812 between the United States and Great Britain and setbacks the Americans faced then (e.g., the burning of the Capitol) discredited the dominant “anti-authoritarian” alliance between individualists and egalitarians and enabled the
hierarchists’ leanings for authority (regular army, etc.) to be politically considered as well (Thompson et al., 1990). It allows, however, considering some combinations between cultural orientations providing that there are good reasons for combining them, such as their theoretical compatibility, along with their empirical proximity, both strengthened through contextual idiosyncrasies. In our view, this is especially relevant for hierarchy and individualism—whose similarities tend to widely exceed differences. Hierarchical and individualistic persons tend to share a community of interests, which is most likely driven by two well-matched bodies of values; that is, they are liberals at the economic level and conservatives at the societal level (Johnson & Swedlow, 2019a, 2019b) and they trust institutionalized bodies and agencies (e.g., executive administration, business industry, scientific agencies) (Langford, Georgiou, Bateman, Day, & Turner, 2000)—making them broadly pro-growth, pro-entrepreneurship, and pro-technology. Douglas and Wildavsky (1982, p.181) summarize it: “Market and hierarchy make a formidably stable combination,” the one needed the other for its positioning and influence (see also Ellis & Thompson, 1997; Tansey & O’Riordan, 1999). In France, such an alliance does exist. It is embedded in a specific cultural context. Specifically, contemporary France is affected by its history, which is that of a segmented and top-down society (much like Great Britain for example; Grendstad, 1999). A quick glance at the history of France indeed provides clear insights that it has a long tradition of hierarchical modes of social and political organization. As an example, we may refer to French feudalism—during which France was a society of orders consisting of the First-Estate (clergy), the Second-Estate (nobility), and the Third-Estate (merchants, peasants, workers, etc.)—that was in use until the end of the 18th century in France (e.g., Sutherland, 2002). We may also refer to the French Fifth Republic of “ENA graduates or top civil servants” whose founders sought to restore the authority of the State [by] developing a highly centralized political system with elitist institutions, a powerful administrative apparatus, and a strong reliance on scientific expertise (Bezes & Le Lidec, 2007; Slovic, Flynn, Mertz, Poumadère, & Mays, 2000). As Jasper (1990, p.83) mentioned, “perhaps no other political system [than the French technocratic one] provides as large a role for people to exercise power on the basis of technical training and certification.” Additionally, contemporary France is also affected by the Europeanization of the French political system started in the late 1980s and early 1990s with the ratification of Maastricht Treaty in 1991 and the subsequent revision of the French Constitution in 1992. In the very monopolistic French landscape (e.g., France Télécom, Electricité de France, Société Nationale des Chemins de fer Français), the coming of the European single market (featuring openness to competition, call for bids, etc.) was like a big groundswell leading French power to make some room for more individualistic values such as competitiveness or reinforced autonomy of private firms (Bezes & Le Lidec, 2007). In the French political arrangement, the individualist voice was thus boosted, thereby fostering an ad hoc alliance between (age-old) hierarchists and (timely) individualists in which allies compensate for their weaknesses and blindspots (Mamadouh, 1999b). In concrete terms, from their coalition, French statist hierarchists receive both the enhanced economic growth and the capacity for innovation necessary to be competitive in front of their trading partners, and, besides, to honor their large social commitments (e.g., welfare payments, social security system, pay-as-you-go pension system), while French entrepreneur individualists (in the words of Douglas & Calvez, 1990)—as small and medium size business managers for the most part (99.8% of total companies in France)—gain trade stability and defense against foreign dumping (through trade regulations, social and environmental standards). Both French hierarchists and individualists thus perceive their coalition as a win–win alliance, which serves their core interests better than an alliance with another culture orientation (Peretti-Watel, 2000). In addition, accumulating evidence shows that hierarchy and individualism are positively and highly correlated with each other (e.g., Brenot et al., 1998, in France; Dake, 1991, in the United States; Marris et al., 1998, in the United Kingdom)—suggesting that “it may not be sensible to assume they are separate cultural biases” (Breakwell, 2007, p. 75) (see also Johnson & Swedlow, 2019b, or Kim & Kim, 2019, for more recent evidence). Accordingly, persons of hierarchical and individualistic orientations tend to show very similar patterns of risk associated with economic (e.g., inflation, debt—Dake, 1991), societal (e.g., civil disobedience, demonstrations—Dake, 1991), environmental (e.g., air pollution, ozone depletion—Xue et al., 2014), as well as technological (e.g., nuclear energy—Peters & Slovic, 1996) issues.
2.1.2. The Importance of Fatalism in the French Context

In the French context, the fatalistic orientation should not go unnoticed. As a whole, the French are likely to hold fatalistic views. Why? Because French people are notoriously pessimistic; that is, resigned, uncertain to future, viz. fatalistic. From year to year, survey to survey, “The French [are] champions of the world in pessimism” as reported by the French newspaper Challenges (February 2019 issue). Further, as mentioned above, France is a very centralized state where the exercise of power is pyramidal and where there is a tradition of looking to a scientific elite for guidance in policy matters (Slovic et al., 2000). As a result, a number of French citizens feel excluded from decision-making process and see citizen participation to politics as unnecessary, as evidenced by the high rate of abstention in France—from election to election—foremost among people with lower levels of schooling and income, younger people, and working classes (Ipsos, 2017). Moreover, the electoral system in France is not a system of proportional representation, thus excluding some fringes of the population from political arena and rule setting (there is currently no worker as deputy in the national assembly; Observatory of Inequalities, 2018). In addition, as illustrated by a recent analysis from the Organization for Economic Co-operation and Development (OECD, 2019), social mobility in France is blocked (low intergenerational mobility, unequal access to the labor market, etc.); that is, France is the second OECD country where social determinism is the most significant (after Hungary), thus giving to the citizens some reasons to be resigned and to believe they have no control over their life. In our view, all those features taken together form a fertile ground for fatalism, foster a “fatalistic mindset” (Verweij, 2011, p. 177), and go well with the idea that French people support fatalistic ideas. Indeed, such an abstainer profile matches the fatalism of the poor picture that depicts the French fatalists as subordinates, unemployed persons, or factory workers, who feel powerless and see themselves as constrained by the top (Peretti-watel, 2000). Similarly, this is consistent with Entwistle’s (2021) view that [low] education, income and status are factors clearly associated with restricted opportunities and fatalist beliefs. It also corresponds to the claim that fatalists are likely to be disengaged from politics and the political process (Nawlin & Rabovsky, 2020), or to the view that fatalism is explained by blocked mobility which generates a sense of lacking control over one’s life (Matheson, 2018). Empirical evidence supporting this view has been provided by Brenot et al. (1998). In their large and representative sample of the French population, they showed a moderate—not a small—agreement with fatalistic statements (M = 12.9 out of 25, SD = 3.8), even though respondents were less inclined toward fatalism than they were to hierarchy (M = 17.4, SD = 3.6), individualism (M = 17.7, SD = 3.4), and egalitarianism (M = 18.9, SD = 3.1) (see also Slovic et al., 2000).

The way the issue of nuclear power is addressed in France (in comparison with the United States) represents an eloquent illustration of the strong hierarchy-individualism alliance as well as the significance of fatalism in France at the present time. Compared to the Americans, the French tend to see greater need for nuclear power (for maintaining their standard of living) and greater economic benefit from it, to have greater trust in industry, scientists, and government officials for managing nuclear power plants, to think more that decision-making process should be handed down to institutionalized authorities (rather than to the people), but also to believe more they have little control over risks (Slovic et al., 2000).

Based on both points, Study 1 aimed to investigate the relevance of a three-factor model of worldviews that combines hierarchy and individualism into a single hierarchical-individualistic worldview and includes a well-defined fatalistic worldview—for the purpose of developing a variant of existing scales that is likely to assess cultural biases among French citizens in a suitable way.

2.2. Method

2.2.1. Participants and Procedure

A total of 850 French citizens were asked to participate voluntarily in this study. A sample of 200 respondents was recruited to complete the exploratory phase, while an independent sample of 650 respondents was recruited to complete the confirmatory phase.\(^5\) The responses from eight participants

\(^5\)Given the step-by-step approach we used to generate our set of items (see below), it was difficult to determine the exact nature (e.g., number, size of relationships, reliability, distribution) of the item indicators to be analyzed in factor analyses, then the sample sizes required to achieve adequate statistical power and precision of parameter estimates. Accordingly, we followed some crude but still well-used guidelines to set our sample sizes, including (1) minimum sample size for the exploratory phase (N
in the first exploratory sample and 19 participants in the second confirmatory sample were removed from analysis due to significant missing data (largely over 10% of total responses), leaving two samples of 192 and 631 participants, respectively. These samples were quite similar in terms of sex ratio (57% women and 51% women, respectively), mean age (41.1 years, range 15–91, and 41.3 years, range 15–90), and level of education (about 30% had not completed secondary education, 30% had completed secondary education, and 40% had some university degree, in both samples).

Participants were contacted through various networks of the research team, encompassing first direct acquaintances, then indirect ones, thus reaching a sufficiently large sample of respondents by snowball effect. After obtaining their consent, participants were invited to fill out a paper and pencil questionnaire consisting of statements about society and how the world works—to which they had to indicate their level of agreement or disagreement on a five-point scale. Higher scores indicated stronger endorsement of cultural biases. The French version of the statements was composed from the English version. In designing the French version, the authors followed the guidelines proposed in the literature on cross-cultural methodology: independent/blind/back translation, educated translation, small-scale pretests (Brislin, 2000).

2.2.2. Instrument: Item Generation

In our scale development process, we adopted a step-by-step approach to design a parsimonious scale for assessing individual orientations toward (each of the) worldviews. As a first step, we reviewed literature in order to take stock of survey measures previously used to assess cultural biases. The resulting list was based on Rippl’s extensive list which included items from Dake’s scales (Rippl, 2002), enriched with items from other scales (including the ones used by Brenot et al., 1998; Ellis & Thompson, 1997; Marris et al., 1998; Peters & Slovic, 1996). As a second step, we deleted from the list all those items that have previously been identified as poor indicators for their expected factor (because of low intrascale correlations, less than acceptable primary loadings, or high cross-loadings). Items clearly improper in the French context were also deleted at this step (e.g., “I am in favor of capital punishment”); “I would support the introduction of compulsory National Service”). As a result, a (purposefully large) set of 37 items has been retained (see table A1 in the appendix for the wording of each item). As a third step, participants from the first sample rated this 37-item preinventory from 1 (strongly disagree) to 5 (strongly agree). We conducted a Principal Components Analysis on these data because it is an appropriate data reduction technique to be used as a preliminary selective procedure (see Brown, 2006, for details). This analysis allowed us to perform a second item sorting, by eliminating poorly behaved items (e.g., isolated items, items with small loadings on all factors, items with high cross-loadings). As a result, our final pool consisted of 18 items considered as good candidates to operationalize worldviews, [by] expressing the “basics” of cultural bias (e.g., law, order and continued economic growth, fairness and equality of conditions, as well as isolation and resignation—see Table I for details).

All subsequent data analyses dealt with ratings that respondents assigned to each of the 18 worldview statements.

2.3. Data Analysis

All the analyses were performed using Mplus (version 8.2, Muthén and Muthén 1998–2017). Initial inspection of both data sets revealed that 0.20% (sample 1) and 0.10% (sample 2) of the item scores were missing (for a total of eight and 14 missing values, respectively), resulting in a minimum coverage of 0.984 for any item. The “missing = all” option in Mplus was then used for handling them. Test for normality did not reveal departure from normality (all skewness and kurtosis values $< |1|$ in both samples, except for one item in sample 2 which exhibited values of 1.24 for skewness and 1.67 for kurtosis—see Muthén & Kaplan, 1985, for cut-off values). Accordingly, we used the maximum likelihood (ML) estimation method for all analyses (Brown, 2006).

To determine the number and nature of factors that account for the covariation among the 18 items, an exploratory factor analysis (EFA) using ML as the extraction method and GEOMIN as the oblique rotation method (allowing factors to be correlated) was first conducted in the first sample. EFA was used because it is the preferred method in the early

---

200) and (2) minimum number of participants per parameter to be estimated (e.g., at least 10 cases) for the confirmatory phase (while keeping in mind that CFA often performs poorly with small or moderate-size samples) (Brown, 2006).

6CFA path diagram was designed with AMOS 22.
### Table I. GEOMIN Rotated Factor Loadings, Eigenvalues, and Cross-Scale Correlations for the Worldviews

| Worldview indicators                                                                 | Hierarchy-Individualism | Egalitarianism | Fatalism |
|--------------------------------------------------------------------------------------|-------------------------|----------------|----------|
| HI1: Respect for authority is one of the most important things that children should learn | 0.76*                   | 0.01           | -0.09    |
| HI2: A free society can only exist by giving companies the opportunity to prosper     | 0.58*                   | 0.01           | 0.08     |
| HI3: Continued economic growth is the answer to improved quality of life              | 0.48*                   | -0.04          | 0.22     |
| HI4: One of the problems with people is that they challenge authority too often        | 0.44*                   | 0.01           | 0.21     |
| HI5: The police should have the right to listen to private phone calls when investigating crime | 0.41*                   | -0.22*         | 0.02     |
| HI6: I like to plan carefully so that financial risks are not taken                  | 0.40*                   | -0.05          | 0.09     |
| E1: If people in this country were treated more equally we would have fewer problems | 0.12                    | 0.70*          | -0.01    |
| E2: The world could be a more peaceful place if its wealth were divided more equally among nations | 0.01                    | 0.70*          | -0.04    |
| E3: The difference between rich and poor nations is not right                        | -0.01                   | 0.67*          | -0.11    |
| E4: Those who get ahead should be taxed more to support the less fortunate            | -0.14                   | 0.55*          | -0.00    |
| E5: What this country needs is a “fairness revolution” to make the distribution of goods more equal | -0.08                   | 0.50*          | 0.11     |
| E6: I would support a tax change that made people with large incomes pay more       | -0.23*                  | 0.49*          | 0.03     |
| F1: A person is better off if he or she doesn’t trust anyone                          | 0.04                    | 0.02           | 0.62*    |
| F2: Cooperating with others rarely works                                             | -0.14                   | -0.03          | 0.55*    |
| F3: Most people make friends only because friends are useful to them                  | -0.09                   | 0.06           | 0.54*    |
| F4: There is no use in doing things for other people—you only get it in the neck in the long run | -0.03                   | -0.07          | 0.51*    |
| F5: The future is too uncertain for a person to make serious plans                    | 0.05                    | 0.20           | 0.48*    |
| F6: It seems to me that, whoever you vote for, things go on pretty much the same     | 0.02                    | 0.10           | 0.40*    |
| Eigenvalues                                                                         | 3.14                    | 3.01           | 1.76     |
| Egalitarianism                                                                      | -0.06                   |                |          |
| Fatalism                                                                            | 0.30                    | 0.07           |          |

Note: Indicators are ordered according to the size of their factor loadings. Hypothesized factor loadings are in bold. Numbering has been added to make reading easier. \( N = 192 \).

\( *p < 0.05 \).

Stages of scale development in combination with confirmatory factor analyses (CFA) used in latter phases (Brown, 2006). In addition to parallel analysis (Horn, 1965), factor selection was guided by goodness-of-fit indices and chi-square difference tests. Regarding goodness-of-fit indices, we used the ML chi-square statistic (ML\( \chi^2 \)); a nonsignificant ML\( \chi^2 \) test statistic indicates an overall good model fit. However, because this statistic is affected by sample size (Brown, 2006), alternative fit indices (and cut-off values) recommended by Hu and Bentler (1999) were used: the comparative fit index (CFI) and the Tucker–Lewis fit index (TLI) (good fit when values are close to 0.95), along with the root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR) (excellent fit when values are 0.05 or lower). Regarding chi-square difference testing (\( \chi^2_{\text{diff}} \)), a significant difference in the model \( \chi^2 \) statistics means that one model provides a significantly better fit to the data than the other one.

To examine the validity of the model highlighted through the EFA and confirm its meaningfulness in an independent sample (cross-validation), a CFA was computed in the second sample. For this analysis, latent factors were defined by their respective items (as found in the EFA) and correlations between latent factors were permitted. Goodness-of-fit indices were the same as those previously used for the EFA. As recommended by Brown (2006)—especially in the context of evaluating the latent structure of a test instrument—reliability was measured by two estimates of “true score”: the squared factor loadings...
and the rho (\(\rho\)) coefficient.\(^7\) Rho values over 0.50 have already been considered as acceptable (Raines-Eudy, 2000).

3. Results and Discussion

3.1. Factorial Structure of the 18-Item Scale of Worldviews

EFA with oblique rotation was performed on the ratings of 18 items from the first sample. Based on a scree plot of the eigenvalues obtained from this sample data against the 95th percentile of eigenvalues produced by 50 sets of completely random data, parallel analysis suggested three factors. Fit indices suggested that the three-factor model fit the data well. ML\(\chi^2\) (\(df\)) = 130.39 (102), nonsignificant (at \(p < 0.01\)), CFI = 0.95, TLI = 0.93, RMSEA = 0.038, and SRMR = 0.041. Comparing the fit between consecutive models revealed that the three-factor model fit the data significantly better than the two-factor model (\(\chi^2\) diff = 105.97, \(\Delta df = 16, p < 0.001\)), and that the two-factor model fit the data significantly better than the one-factor model (\(\chi^2\) diff = 251.17, \(\Delta df = 17, p < 0.001\)).\(^8\) Table I presents the three-factor model of worldviews. All primary factor loadings were above 0.40 (recommended cut-off; Velicer, Peacock, & Jackson, 1982) and all of them were significant (at \(p < 0.05\)). No secondary loading exceeded 0.25 and none of them (except two) were statistically significant. Given the pattern of indicator-factor loadings, factor 1 represented hierarchy-individualism, factor 2 reflected egalitarianism, and factor 3 referred to as fatalism. No significant relationship between the three worldviews were observed.

3.2. Validity and Reliability of The Three-Factor Model of Worldviews

CFA was conducted on the ratings of 18 items from the second sample. Each of the overall goodness-of-fit indices suggested that the three-factor model fit the data well, CFI = 0.93, TLI = 0.92, RMSEA = 0.038, and SRMR = 0.048 (given how large the size of the sample is, the ML\(\chi^2\) was unsurprisingly significant at \(p < 0.01\)). Fig. 1 represents the model. All standardized factor loadings were higher than 0.40 and statistically significant (\(ps < 0.001\)), revealing that indicators were related to their purported latent factors well enough (range of \(R^2\)'s = 0.17–0.52). This is consistent with the position that our 18-item scale represents a set of reasonable indicators of the constructs of hierarchy-individualism, egalitarianism, and fatalism, just as the acceptable to good reliability indices calculated for each construct (\(\rho = 0.77\) for egalitarianism; \(\rho = 0.66\) for fatalism; \(\rho = 0.63\) for hierarchy-individualism). Moreover, estimates from the three-factor solution indicate low and nonsignificant cross-scale correlations, except for hierarchy-individualism and fatalism (0.35, \(p < 0.001\)).

Overall, the results of the first study provide starting support for an innovative assessment tool of worldviews operating in a French context. This instrument consists of 18 items used as indicators of three factors we named hierarchy-individualism (six items), egalitarianism (six items), and fatalism (six items). Considered together, fit statistics across the two samples suggested that a three-factor solution in which hierarchy and individualism are combined was the most suitable option for fitting the data well; more so, findings provided evidence for adequate reliability of each worldview subscale and offered some clue for construct validity of the full scale (e.g., replicability of the three-factor solution in an independent sample, good model fit, low-sized...
Fig 1. Three-factor model for the 18-item scale of worldviews (N = 631). The values above one-headed arrows are standardized factor loadings. The values at double-headed arrows are correlations. The numbers in brackets above the circles are rho coefficients of reliability.
cross-scale correlations\(^9\)). Therefore, results of study 1 enhance prior effort to develop alternative worldview scales that overcome the deficiencies of Dake’s original measures (e.g., Jenkins-Smith & Herron, 2009; Kahan et al., 2007; Rippl, 2002). In particular, as recently recommended by Kim and Kim (2019), we devised a culturally appropriate measurement of worldviews by providing it with fatalism—given that it is a widespread mindset in France. Additionally, our instrument successfully operationalized the theoretical compatibility as well as the empirical relationship of hierarchy and individualism (both of them are major issues recently raised in the cultural theory literature; e.g., Johnson & Swedlow, 2019a, 2019b).

However, although results from study 1 are promising, further work is needed before regarding our rating scale as a psychometrically sound measure of worldviews. In particular, how similar our instrument is with other measures of worldviews and how efficient it is to predict worldviews-related outcomes are additional aspects of validity, which need to be examined. This served as a basis for study 2.

### 3.3. STUDY 2

Study 2 focused on the validation of our measurement scale of worldviews. We tested the convergent and discriminant validity of our instrument comparing it with another, psychometrically sound assessment tool of worldviews. For that purpose, we opted for the worldview measures developed by Jenkins-Smith and coworkers (here named Jenkins-Smith’s scale for sake of brevity) because they turned out to be reliable in several recent studies (e.g., Ripberger et al., 2014; Tumlison & Song, 2019) as well as in a flattering position in terms of face and content validity compared to other measures (Liu, 2020; Swedlow et al., 2020). Large positive correlations (i.e., \( r > 0.50 \); see Cohen, 1988) of each of our subscales with—and only with—the subscale designed to measure the same worldview in this comparative instrument were interpreted as evidence for convergent validity. Simultaneously, we also expected that each of these subscales would evidence weaker, small (i.e., \( r < 0.30 \); see Cohen, 1988), and nonsignificant correlations with all other indicators—suggesting discriminant validity. Moreover, we examined the predictive validity of our instrument. We hypothesized that different worldviews acting as orienting dispositions should lead to different perceptions of risk in a way supportive of respondents’ cultural values (Kahan, 2012; Kahan et al., 2007; Wildavsky & Dake, 1990). First, individuals holding different worldviews should disagree with each other only when the allegedly hazardous activity threatens (for some)—or instead conforms to (for others)—their respective values. Second, individuals sharing a cultural worldview should diverge depending on their level of commitment to the worldview, hence its centrality. In other words, the higher their commitment, the more threatened their values, and therefore the more likely they are to form an extremely dismissive—or instead crediting—posture toward asserted risks. Based on previous literature (e.g., Bouyer, Bagdasarian, Chaabane, & Mullet, 2001; Dake, 1991; Kahan et al., 2007), we focused on various categories of risk—pollutants, global economy, civil disturbance, social deviance, health, and transportation—which allowed us to break down this basic hypothesis into more specific, testable predictions.

As technologically optimistic persons, hierarchists-individualists were expected to express low concern about technological and environmental risks (e.g., nuclear power, fertilizers); furthermore, because they are part of the establishment, persons of hierarchical-individualistic orientation were hypothesized to exhibit risk skepticism about activities allowing them to maintain the status quo (e.g., market economy) but risk aversion toward any form of disruption or deviance (e.g., demonstrations, marijuana). Egalitarians believe that “an inequitable society is likely to insult the fragile environment just as it exploits the poor” (Dake, 1991, p. 67). Therefore, they were expected to be very sensitive to technological and environmental risks as well as economic issues; they might be much more relaxed, however, about disruptive activities, seeing them as a lever for radical changes they call for in behavior and society. Persons holding a fatalistic worldview generally tend to see life as a lottery in which no particular risk management strategy is efficient except their personal (but limited) one; accordingly, we

---

\(^9\)One exception was the moderate correlation between hierarchy-individualism andfatalism. Such a relation is not uncommon in the literature. It has been reported in studies using Dake’s scale or refinement thereof (e.g., Brenot, Bonnefous, & Marris, 1998, \( r = 0.30 \) between hierarchy and fatalism; Rippl, 2002, \( r = 0.28 \) between individualism and fatalism) or Jenkins-Smith’s scale (e.g., Johnson & Swedlow, 2019b, \( r = 0.28 \) between hierarchy and fatalism, \( r = 0.29 \) between individualism and fatalism). This relation is difficult to interpret. One might argue that fatalists as lower in rank people should inevitably acknowledge the legitimacy of hierarchists as higher in rank people to whom fatalists may transfer the responsibility for making decision and taking action (Peretti-Watel, 2000).
suggested that they would adopt neutrality toward most threats, but they would be receptive to those risks they personally suffer (e.g., blood transfusion, vaccinations). For all expectations, we predicted that the influence of cultural worldviews (on risk judgments) would be proportional to the degree individuals adhere to them.

3.3.1. Method

3.3.2. Participants and Procedure

Participants were contacted through social and professional networks of the research team. They received an invitation e-mail with a brief description of the survey and an embedded survey link to complete the questionnaire battery online. We used the Qualtrics survey platform to collect our data. Overall, 533 French participants have been recruited in this manner and sent back a completed questionnaire on a voluntary basis. Among them, 111 individuals (60% women; mean age = 30.9 years, range 15–66; intermediate or high educational level for most) participated in the part of the study devoted to convergent and discriminant validity testing. The remaining 422 individuals (83% women; mean age = 26.9 years, range 17–80; intermediate or high educational level for most) completed the second part of the study designed to test for predictive validity.

3.3.3. Instruments

All participants were administrated the 18-item measure of worldviews using the same instructions as study 1. Additionally, participants in the first group (N = 111) completed a French version of Jenkins-Smith’s scale. It consists of 12 agree–disagree statements to be rated on a five-point scale and designed to assess individual orientations toward each of the four worldviews posited by cultural theory (see Table B1 in the appendix for the exact wording of each item). Higher scores indicated stronger endorsement of worldviews. Participants in the second group (N = 422) were presented with a set of 15 hazards selected to represent the aforementioned categories of risk which are likely to generate distinctive patterns of risk perception congenial to differences in cultural orientations (blood transfusion, demonstrations, fertilizers, free-trade, global warming, globalization, heterosexual relationships with multiple partners, homosexual relationships with multiple partners, marijuana, market economy, nuclear power, ozone depletion, public transportation, strikes, vaccinations). They were asked to express the level of risk (for all people in the whole world) of being seriously ill, wounded, or dying from each of these hazards. They used a 11-point scale ranging from 0 (no risk) to 100 (extremely severe risk). Higher scores indicated greater concern about risk.

3.4. Results and Discussion

3.4.1. Convergent and discriminant validity

For each of the three worldviews from our 18-item scale as well as for each of the four worldviews from Jenkins-Smith’s 12-item scale, an index was created by averaging the scores of the corresponding items in the first group. For the purpose of comparison, the Jenkins-Smith hierarchism and individualism indices were combined into a single index named hierarchy-individualism. Reliability coefficients and cross-scale correlations between worldview indices are shown in Table II.

As expected, positive correlations of medium to large magnitudes were observed between the two measures of hierarchy-individualism, the two measures of egalitarianism, and the two measures of fatalism, thus meeting our criteria for convergent validity. Additionally, all other correlations were small and nonsignificant (at p < 0.01), thereby suggestive of discriminant validity.

3.4.2. Predictive validity

As previously, we created an index for each of the three worldviews from our 18-item scale by averaging the scores of the corresponding items in the second group. Rho values for these scales ranged from 0.65 to 0.81, indicating an acceptable to good reliability. At the same time, five categories of risk (consisted of 2–4 items) were created: pollutants, global economy, civil disturbance, social deviance, health, and transportation. Rho values ranged from 0.68 to 0.88, indicating that the five categories have acceptable to very good reliabilities. Bivariate correlation, standard multiple regression, and quantile analyses were conducted to examine the nature and

10 Participants were presented with only one part of study 2 for practical reasons (e.g., length of the full questionnaire, clear instructions). The convergent and discriminant validity part was associated with a smaller sample size than the other part as a result of the (smaller) expected size of the correlation matrix to be analyzed.
the size of the effects of cultural worldviews on perceived risk.\footnote{Correlation analyses were used because the relationships between cultural theory and risk perception have mostly been studied in this way in the literature (see Xue, Hine, Loi, Thorsteinsen, & Phillips, 2014, for an overview). Standard multiple regression analyses were used to assess (1) the ability of each worldview to predict risk judgments controlling for the two other worldviews and (2) the overall part of variance in risk perceptions explained by the combination of the three worldviews. Quantile analyses were used to evaluate worldview effects on perceived risk in terms of changes in the percentage of respondents rating the risk as high depending on increment in the level of agreement with worldview statements (see Slovic & Peters, 1998, for details).} Findings are summarized in Table III.

The upper part of the table (correlations) reveals several important trends. First, we observed that the associations between cultural worldviews and risk perception were largely consistent with cultural theory’s claims. That is, the more the respondents’ worldview was hierarchical-individualistic, the less was their perceived risk of environmental and economic issues and the more concerned they were about disruptive and deviant activities, whereas the opposite pattern was found for egalitarians; fatalists tended to hold a neutral view on pollutants and global economy but tended to be afraid of civil disturbance, social deviance, transportation, and health risks. Second, the relationships observed here between worldviews and perceived risk are small to moderate, with cultural effect sizes varying with risk category from 0.16 to 0.40.

The lower part of the table (regression coefficients) provides for the most part support for our basic hypothesis (and the more specific worldview-related expectations). As expected, distinct cultural biases were associated with distinctive patterns of risk perception, most of which varied in predictable ways for individuals with differing cultural orientations. More precisely, the hierarchical-individualistic worldview (controlling for the two other worldviews) predicted the belief that disruptive as well as deviant activities are associated with a high risk. Unexpectedly, however, it did not predict significantly (only marginally) the belief that environmental and economic risks are low. That this worldview explains variance in transportation and health risk perception was also an unexpected finding. Controlling for hierarchy-individualism and fatalism, the egalitarian worldview was a significant predictor of (a) higher level of concern about pollutants and global economy and (b) lower risk perception linked to civil disturbance. The fatalistic worldview (controlling for the two others) was the main predictor of the propensity to perceive transportation and health risks as high. An unexpected finding was that fatalism was found to predict the belief that civil disturbance is risky. When combined, the three worldviews explained 8–20% of the variance in risk perceptions.

For each worldview, we also expected individuals holding the strongest beliefs about that worldview, regarding it as central, to score (or not to score, depending on the hazard used) the highest on the risk perception scale. This was mostly supported by the data. Individuals scoring high on the egalitarian measure (belonging to the upper quartile Q4) were more likely than individuals scoring low (Q1) to perceive pollutants as high in risk (the high risk ratings increased from 11% in Q1 to 42% in Q4). The same was true for global economy (Q4–Q1 difference = 20%); Conversely, they were less likely than individuals scoring low to see civil disturbance as high in risk (Q1–Q4 difference = 35%).

Among those who scored lowest on the hierarchy-individualism scale (Q1), only 14% and 12% rated civil disturbance and social deviance as high in risk, respectively. They were respectively 49%
### Table III. Correlation (Upper Part) and Standardized Regression (Lower Part) Coefficients Between Worldviews and Risk Categories

| Worldviews       | Categories of Risk                        | Correlations (\(r\)) | Regressions (\(\beta\)) | \(R^2\) |
|------------------|------------------------------------------|------------------------|--------------------------|---------|
|                  | Pollutants [0.83]                        | Global Economy [0.74]  | Civil Disturbance [0.73] | Social Deviance [0.88] | Health and Transportation [0.68] |
| Hierarchy-       |                                          |                        |                          |                      |                                  |
| Individualism    | -0.17**                                 | -0.17**                | 0.40**                   | 0.39**               | 0.20**                           |
| Egalitarianism [0.81] | 0.29**                                  | 0.27**                 | -0.24**                  | -0.16**              | -0.01                            |
| Fatalism [0.65]  | -0.13                                   | 0.02                   | 0.22**                   | 0.17**               | 0.22**                           |
| Hierarchy-       |                                          |                        |                          |                      |                                  |
| Individualism    | -0.07 (0.05)                            | -0.11 (0.05)           | 0.33** (0.05)            | 0.36** (0.05)        | 0.18** (0.05)                    |
| Egalitarianism [0.81] | 0.27** (0.06)                           | 0.24** (0.05)          | -0.14** (0.05)           | -0.05 (0.05)         | 0.06 (0.05)                      |
| Fatalism [0.65]  | -0.10 (0.05)                            | -0.05 (0.05)           | 0.15** (0.05)            | 0.11 (0.05)          | 0.19** (0.05)                    |
| \(R^2\)         | 0.10                                    | 0.09                   | 0.20                     | 0.17                 | 0.08                             |

**Note:** Reliability [\(\rho\)] of worldview subscales and risk categories is given in brackets. Standard errors of regression coefficients are given in parentheses. \(R^2\) reflects the amount of explained variance of the associated category of risk by the combination of the three worldviews. \(N = 422.\)

**p < 0.01.**
and 43% among those who scored highest on the hierarchy-individualism scale (Q4). Individuals scoring high on the fatalism measure were more likely than individuals scoring low to give a high risk rating with regard to transportation and health-related activities (Q4–Q1 difference = 28%).

Collectively, the findings from study 2 add evidence that our assessment tool of worldviews is a valid instrument to measure cultural orientations held by individuals, and is well suited to predict risk perception. Evidence was found for both convergent and discriminant validity, as indicated by substantial positive correlations between each of our worldview subscale (hierarchy-individualism, egalitarianism, fatalism) and its counterpart in the scale developed by Jenkins-Smith and coworkers, together with negligible correlations between all other indicators. This is noteworthy because, as Johnson and Swedlow (2019a) recently pointed out, the assessment of such aspects of construct validity of worldview measures have mostly been absent from the cultural theory literature.

Evidence was also found for the predictive validity of our worldview scale, given its ability to predict risk perceptions in a way that is congruent with the preferred worldview held by individuals. In other words, we observed a clear cultural effect insofar as individuals’ orientations toward hierarchy-individualism, egalitarianism, or fatalism distinctively guided their risk perception—depending on the extent to which the hazardous activity goes against their values. Persons of hierarchical-individualistic orientation were motivated to see disruptive and deviant activities as risky because such activities clearly challenge the system in power, their system (Dake, 1991; Wildavsky & Dake, 1990; see also Bouyer et al., 2001, or Marris et al., 1998, for similar results). In line with the positive view of technological developments and economic growth they hold, hierarchists-individualists were expected to show low concern about environmental and economic issues (Dake, 1992; Douglas & Wildavsky, 1982; Kahan, 2012). This hypothesis was partly supported by the data. We did observe that the hierarchy-individualism worldview was negatively associated with environmental as well as economic risk perceptions but it was a weak relation (even becoming nonsignificant in our regression analyses), in any case not as strong as anticipated and previously observed (e.g., Kahan et al., 2007; Kahan et al., 2011). The time of data collection may contribute to explaining this discrepancy. Today—certainly more than before—technologies like nuclear power, environmental concern such as global warming, or globalization are major and much debated issues, for citizens (see the Greta Thunberg phenomenon), experts, as well as politics (see the GAFA controversy). This may have led hierarchists and individualists to adopt a more balanced view of costs and benefits from such activities, which is in line with very recent findings showing nonsignificant or very weak relationship between hierarchists, individualists, and climate change (Johnson & Swedlow, 2019b), pesticides (Johnson et al., 2019), or GMOs (Kiss, Montpetit, & Lachapelle, 2020). Further research is needed to test this hypothesis. Consistent with past literature (e.g., Brenot et al., 1998; Kahan et al., 2007; Kim & Kim, 2019; see Xue et al., 2014, for a review), individuals holding an egalitarian worldview were predictably worried about pollutants and global economy, which they see as sources of unjust social disparities, and as symbols of noxious self-seeking (Kahan, 2012; Wildavsky & Dake, 1990). In contrast, egalitarians downplayed the risk of civil disturbance, in line with their commitment to another, less top-down system (Steg & Sievers, 2000; Tansey & O’Riordan, 1999). Persons who were fatalistic tended to worry more about blood transfusions, vaccinations, and public transportation; that is, those hazards which affect them personally and inevitably, then running conspicuously into their strategy of personal survival (see Xue et al., 2014, for a similar analysis). This finding is echoing those from several recent studies that found positive and significant relationship between fatalism and the risks associated with Zika virus, Ebola virus, airplane crashes (Johnson & Swedlow, 2019b; Johnson et al., 2019), or vaccines (Kiss et al., 2020). Of note, fatalists also feared civil disturbance, as hierarchists-individualists did, probably because of the moderate correlation between both worldviews in our sample (0.37, p < 0.001). This may be the same statistical explanation for why hierarchists-individualists tended to fear transportation and health risks. More research is warranted to test it with another sample in which fatalism and hierarchy-individualism are not correlated with each other.

Finally, regardless of the method used, the explanatory power of cultural worldviews was neither unimportant nor weak, but rather moderate. Using explained variance, the worldview measures explained 8–20% of the variance in perceived risk when considered together, then exhibiting medium effects (i.e., 9% < R² < 25%; see Cohen, 1988) for the most
part. Although not impressive, these cultural effect sizes are noteworthy, considering that prior Western studies using Dake’s scales and its refinement have commonly reported very modest effects (about 3–6% of explained variance in risk perception; e.g., Brenot et al., 1998; Marris et al., 1998; Sjöberg, 1997). Using variation in high risk ratings across quartiles, we found effect sizes to be not only substantial, but also proportional to respondents’ commitment to each worldview, varying from 20% to 35% depending on worldviews and risk domains (see Slovic & Peters, 1998, for similar result).

4. GENERAL DISCUSSION

The aim of the current research was to investigate the associations between cultural orientations and risk preferences in France using an innovative scale for measuring worldviews. Basically, our findings (1) provided support for a three-factor scale of worldviews—in which the first dimension emerged as a combination of the hierarchical and individualistic worldviews while the two others respectively corresponded to the egalitarian and the fatalistic worldviews, and (2) affirmed, for each worldview, its convergent validity (with its counterpart in another worldview measure), discriminant validity (from all other subscales), and predictive validity (for specific patterns of risk perception).

Study 1 advances prior approaches to operationalizing cultural theory in survey research in two major ways. At the methodological level, research using CFA approaches to investigate how worldview items are structured has been very rare until now (see Johnson et al., 2019, and Xue et al., 2016, for recent exceptions)—even though CFA is considered by many as an indispensable analytic tool for construct validation (e.g., Brown, 2006). More importantly, the main contribution of study 1 consists of giving a psychometric legitimacy to the hierarchy–individualism combination. This is noteworthy, as previous research has put much emphasis on the theoretical similarity or the value compatibility of the hierarchical and individualistic cultural orientations without providing it with some empirical evidence (e.g., Douglas & Wildavsky, 1982; Thompson et al., 1990; Wildavsky & Dake, 1990; see also Kahan, 2012; Kahan et al., 2007). Additionally, fatalism and egalitarianism are not correlated with each other in our scale, in contrast with Jenkins-Smith’s scale (e.g., Johnson & Swedlow, 2019b) or with some others (Rippl, 2002). This orthogonality, in turn, provides a good basis for meeting more distinctive and specific patterns of risk perception from persons of fatalistic versus egalitarian orientations, which is very congruent with the conceptual gap that separates both cultural orientations (Douglas, 1999, 2003; Thompson et al., 1990). It could be puzzling for scholars who are interested in cultural theory to run into a scale assessing three cultural biases—not four. One must bear in mind, however, that our approach fits in the French context (e.g., Bezes & Le Lidéc, 2007) and is grounded in theoretical as well as empirical reasons for what is called the natural affinity between hierarchy and individualism (Douglas & Wildavsky, 1982; Wildavsky, 2006; see also Kiss et al., 2020). By developing a culturally-sensitive measure of worldviews, our work joins the recent wave of efforts to evaluate and improve cultural theory’s operationalization in survey research (Swedlow et al., 2020; see also Kim & Kim, 2019; Liu, 2020). Whether this alternative way of operationalizing worldviews is both replicable across various social and political contexts and countries and suitable for shedding more light on variation in risk perception in those countries remains an important question that requires further investigation. In this respect—based on Thompson et al. (1990)) cultural analysis of some European countries—the British deferential civic culture (where there is an establishment alliance of individualism and hierarchy), the hierarchical German culture (in which individuals identify with the system but believe their participation should be limited to its proper sphere), or the Italian culture (which is characterized by a fatalistic way of life) could be interesting to investigate (see also Grendstad, 1999). By offering a three-factor model of worldviews, our work is actually in line with previous attempts to innovate in operationalizing cultural theory, such as a Chinese study that highlighted a worldview scale which consists of items from Dake’s and Kahan’s measures (Xue et al., 2016), or the cultural cognition thesis (Kahan, 2012). Like cultural cognition scales, our measure is an original variant of existing scales, which comes to expand the variety of approaches designed to empirically test the cultural theory of risk. As such, it is worth noting that our scale is not designed to replace other scales—in particular those comprising four distinct factors, each reflecting a

---

12A noticeable exception is found in Shi, Visschers, and Siegrist’s (2015) Swiss study which found a moderate relationship between cultural worldviews and risk perception, (but) using Kahan’s scales and one specific concern (climate change).
single worldview as conceptually posited by cultural theory (Douglas, 1999; Swedlow et al., 2020).

Study 2 helps illuminate our understanding of how cultural orientations shape individuals’ preferences for risk. Findings suggest that culturally diverse individuals may fear those hazards that threaten their values while forming a positive view of hazards that reinforce their values, or a neutral view toward those hazardous activities that neither threaten nor reinforce their values. Additionally, this mechanism tends to be commensurate with the degree individuals adhere to each worldview. This is in agreement with the results from Kahan’s studies (e.g., Kahan, 2012; Kahan et al., 2007). For example, risk sensitivity that egalitarians displayed toward environmental and economic issues (e.g., fertilizers, ozone depletion, globalization) is very in line with their environmental activism and alarmism against a backdrop of distrust of current regulatory bodies to control for untoward events (Ellis & Thompson, 1997; Thompson et al., 1990; Van de Graff, 2016): the more egalitarian individuals were, the more worried they were that such issues would lead to more distance between the rich and the poor; that is, more benefits for the former but more vulnerability to risk for the latter (see Leiserowitz, 2006, or Thaker, Smith, & Leiserowitz, 2020, for similar interpretations). In the same way, risk skepticism that egalitarians showed when they faced activities that are inherently disruptive for the system in power (e.g., demonstrations, strikes) is congruent with their values; that is, they need such events to blame the current, pyramidal system and substitute it with a more fair and participatory one (Mamadouh, 1999a; Tansey & O’Riordan, 1999). Conversely, hierarchical-individualists are naturally sensitive to such hazards, including social deviance, because both constitute a serious threat to existing power structures that favor their preferred activities (e.g., technological innovation, economic growth, societal elites). The allocation of riskiness for those hazards is a strategy for protecting the status quo of whom they benefit according to Dake (1991, 1992; Wildavsky & Dake, 1990). Finally, risk neutrality that fatalists exhibited for most hazardous activities except for transportation and health-related hazards (like blood transfusions, vaccinations) matches their dual strategy in coping with risks: fatalists adopt a “why bother?” risk strategy because they believe they lack control over events for the most part; nevertheless they are disposed to form a negative view facing threats that affect them personally (Dake, 1992; Thompson et al., 1990; see also Johnson et Swedlow, 2019b). Such a fatalistic pattern may reflect protective fatalism that describes fatalists as (1) resigned to randomness and constraints but (2) rational in their attempts to guard against misfortune—using their little agency to defend their interests (Entwistle, 2021). Future research is warranted to provide for more certainty about this assumption.

4.1. Practical implications

Our findings bear important practical implications for risk management and communication. First, by providing robust evidence for the influence of worldviews in determining risk perception, the present study emphasizes that public answers toward hazards do not depend only on technical information grounded primarily in scientific evidence but are also a matter of cultural orientation (Dake, 1992; Slovic, 2000; Steg & Sievers, 2000). This result prompts risk regulators to take individuals’ cultural orientations into account in their policy measures. If not, they are more likely to exacerbate existing political conflict in France over issues such as nuclear power, marijuana, or end-of-life care than social acceptability (for similar conclusions, see Kahan et al., 2007; Van de Graaff, 2016; Van der Linden, 2015). Second, by contributing an answer to the questions of why cultural worldviews do—or do not—enter a decision-making process about risk and how this can occur, the present study could help frame risk communication so that it specifically addresses risk issues which are relevant to the worldview(s) of a targeted audience (Kahan, 2013; Kahan et al., 2011; Palmer, 1996). This could be highly complementary to earlier work supporting the role of worldviews in shaping information about risk (Jones & Song, 2014) or perception of expert credibility (Lachapelle, Montpetit, & Gauvin, 2014).

4.2. Limitations

This research suffers some limitations. One limitation resides in the constitution of our samples. First, although the gender and age distribution of the samples in study 1 were fairly representative of the French population, both samples in study 2 consisted predominantly of female and young participants. Second, in every sample, well-educated people were overrepresented. The method of recruitment for our study left it vulnerable to this representativeness bias. We used snowball sampling via various networks of the research team. This team was young, with a greater proportion of females than males, and...
Further, the predictive validity of our scale was not compared with data from other worldview measures, in particular Jenkins-Smith’s scale. As a result, it was not possible to establish the relative explanatory power of our scale against other ones for risk judgements within the same people. This serves as the next logical step in the psychometric evaluation of our scale, for the purpose of determining whether or not it brings some additive value to predict and explain risk perception. In the same way, the face validity of our worldview measure—as we assessed it (viz. post factum, at one reviewer’s request, once a template for such an assessment was available in Swedlow et al., 2020)—showed that most of items do maybe a good job in operationalizing [their] worldview (Appendix A displays in detail our analysis of the face validity of all the 37 items). As reported by Swedlow et al. (2020), the same is true of Jenkins-Smith’s indices, Jenkins-Smith’s statements, and Kahn’s scales. This finding arguably leaves room for improving our measure regarding such a facet of validity. Addressing our hierarchy-individualism scale could be a good starting point. Specifically, in the current version of the subscale, it may be argued that (1) items previously viewed as individualistic ones are outnumbered (2:1; compared to “hierarchical” ones), and (2) the individualistic part of the subscale does not operationalize all components of individualism—emphasizing more the economic facet than the government regulation facet. Accordingly, it could be useful to better balance the number of “individualistic” versus “hierarchical” items by adding a couple of items which tap individualistic views on the best way to make decisions (see Thaker et al., 2020, or Xue et al., 2016, for such operationalizations of individualism). Of note, suggesting that the individualism dimension consists of various facets echoes to some extent early work that distinguished between cooperative and competitive individualism (Caulkins, 1994). Knowing whether the individualistic part of our current hierarchy-individualism scale can be equated with cooperative individualism and, relatedly, disentangled from the most competitive parts of individualism is an intriguing question, though beyond the scope of the present study.

Another, important limitation relates to our mode of investigation. We designed a nonexperimental study, which yielded correlational evidence that individuals’ cultural orientations contribute to shape risk perceptions in proportion to their commitment to each worldview. As a result, this limits our ability to make strong causal conclusions. To further corroborate and demonstrate more strictly the specific effect of each cultural orientation on risk perception, all other things being equal, additional experimental research is needed. As suggested by Xue et al. (2014) in their meta-analysis, we could use priming paradigms in which worldviews would be activated (1) one at a time, and (2) without any reference to risk issues in order to empirically distinguish the value activation from its subsequent influence on judgments.

5. Conclusion

All together, the findings from the present research extend previous work on cultural theory by developing a psychometrically sound survey measure of worldviews composed of three dimensions: hierarchy-individualism, egalitarianism, and fatalism. The features of our three-factor measure of worldviews make it an attractive instrument for quickly capturing to what extent French citizens adhere to various cultural orientations. Once endowed with it, we were in position to appropriately investigate the connection between cultural worldviews and risk perception. Our findings indicate that each worldview generates its own risk pattern in which hazards are considered as dangerous or conversely safe in proportion to the strength those hazards threat or instead conform to the worldview set of beliefs and values, thus providing some valuable insights into conflict over risk across individuals and groups.

ACKNOWLEDGMENTS

We would like to thank the area editor and the anonymous reviewers for their useful comments and advices on an earlier version of this article.
APPENDIX A

The table below presents the face validity analysis of the items first retained in our preliminary list (N = 37).

| Survey Items Operationalizing CT Concept in the Literature | Most Probably Targeted CT Concept | Face Validity |
|------------------------------------------------------------|-----------------------------------|---------------|
| Hierarchy Index (n = 11)                                   |                                   |               |
| 1. It is important to preserve our customs and heritage (Rippl, 2002) | HPV                               | Maybe: Item expresses HPV but it could be supported by everybody |
| 5. Decisions about health risks should be left to the experts (Peters & Slovic, 1996) | HPR                               | Yes: Item appeals to HPR |
| 9. I think it is important to carry on family traditions (Marris et al., 1998) | HPV                               | Maybe: Ambiguity about what “family traditions” means; also item expresses HPV but it could be supported by everybody |
| 13. One of the problems with people is that they challenge authority too often* (Ellis & Thompson, 1997) | HPR                               | Yes: Item appeals to HPR |
| 17. Respect for authority is one of the most important things that children should learn* (Ellis & Thompson, 1997) | HPV                               | Yes: Item expresses HPV |
| 21. When national security is threatened, then government needs to keep it quiet | HPR                               | May: Ambiguity regarding whether it is about HPR, HR, High GrdR, High GrdRP |
| 25. I prefer clear instruction from my superiors about what to do (Rippl, 2002). | HPR                               | Yes: Item appeals to HPR |
| 29. The police should have the right to listen to private phone calls when investigating crime* (Dake, 1991) | HPR                               | May: Item expresses HPR, High GrdRP but does not really express High GrpRP |
| 33. An intact family is the basis of a functioning society (Rippl, 2002) | HPV                               | May: Ambiguity about what “an intact family” means and could express HPV but also High GrdR, High GrpR, High GrdRP and High GrpR |
| 36. I like to plan carefully so that financial risks are not taken* (Dake, 1992) | HPR                               | May: Item expresses preference for scheduling that may appeal to hierarchists, but could also be supported by others, except fatalists |
| Individualism Index (n = 8)                                |                                   |               |
| 3. Government has no right to regulate people’s personal risk-taking activities such as smoking, mountain climbing, hang gliding, etc. (Peters & Slovic, 1996) | IPR                               | May: Item expresses low GrdRP, appealing to both individualists and egalitarians |
| 7. My ideal job would be an independent business (Rippl, 2002) | IPR                               | May: Ambiguity about what “independent business” means |
| 11. This country would be better off if we didn’t worry so much about how equal people are (Dake, 1992) | IPV                               | May: Item expresses both high and low GrdRP, appealing to hierarchists and individualists |
| 15. A free society can only exist by giving companies the opportunity to prosper* (Dake, 1992) | IPV                               | May: Ambiguous whether item expresses a preference for IPV or IPR; hierarchists and individualists might agree with it |
| 19. Continued economic growth is the answer to improved quality of life* (Dake, 1991) | IPV                               | May: Ambiguous whether item expresses a preference for IPV or IPR; hierarchists and individualists might agree with it |

(Continued)
| Survey Items Operationalizing CT Concept in the Literature | Most Probably Targeted CT Concept | Face Validity |
|----------------------------------------------------------|-----------------------------------|---------------|
| 23. I prefer tasks where I work something out on my own (Rippl, 2002) | IPR | Yes: Low GrpRP plus low GrdRP equals IPR |
| 27. When I have problems I try to solve them on my own (Rippl, 2002) | IR | Yes: Low GrpR plus low GrdR equals IR |
| 31. In a fair system people with more ability should earn more (Dake, 1992) | IPR | Maybe: Ambiguity about what “more ability” means, so item could be supported by both individualists and hierarchists |
| 2. I would support a tax change that made people with large incomes pay more* (Dake, 1992) | EPR | Maybe: Ambiguous whether item expresses EPR or EPV; also item might not bother some hierarchists (pay “more”, not “pay”) |
| 6. Those who get ahead should be taxed more to support the less fortunate* (Dake, 1992) | EPR | Maybe: Appeals to EPR and HPR |
| 10. Those in power often withhold information about things that are harmful to us (Peters & Slovic, 1996) | None | No: Could be a complaint of an egalitarian who denounce it, but also a stance with which both hierarchists and fatalists agree; ambiguous as to whether describing or evaluating those in power |
| 14. What this country needs is a “fairness revolution” to make the distribution of goods more equal* (Ellis & Thompson, 1997) | EPR | Maybe: Expresses a preference for more equality but could also be supported by hierarchists |
| 18. If people in this country were treated more equally we would have fewer problems* (Dake, 1992) | EPR | Maybe: Expresses a preference for more equality but could also be supported by hierarchists |
| 22. The difference between rich and poor nations isn’t right* (Brenot et al., 1998) | EPR | Maybe: Ambiguous whether item expresses EPR or EPV |
| 26. Important questions for our society should not be decided by experts but by the people (Rippl, 2002) | EPR | Yes: Item appeals to EPR |
| 30. Firms and institutions should be organized in a way that everybody can influence important decisions (Rippl, 2002) | EPR | Maybe: Item clearly expresses low GrdRP but it could be supported by egalitarians as well as by individualists |
| 34. The world could be a more peaceful place if its wealth were divided more equally among nations* (Marris et al., 1998) | EPR | Maybe: Expresses a preference for more equality but could also be supported by hierarchists; also, ambiguous whether item expresses EPR or EPV |
| 4. The future is too uncertain for a person to make serious plans* (Dake, 1992) | FR | Maybe: Expresses FR but comes close to expressing FMN as well |
| 8. If something like a chemical is going to harm me it will, and there isn’t much that I can do about it, what will be, will be (Krewski, Slovic, Bartlett, Flynn, & Mertz, 1995) | FIN | Maybe: Expresses FIN but comes close to expressing FMN as well |
| 12. It seems to me that, whoever you vote for, things go on pretty much the same* (Dake, 1992) | FMHN | Maybe: Comes close to expressing FMHN but does not do so cleanly because “things” are not related to human nature |
| 16. I feel that life is like a lottery (Marris et al., 1998) | FIN | Maybe: Expresses FIN but comes close to expressing FMN as well |
| 20. Cooperating with others rarely works* (Dake, 1992) | FPR | Maybe: Appeals to FPR and IPR |
| 24. Most people make friends only because friends are useful to them* (Marris et al., 1998) | FPR | Maybe: Ambiguous whether item expresses FPR or is describing FR |

(Continued)
Table A1. (Continued)

Survey Items Operationalizing CT Concept in the Literature | Most Probably Targeted CT Concept | Face Validity
---|---|---
28. I have very little control over risks to my health (Krewski et al., 1995) | FIN | Maybe: Expresses FIN but comes close to expressing FMN as well
32. There is no use in doing things for other people you only get it in the neck in the long run* (Dake, 1992) | FPR | Maybe: Expresses FPR but comes close to expressing FMHN as well
35. A person is better off if he or she doesn’t trust anyone* (Dake, 1992) | FPR | Maybe: Ambiguous whether item expresses FPR or is describing FR

Note: Numbers before items are their rank in the first inventory. Marked items (*) are those selected in our final pool (N = 18) as good candidates for measuring worldviews in a French context; EPR: Egalitarian preferences for relations, EPV: Egalitarian political values, FR: Fatalistic relations, FPR: Fatalistic preferences for relations, FIN: Fatalistic ideas of nature, FMN: Fatalistic myths of nature, FHMN: Fatalistic myths of human nature, GrdR: Grid relations, GrpR: Group relations, GrdRP: Grid relational preferences, GrpRP: Group relational preferences, HR: Hierarchical relations, HPR: Hierarchical preferences for relations, HPV: Hierarchical political values, IR: Individualistic relations, IPR: Individualistic preferences for relations, IPV: Individualistic political values (see Swedlow et al., 2020 for details). Yes = Yes, both coders agreed that the item has face validity as a measure of one CT concept; No = No, both coders agreed that the item has no face validity as a measure of any CT concept; Maybe = Maybe the item has face validity as a measure of one CT concept because one coder thought it did while the other one thought it did not.

APPENDIX B

The table below presents the 12-item scale of Jenkins-Smith.

Table B1. Jenkins-Smith Items

Hierarchy
The best way to get ahead in life is to work hard and do what you are told to do.
Society is in trouble because people do not obey those in authority.
Society would be much better off if we imposed strict and swift punishment on those who break the rules.
Individualism
Even if some people are at a disadvantage, it is best for society to let people succeed or fail on their own.
Even the disadvantaged should have to make their own way in the world.
We are all better off when we compete as individuals.
Egalitarianism
What society needs is a fairness revolution to make the distribution of goods more equal.
Society works best if power is shared equally.
It is our responsibility to reduce differences in income between the rich and the poor.
Fatalism
The most important things that take place in life happen by chance.
No matter how hard we try, the course of our lives is largely determined by forces beyond our control.
For the most part, succeeding in life is a matter of chance.

Note: Drawn from Ripberger et al. (2014).

REFERENCES

Bezes, P., & Le Lidec, P. (2007). French top civil servants within changing configurations: From monopolization to contested places and roles. In E. C. Page & V. Wright (Eds.), From the active to the enabling state. Transforming government (pp. 121–163). London, UK: Palgrave MacMillan. https://doi.org/10.1057/9780230288768.7
Boholm, A. (1996). Risk perception and social anthropology: Critique of cultural theory. *Ethnos, 61*(1-2), 64-84. https://doi.org/10.1080/00141844.1996.9981528
Bouyer, M., Bagdassarian, S., Chaabane, S., & Mullet, E. (2001). Personality correlates of risk perception. *Risk Analysis, 21*(3), 457–465. https://doi.org/10.1111/0272-4332.21325
Breakwell, G. M. (2007). *The psychology of risk*. Cambridge, UK: Cambridge University Press. https://doi.org/10.1017/CBO9780511819315
Brenot, J., Bonnefous, S., & Marris, C. (1998). Testing the cultural theory of risk in France. *Risk Analysis, 18*(6), 729–739. https://doi.org/10.1111/j.1539-6924.1998.tb01116.x
Brissin, R. W. (2000). Some methodological concerns in intercultural and cross-cultural research. In R. W. Brissin (Ed.), *Understanding culture’s influence on behavior*. Fort Worth, TX: Harcourt.
Brown, T. A. (2006). Confirmatory factor analysis for applied research. New York: The Guilford Press.

Caulkins, D. D. (1994). Norwegians: Cooperative individualists. In M. Ember, C. R. Ember, & D. Levinson (Eds.), Portraits of culture: Ethnographic originals (pp. 72–85). New Jersey, NJ: Prentice Hall.

Chauvin, B. (2018). Individual differences in the judgment of risks. In M. Raue, E. Lerner, & B. Streicher (Eds.), Psychological perspectives on risk and risk analysis: Theory, models, and applications (pp. 37–61). Cham, Switzerland: Springer. https://doi.org/10.1007/978-3-319-92478-6_2

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). New York: Psychology Press.

Dake, K. (1991). Orienting dispositions in the perception of risk: An analysis of contemporary worldviews and cultural biases. Journal of Cross-Cultural Psychology, 22(61), 61–82. https://doi.org/10.1177/0022022191221006

Dake, K. (1992). Myths of nature: Culture and the social construction of risk. Journal of Social Issues, 48(4), 21–37. https://doi.org/10.1111/j.1540-4563.1992.tb01943.x

De Witt, A., Osseweijer, P., & Pierce, R. (2017). Understanding public perceptions of biotechnology through the “integrative worldview framework”. Public Understanding of Science, 26, 70–88. https://doi.org/10.1177/0963662515592364

Douglas, M. (1966). The logic of pollution and taboo. London, UK: Routledge.

Douglas, M. (1978). Cultural bias. London, UK: Royal Anthropological Institute.

Douglas, M. (1999). Four cultures: The evolution of a parsonomious model. Geosystems, 47, 411–415. https://doi.org/10.1023/A:1007008025151

Douglas, M. (2003). How fair is fair? Risk. Columbia University Press.

Douglas, M. (2006). Purification and danger: An analysis of the concepts of pollution and taboo. London, UK: Routledge.

Douglas, M., & Wildavsky, A. (1982). Risk and culture. An essay on the selection of technological and environmental dangers. Berkeley, CA: University of California Press.

Ellis, R. J., & Thompson, F. (1997). Culture and the environment in the Pacific Northwest. American Political Science Review, 91(4), 885–897. https://doi.org/10.1111/j.1467-954X.1990.tb09919.x

Entwistle, T. (2021). Why nudge sometimes fails: Fatalism and the cultural cognition of scientific consensus. Risk Analysis, 41(3), 1071–1087. https://doi.org/10.1111/risa.13299

Favre, M., Swedlow, B., & Verweij, M. (2019). A cultural theory of power and model of power relations. Journal of Political Power, 12(2), 245–275. https://doi.org/10.1080/2158379X.2019.1624060

Gastil, J., Braman, D., Kahan, D. M., & Slovic, P. (2011). The cultural orientation of mass political opinion. Journal of Political Science & Policy, 44(4), 720–725. https://www.jstor.org/stable/248. https://doi.org/10.1007/s11014-009-9137-9

Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. Psychometrika, 30, 179–185. https://doi.org/10.1007/BF02289447

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling, 6(1), 1–55. https://doi.org/10.1080/10705511.1999.1051708

IpsoS. (2017). 1er tour législatives 2017 : Sociologie des électorats et profil des abstentionnistes. Retrieved from https://www.ipos.com/fr-fr/1er-tour-legislatives-2017-sociologie-des-electorats-et-profil-des-abstentionnistes

Kahan, D. M. (2012). Cultural cognition as a conception of the cultural theory of risk. In R. Hillerbrand, P. Sandin, S. Roeser, & M. Peterson (Eds.), Handbook of risk theory: Epistemology, decision theory, ethics and social implications of risk (pp. 725–760). Dordrecht, The Netherlands: Springer. https://doi.org/10.1007/978-94-007-1433-5_28

Kahan, D. M. (2013). A risky science communication environment for vaccines. Science, 342(6154), 53–54. https://doi.org/10.1126/science.1245724

Kahan, D. M., Braman, D., Gastil, J., Slovic, P., & Mertz, C. K. (2007). Culture and identity-protective cognition: Explaining the white-male effect in risk perception. Journal of Empirical Legal Studies, 4(3), 465–505. https://doi.org/10.1080/1740-1742.2017-1461.2007.00097.x

Kahan, D. M., Braman, D., Slovic, P., Gastil, J., & Cohen, G. (2009). Cultural cognition of the risks and benefits of nanotechnology. Nature Nanotechnology, 4, 87–91. https://doi.org/10.1038/nnano.2008.341

Kahan, D. M., Jenkins-Smith, H. C., & Braman, D. (2011). Cultural cognition of scientific consensus. Journal of Risk Research, 14(2), 147–174. https://doi.org/10.1080/13691481.2010.511246

Kahan, D. M., Wittlin, M., Peters, E., Slovic, P., Ouellette, L. L., Braman, D., & Mandel, G. N. (2011). The tragedy of the risk-perception commons: Culture conflict, rationality conflict, and climate change. Cultural Cognition Project Working Paper No. 89. https://doi.org/10.2139/ssrn.1871503

Kim, H. K., & Kim, Y. (2019). Risk information seeking and processing about particulate air pollution in South Korea: The roles of cultural worldview. Risk Analysis, 39(5), 1071–1087. https://doi.org/10.1111/risa.13231

Kiss, S. J., Montpetit, E., & Lachapelle, E. (2020). Beyond regions and ideology: Using cultural theory to explain risk perception in Canada. Canadian Journal of Political Science, 53(2), 439–460. https://doi.org/10.1017/S00084239200001177

Krewski, D., Slovic, P., Bartlett, S., Flynn, J., & Mertz, C. K. (1995). Health risk perception in Canada II: Worldviews, attitudes and opinions. Human and Ecological Risk Assessment, 1(3), 231–248. https://doi.org/10.1080/10807039509380009

Lachapelle, E., Montpetit, E., & Gauvin, J-P. (2014). Public perceptions of expert credibility on policy issues: The role of ex-
pert framing and political worldviews. The Policy Studies Journal, 42(4), 674–697. https://doi.org/10.1111/pjsj.12073
Langford, I., Georgiou, S., Bateman, I. J., Day, R. J., & Turner, R. K. (2000). Public perceptions of health risks from polluted coastal bathing waters: A mixed methodological analysis using cultural theory. Risk Analysis, 20(5), 691–704. https://doi.org/10.1111/0272-4332.205062
Leiserowitz, A. (2006). Climate change risk perception and policy preferences: The role of affect, imagery, and values. Climate Change, 77, 45–72. https://doi.org/10.1007/s10584-006-9059-9
Liu, L-Y. (2020). Does culture travel? Cultural influences on environmentalism in Taiwan in comparison to the United States, The Journal of Environmental Education, 51(3), 214–231. https://doi.org/10.1080/00958964.2019.1631740
Lockhart, C. (2001). Political culture, patterns of American political development, and distinctive rationalities. Review of Politics, 63(3), 517–548. https://doi.org/10.1080/00346630050030941
Mamadouh, V. (1999a). Grid-group cultural theory: An introduction. Geojournal, 47, 345–409. https://doi.org/10.1023/A:1007024008646
Mamadouh, V. (1999b). A political-cultural map of Europe. Family structures and the origins of differences between national political cultures in the European Union. Geojournal, 47, 477–486. https://doi.org/10.1023/A:1007057527547
Marris, C., Langford, I., & O’Riordan, T. (1998). A quantitative test of the cultural theory of risk perceptions: Comparison with the psychometric paradigm. Risk Analysis, 18(5), 635–647. https://doi.org/10.1111/j.1539-6924.1998.tb00576.x
Matheson, C. (2018). Four organisational cultures in the Australian public service: Assessing the validity and plausibility of Mary Douglas’ cultural theory. Australian Journal of Public Administration, 77(4), 644–657. https://doi.org/10.1111/1467-8500.12303
Moyer, R. M., & Song, G. (2016). Understanding local policy elites’ perceptions on the benefits and risks associated with high-voltage power line installations in the state of Arkansas. Risk Analysis, 36(10), 1983–1999. https://doi.org/10.1111/risa.12548
Muthén, B. O., & Kaplan, D. (1985). A comparison of some methodologies for the factor analysis of non-normal likert variables. British Journal of Mathematical and Statistical Psychology, 38(2), 171–189. https://doi.org/10.1111/j.2044-8317.1985.tb00832.x
Muthén, L. K., & Muthén, B. O. (1998–2017). Mplus user’s guide (8th Ed). Los Angeles, CA: Muthén & Muthén.
Nawlin, M. C., & Rabovsky, T. M. (2020). A cultural theory of populaires. Assemblee-nationale-ne-compte-quasiment-plus-de-depassements-des-mesures-populaires. Retrieved from https://www.inegalites.fr/L-inegales-et-lascenseur-social/
Palmer, C. G. (1996). Risk perception: An empirical study of the relationship between worldview and the risk construct. Risk Analysis, 16, (5), 717–723. https://doi.org/10.1111/j.1539-6924.1996.tb00820.x
Peretti-Watel, P. (2000). The sociology of risk. Paris, France: Armand Colin.
Peters, E., & Slovic, P. (1996). The role of affect and worldviews as orienting dispositions in the perception and acceptance of nuclear power. Journal of Applied Social Psychology, 26(16), 1427–1453. https://doi.org/10.1177/1096508196.260079.x
Raines-Eudy, R. (2000). Using structural equation modeling to test for differential reliability and validity: An empirical demonstration. Structural Equation Modeling, 7(1), 124–141. https://doi.org/10.1207/S15328007SEM0701_07
Ripberger, J. T., Gupta, K., Silva, C., & Jenkins-Smith, H. C. (2014). Cultural theory and the measurement of deep core beliefs within the advocacy coalition framework. Policy Studies Journal, 42(4), 509–527. https://doi.org/10.1111/j.1579-7747.2000.9307
Rippl, S. (2002). Cultural theory and risk perception: A proposal for a better measurement. Journal of Risk Research, 5(2), 147–165. https://doi.org/10.1080/13669870101042598
Rokeach, M. (1973). The nature of human values. New York: Free Press.
Schwartz, S. H. (1999). A theory of cultural values and some applications for work. Applied Psychology: An International Review, 48(1), 23–47. https://doi.org/10.1111/j.1464-0597.1999.tb00047.x
Schwarz, M., & Thompson, M. (1990). Divided we stand: Redefining politics, technology, and social choice. New York: Harperter-Wheatsheaf.
Shi, J., Visschers, V., & Siegrist, M. (2015). Public perception of climate change: The importance of knowledge and cultural worldviews. Risk Analysis, 35(12), 2183–2201. https://doi.org/10.1111/risa.12406
Sjöberg, L. (1997). Explaining risk perception: An empirical evaluation of cultural theory. Risk Decision and Policy, 2, 113–130.
Sjöberg, L. (1998). Worldviews, political attitudes, and risk perception. Risk: Health, Safety, and Environment, 9(2), 137–152. Retrieved from https://scholars.unh.edu/risk/vol9/iss2/6
Sjöberg, L. (2003). Distal factors in risk perception. Journal of Risk Research, 6(3), 187–211. https://doi.org/10.1080/1369870032000008847
Slovic, P. (1999). Trust, emotion, sex, politics, and science: Surveying the risk-assessment battlefield. Risk Analysis, 19, 689–701. https://doi.org/10.1111/1539-6924.00194
Slovic, P. (2000). The perception of risk. London, UK: Earthscan.
Slovic, P., Flynn, J., Mertz, C. K., Pournadere, M., & Mays, C. (2000). Nuclear power and the public: A comparative study of risk perception in France and the United States. In O. Renn & B. Rohrmann (Eds.), Cross-cultural risk perception: A survey of empirical studies (pp. 55–102). Boston, MA: Springer. https://doi.org/10.1007/978-1-4757-4891-8_2
Slovic, P., & Peters, E. (1998). The importance of worldviews in risk perception. Risk Decision and Policy, 3, 165–170.
Song, G. (2014). Understanding public perceptions of benefits and risks of childhood vaccinations in the United States. Risk Analysis, 34, (3), 541–555. https://doi.org/10.1111/risa.12114
Steg, L., & Sievers, I. (2000). Cultural theory and individual perceptions of environmental risks. Environment and Behavior, 32(2), 250–269. https://doi.org/10.1177/00190625993172513
Sutherland, D. M. (2002). Peasants, lords, and leviathan: Winners and losers from the abolition of French feudalism, 1780–1820. The Journal of Economic History, 62(1), 1–24. Retrieved from https://www.jstor.org/stable/2697970
Swedlow, B., Ripberger, J. T., Liu, L. Y., Silva, C. L., Jenkins-Smith, H. C., & Johnson, B. B. (2020). Construct validity of cultural theory survey measures. Social Science Quarterly, 101(6), 2332–2383. https://doi.org/10.1111/ssqu.12859
Tansey, J., & O’Riordan, T. (1999). Cultural theory and risk: A review. Health, Risk, & Society, 1(1), 71–90. https://doi.org/10.1080/1369857990847008
Thaker, J., Smith, N., & Leiserowitz, A. (2020). Global warming risk perceptions in India. Risk Analysis, 40(12), 2481–2497. https://doi.org/10.1111/risa.13574
Thompson, M., Ellis, R., & Wildavsky, A. (1990). Cultural theory. Boulder, CO: Westview Press.
Tumilson, C., & Song, G. (2019). Cultural values, trust, and benefit-risk perceptions of hydraulic fracturing: A comparative analysis of policy elites and the general public. Risk Analysis, 39(3), 511–534. https://doi.org/10.1111/risa.13197
Van de Graaff, S. (2016). Understanding the nuclear controversy: An application of cultural theory. Energy Policy, 97, 50–59. https://doi.org/10.1016/j.enpol.2016.07.007
Van der Linden, S. (2015). The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. *Journal of Environmental Psychology, 41*, 112–124. https://doi.org/10.1016/j.jenvp.2014.11.012

Velicer, W., Peacock, A., & Jackson, D. (1982). A comparison of component and factor patterns: A Monte Carlo approach. *Multivariate Behavioral Research, 17*(3), 371–388.

Verplanken, B., & Holland, R. W. (2002). Motivated decision making: Effects of activation and self-centrality of values on choices and behavior. *Journal of Personality and Social Psychology, 82*(3), 434–447. https://doi.org/10.1037/0022-3514.82.3.434

Verweij, M. (2011). They may be génocidaires but at least they are our génocidaires: The role of France in Rwanda. In M. Verweij (Ed.), *Clumsy solutions for a wicked world: How to improve global governance* (pp. 127–182). London, UK: Palgrave MacMillan.

Verweij, M., Luan, S., & Nowacki, M. (2011). How to test cultural theory: Suggestions for future research. *PS: Political Science & Politics, 44*(4), 745–748. https://doi.org/10.1017/S1049096511001399

Wildavsky, A. (2006). *Cultural analysis: Politics, public law, and administration*. New Jersey, NJ: Transaction Publishers.

Wildavsky, A., & Dake, K. (1990). Theories of risk perception: Who fears what and why? *Daedalus, 119*(4), 41–60. https://www.jstor.org/stable/20025337

Xue, W., Hine, D. W., Loi, N. M., Thorsteinsson, E. B., & Phillips, W. J. (2016). Cultural worldviews and climate change: A view from China. *Asian Journal of Social Psychology, 19*(2), 134–144. https://doi.org/10.1111/ajsp.12116

Yang, Y., & Green, S. B. (2011). Coefficient alpha: A reliability coefficient for the 21st century? *Journal of Psychoeducational Assessment, 29*(4), 377–392. https://doi.org/10.1177/0734282911406668