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A Cross-Cultural Comparison of the Impact of Individualism – Collectivism on Risk Perception of Engineering Students from Brazil and Spain*

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There has been an emerging interest in exploring the *influence* of individualism-collectivism and uncertainty avoidance cultural dimensions on risk perception at an individual level of analysis. This paper aims to evaluate the impact of both cultural dimensions on risk perception. For this purpose, a survey was conducted with 340 students; 214 Brazilian and 126 Spanish respondents participated. The data were evaluated using descriptive statistics and Fuzzy-set Quantitative Comparative Analysis (fsQCA) for hypotheses testing. Results demonstrate that collectivistic and uncertainty avoidance preferences negatively influence risk tolerance, leading to risk-avoidance behavior. The managerial contributions of this study focus on aspects that lead to a broader sense of the collective, social and environmental aspects. Furthermore, this study contributes to the academic literature by demonstrating how individualism-collectivism and uncertainty avoidance impacts risk perception.

Keywords: individualism-collectivism; uncertainty avoidance; risk perception; fsQCA, cultural dimensions

1. Introduction

Globalization and internationalization lead to an increasing extent of the influence of culture on projects that implies the need to prepare students to deal with a diversified scenario and to build intercultural competencies [1]. The importance of culture is broadly discussed in the academic literature. The Cultural Theory [2] aims to analyze the perceptions and actions of people according to their social and cultural adherence in groups. In the 20th century, numerous approaches emerged for comparing different cultures through multiple cultural dimensions [3–5]. This trend continues today with global projects that seek to find other ways for people reacting to everyday activities depending on their country of origin. Examples of this are the World Value Survey (WVS), which is the most extensive non-commercial cross-cultural research (WVS, 2020), and the Global Leadership and Organizational Behavior Effectiveness (GLOBE) project [6], which demonstrate the influence of culture on leadership. Both projects involve many researchers from different countries, demonstrating the relevance that culture acquires in the scientific field. Thus, intercultural competencies are important for the global and the domestic context [7].

Several research has been done in Higher Education Institutions to know the links between specific cultural indicators and preferences for some competences [8] or to predict culture related preferences [9]. In both cases Hofstede cultural dimensions were used as reference to measure differences. Nevertheless, the comparison between Spanish and Brazilian students here presented has not been found.

Multicultural experiences in the class show that students increase understanding of cultural differences [10] and strengthen competences needed today [11]. Moreover, some experience has been done with virtual multicultural teams showing how various cultural backgrounds of creative team members could lead into different perceptions of particular design features in product development education [12].

Some recent studies pay special attention to two cultural dimensions: (i) individualism and collectivism [13] and (ii) uncertainty avoidance [14, 15]. Our paper follows this stream focusing on both cultural dimensions. Previous researches have

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reported the influence of cultural factors on risk management [16, 17]. Liu et al. [18] state that risks are perceived and managed differently according to the national cultures. Likewise, [14] reinforce a significant relationship between risk-taking and cultural dimensions. Thus, there is a need to explore the role of cultural orientation and the perception of risk at the individual level [13].

Our study aims to narrow the gap by exploring the relationship between risk perception and both cultural dimensions, individualism and collectivism, and uncertainty avoidance at the individual level. Specifically, this paper discusses how students from two countries, Spain and Brazil, behave when facing risks. According to Hofstede's values [19], these countries have scores on individualism 38 (Brazil) and 51 (Spain), and on uncertainty avoidance 76 (Brazil) and 86 (Spain), which, albeit different, are not very far away. A survey with 214 students from Brazil and 126 in Spain explores risk perception according to cultural dimensions, individualism-collectivism, and uncertainty avoidance. For this research purposes, we employ the fsQCA. Our study contributes to the literature by (i) inferring that high collectivism and uncertainty avoidance preferences tend to lead to a risk aversion behavior and (ii) suggesting that collectivism and uncertainty avoidance cultural dimensions are directly correlated to risk aversion for individuals from Brazil and Spain. Results may be of interest when teaching students subjects linked with risk management such as project management or finance. Our study also demonstrated that both countries present similar behaviors, considering these two cultural dimensions and their influence on risk response, which their shared Latin roots could explain. As managerial contributions derived from this study, the cultural dimensions evaluated in this study may lead to a decision-making process that considers the repercussions of an individual from Brazilian and Spanish cultures in the business, an important issue to be considered in Higher Education programs. Besides, the cultural dimension aspects would also have a broader impact, including their influence on social and environmental issues.

2. Literature Review and Hypotheses

2.1 Risk Perception and Culture

The importance of culture has also taken special consideration in the risk management process, as highlighted by the International Standard Organization (ISO) guidelines ISO 31.000:2018 [20] and in the definition of the critical success factors [21, 22]. So far, several studies have reported the influence of cultural factors on risk management (e.g., [16–18, 22]). All these studies give a leading role to the model defined by Geert Hofstede [23, 24].

Douglas [2] reinforces the institutional influence on risk perception due to the social or cultural phenomenon and personality needs, traits, preferences, or characteristics of the risk events. Furthermore, risk perception can occur in a social environment whereby one cannot avoid considering how people perceive and interpret risks. Dake [25] conducted an empirical research that stated the cultural biases of hierarchy, individualism, and egalitarianism on risk-taking behavior. In this aspect, individuals are not socially isolated, and collectivistic cultures appreciate risk avoidance. Other predictors were tested in this study, such as personality, political orientations, and contemporary worldviews. Nonetheless, cultural aspects represented by their biases were presented as the best predictors for risk perception.

The perception and interpretation of risk [25] reached attention through cultural theory [2, 26]. We could wonder if cultural and social learning should explain how people perceive and understand risk. Depending on the cultural environment groups belong to, the cultural theory focuses on different risks. Nevertheless, there is a lack of empirical support for this theory [27]. Oltedal et al. [28] promote a critical review to Douglas's [2] theory and explain this lack of empirical support with three main reasons: (i) the theory presupposes a correlation between ''way of life'' and individual orientation, and very little evidence supports the idea that individuals deliberately choose their ''way of life''; (ii) measurement instruments do not measure the relevant aspects of culture; (iii) the theory is overestimated and is not able to anticipate risk perceptions in some situations.

More recently, several authors have gone deeper, analyzing the link between risk management and cultural approach. Wang et al. [29] highlighted the influence of culture on the degree of loss aversion after studying 53 countries and considering the Hofstede survey on cultural dimensions. Liu et al. [18] presented a conceptual framework to link culture and risk management. From this perspective, risks are perceived and managed differently according to each national culture. Besides, the prevailing culture of individuals has significant influence over corporate risk-taking individuals [30]. Gaganis et al. [14] investigated the relationship between national culture and risk management at insurance firms. The authors found a strong and significant relationship between the risk-taking behavior of insurance firms and cultural dimensions as individualism and uncertainty avoidance. Ashraf et al. [30] reached similar conclusions correlating risk-taking behavior and culture, finding that cul-

tural values, as high individualism and low uncertainty avoidance, lead to bank risk-taking decisions.

The interplay between risk perceptions and risk behaviors is not an easy topic, even when there is a great need. Weber et al. [31] published a scale to assess risk-taking in five content domains, financial, health and safety, ethical, recreational, and social decisions. An individual's risk attitude is related to the utility function derived from risky decisions-taken choices. This scale has been used to measure risk perception differences between Brazilian and Spanish students presented in this paper. The concepts of "risk-averse" and "risk-seeking" within the expected utility framework [32] are linked to the curvature of the utility function.

This risk attitude (what stands between risk aversion and risk-seeking) is related to individual personality. Some researchers associate greater personal and corporate success with greater risk-taking [33]. Cultural factors also influence the perception of risks [14] or their assessment. An empirical study [34] stated that project managers from different national cultures present different ways of assessing risk.

The risk is related to thoughts, beliefs, and constructs [35]. When we can define "objective" risk, the measurement is independent of individuals' knowledge and worries [36]. Calculating objective risk statistics and probability distributions are needed and may vary in different cultures since the perceived risk concerns how individuals understand and experience a specific situation [28].

The literature review in the management field highlights the importance of differentiating between risk perception and attitude against perceived risk [37]. These authors state that the entrepreneurs differentiate themselves rather by an optimistic perception of the risks involved in a situation. Empirical researches have shown that risk perception varies according to cultural values differences [38–40]. Moreover, some variables, such as knowing ahead of time the estimated benefits of accepting different circumstances, are likely to have contributed to distinct perceptions of risk [41].

This study focuses on the influence on risk perception of two cultural dimensions, individualism and collectivism, and uncertainty avoidance, that stood out in recent literature [13–15] as explained further on.

2.2 Individualism and Collectivism

Individualism and collectivism are two of the most important constructs in intercultural and cross-cultural studies. Collectivism is defined as a social pattern based on closely connected individuals who see themselves as part of collectivities, represented by examples as a family, the co-workers from an organization, or the inhabitants of a country. The members of these groups are motivated by imposed norms and duties, and these restrictions have priority over personal goals. Conversely, individuals from individualistic cultures view themselves as independent, with a predominancy in following their preferences, needs, and rights [42, p.2].

In comparing countries, although Brazil and Spain are originally Latin cultures [43], Brazil presents a higher level of collectivism according to Hofstede's values [19], with a score of 38 to Brazil and 51 to Spain. Nonetheless, studies demonstrated that the generalization of individualism and collectivism leads to misconceptions. In their study, Smith et al. [44] emphasize that individualistic and collectivistic behaviors were more predicted by changing aspects in a specific environment as business (such as spoken language and hierarchical relations) than a nation-level measurement. Besides, social psychologists have measured tendencies toward individualism and collectivism in recent years. For example, according to the causes and consequences, people behave individualistically or collectivistically. Many problems of modernity can be linked to an individualistic behavior of the society, whereas situations, whereby a lack of human rights can be observed, are related to collectivism [42]. Considering the recent impact of the COVID-19 pandemic, which affected most the countries and cultures worldwide, Biddlestone et al. [45] demonstrated that individualism negatively anticipated intentions to engage in social distance due to feelings of powerlessness. In turn, collectivism positively impacts social distance due to the feeling of taking care of the community.

The corporate impact of individualism and collectivism is demonstrated from various perspectives in academic literature. Individualism and collectivism are also well-known dimensions for developing cross-cultural assessments and training programs, as intercultural sensitivity, is based on the individualistic and collectivist background of others [46]. The aspects of corporate earnings and governance practices behaviors shaped by individualistic or collectivistic dimensions are highlighted by the academic literature [47–49]. They are mainly based on the idea advocated by Breuer et al. [50] that individualism leads to an overestimation of optimism and self-confidence, making these societies more risk-takers.

An et al. [51] found that firms established in countries with a higher level of individualism have a higher risk to a stock price crash. They hypothesize that people in a more individualistic country are more prone to avoid bad news and evaluate their lives from a more positive perspective than the collectivistic ones [50, 52]. Also, Autio et al. [53]

stated that cultures with higher scores of the collectivism dimension tend to present negative practices to entrepreneurial activities, with is commonly associated with a lower disposition to take risks.

Thus, in the light of these arguments, the following hypothesis emerges to be investigated in this study:

Hypothesis 1 (H_1): Individuals with higher collectivistic beliefs tend to be more risk-averse.

2.3 Uncertainty Avoidance

The definition of uncertainty avoidance is treated in the academic literature by different authors but with slightly distinct meanings. While Hofstede [23] treats uncertainty avoidance to the extent of people feeling uncomfortable with ambiguous situations, the GLOBE Project defined this dimension as the "rule orientation" [54]. According to Hofstede's values [19], in the uncertainty avoidance dimension, Brazil presents a score of 76 and Spain, 86, which are very close results. Furthermore, it is related to how societies, organizations, or groups commit with social norms, rules, and procedures due to the unpredictability of future events [43]. Generally, countries with a high uncertainty avoidance value strict rules and protocols due to the preference for having a more secure and predictable life. Considering corporate behavior, managers tend to favor lower-risk decisions and prefer permanent employment [55].

Uncertainty avoidance is one of the most influential dimensions of decision-making in a project or organization. Graham et al. [56] demonstrated how this dimension strongly influences CEOs when making decisions, as their tolerance to risk incentive them to adopt more internationally diversified portfolios. Other studies have also shown how the uncertainty avoidance dimension affects entrepreneurs, who are more comfortable in environments with a certain ambiguity because they are confident in their abilities to face the uncertain future [57]. Societies with high scores in this dimension are full of rules and employ a strong control process, which means conservatism for managing revenues [58]. In turn, this greater protection of investments, encouraged in many cases by governments, has shown to have a strong impact on reducing the levels of risk taken by people, which has been demonstrated by the analysis of insurance companies [14, 59, 60].

Budner [61] defines uncertainty avoidance as intolerance of ambiguity, which means a tendency to identify and interpret ambiguous situations as a threat, while tolerance of ambiguity is about the tendency to understand ambiguous situations as desirable, considering perceptions and behaviors according to the external environment.

Considering these conceptualizations, we adopt as the basis of this research that intolerance of ambiguity can lead to risk aversion. Therefore, this discussion leads to the second research hypothesis:

Hypothesis 2 (H_2): Individuals with higher fear of uncertainty tend to be more risk-averse.

3. Methods

3.1 Data Collection

To test the hypothesis made in the previous session, we use 2-year (2019–2020) longitudinal data collected from 381 students enrolled in STEM courses established in Brazilian and Spain universities (polytechnic schools). From this total, 235 respondents were Brazilians, and 146, were Spanish. The use of a student sample is justified in the study of numerous academic researchers due to the replicability of their results in business research. From them, we highlight the study by Taras et al. [62] that cited previous studies [63, 64]. Moreover, previous researches demonstrated that the scores of the perceived cultural dimensions do not differ much from what was previously established by Hofstede [65].

From the total of respondents, 41 responses were discarded due to missing values (listwise procedure), no adherence to research purposes, i.e., non-Brazilian or Spanish respondents, or not enrolled in STEM courses. Of the valid cohort of 340 respondents, (i) 214 were Brazilian and 126 Spanish, (ii) 99 were female, 236 male, and five preferred not to inform their gender, and (iii) 222 students were enrolled as undergraduate and 118 in graduate courses. The average age of the students was 23.5, with an age range from 18 to 50. The average work experience in years was 1.8, with students from previous job experience to 25 years.

Using 7-point Likert scale questions, ranging from 1 (strongly disagree) to 7 (strongly agree) and divided into four sessions, participants were asked to answer them according to their precepted attitudes and behaviors in stated situations. The first session was structured with 16 individualism-collectivism questions according to the protocol stated by Bhawuk and Brislin [46]. It was based on the first part of their Intercultural Sensitivity Inventory (ICSI). According to the authors, MBA students should respond to the items by imagining that they were living and working in the United States. In our case, those items were answered by undergraduate STEM students from Brazil and Spain polytechnic schools.

The second session was formed based on 16 positive and negative intolerance of ambiguity

items based on Budner [61]. This instrument was designed to identify a particular mode of response to a particular ambiguous situation, referring to their evaluations and perceptions based on the values of respondents rather than overt behaviors performed, which leads, according to the author, to a more directly constructed measurement by the respondent without inferences from observed behaviors.

The third scale, considered a domain-specific risk attitude, was addressed in the third session of the questionnaire, with 27 questions extracted from the protocol of Weber et al. [31] regarding the Domain-Specific Risk-Taking Scale (DOSPERT). Some items from this protocol (with 50 items) were not included due to unethical or dubious contraventions, as forging a term paper, illegally copying a part of a software, or cheating on an exam.

Finally, the fourth session is constituted by five adapted risk perception dilemma questions [66] presented as vignettes. Silva et al. [67] define vignettes as scenarios used in various areas of the academic environment whose main application relates to situations whereby the respondent's understanding of a specific situation is subject to bias or distortion. Character names were adapted to common names for each country, such as ''Eduardo and Adriana'' in Brazil and ''Federico and Esperanza'' in Spain.

The 64-questions survey protocol was validated in three steps, according to Hair et al. [68]. First, the face validation was conducted considering three academic specialists in cultural values or risk management in projects and adjustments in the text. Besides, as the scales used were not found in Spanish and Portuguese, these specialists performed and translated the questionnaire from English (the original language protocols based on the authors) into these languages using a back-translation process, as recommended by Chidlow and Plakoyiannaki [69]. Second, the semantic validation was conducted through a pilot sample of 83 Brazilian respondents, meeting and surpassing the prerequisite stated by Hair et al. [68] of between 20 to 40 respondents at this step. Following the recommendation of Marzagão et al. [70], the 7-Likert scale used in the questionnaire, despite being an ordinal scale, was treated as continuous in this study.

It is important to highlight that this protocol should be adapted to cultural aspects according to Brazil and Spain's rules and norms and also for contemporaneity aspects for unbiased results. For example, the question about seatbelts (''Preference for not wearing a seatbelt when being a passenger in the front seat'') related to risk perception was eliminated from the protocol. Nowadays, it is a mandatory item in both countries. Not using it is a law contravention.

3.2 Operationalization of the Variables and Analysis

Two main methods were tested for data analysis. First, a statistical analysis was carried out using the SPSS program (Statistical Package for the Social Sciences), whereby the main parameters of the descriptive statistics were identified. Moreover, an ANOVA analysis was performed to identify statistically significant differences between the means from both countries. Second, the Fuzzy methodology was used as a complementary methodology to the statistical analysis that often allows obtaining results when statistics are unable to do so. The Fuzzy-set Analysis was conducted using the fsQCA 3.0 approach [71,72] to obtain the different solutions scenarios of a social phenomenon framed through a set of relations.

fsQCA, a variant method of qualitative comparative analysis (QCA), is a suitable tool that aims to analyze paradoxical and nonlinear cases with a combination of the complex case analysis and the generalization by formal analysis [73, 74]. fsQCA lies between conventional qualitative and quantitative analyses and combines cause-effect relationships between conditions and outcomes [73, 74]. We analyze independent variables (collectivism vs. individualism and uncertainty avoidance), considering necessary and sufficient causal decisions to deduce their impact on risk tolerance in Brazil and Spain [73]. Besides, the fsQCA approach was chosen to explain this outcome based on the explanatory power of a configuration of all variables [71], calibrated using a Boolean approach (between 0 and 1).

We adopted the following steps [72, 74, 75]. First, we draw the truth table, an algorithm that generates possible solutions [74]. Second, we performed the fsQCA to reduce the number of rows to a minimum and acceptable level. Finally, we reduced and simplified the combinations from the truth table algorithm to simplify the causal combinations and achieve a final solution. This method produces three solutions, according to Ragin [73]: the parsimonious solution (including all simplifications for the logical assumptions), the intermediate solution (which is more conservative and is based on simplified assumptions), and the complex solution (with easy and difficult causal configurations). Third, we determined whether the causal conditions belong to the core (with both parsimonious and intermediate solutions) or peripheral (with only intermediate solution) configuration [73, 76].

4. Results

4.1 Descriptive Statistics: Differences Between Brazil and Spain

This first descriptive analysis performed with SPSS shows the values obtained for each of the variables

Table 1. Descriptive statistics for individualism-collectivism, uncertainty avoidance, and risk tolerance constructs

		N	Mean	Standard deviation	F	Sig.
ICMED	Brazil	215	4.177	0.914	37.596	0.000
	Spain	125	3.588	0.738		
	Total	340	3.960	0.898		
UAMED	Brazil	215	3.370	0.865	2.872	0.091
	Spain	125	3.208	0.818		
	Total	340	3.310	0.851		
RTMED	Brazil	215	4.000	0.714	3.269	0.071
	Spain	125	3.860	0.652		
	Total	340	3.950	0.694		

[31, 46, 61, 66]. Analyzing the differences between Brazil and Spain, the variables for which the mean differences were statistically significant with a p-value of less than 0.01 (Table 1). ICMED and UAMED are the variables that measure the levels of individualism and uncertainty avoidance, respectively. RTMED is the variable in which all the questions regarding risk tolerance have been considered.

Working with the means of each of the clusters made it possible to identify only significant differences between the means of the Brazilian and Spanish samples in the case of the cluster related to individualism and collectivism. It can be seen that the Spanish sample is more collectivist than the Brazilian one. This result contrasts with those obtained by Hofstede. It may highlight various aspects linked to the particular situation of the respondents, who are university students and may be greatly influenced by this situation. In Brazil, having a university education is more elitist since, according to OECD data, 18.4% of the Brazilian population has a university education, compared to 37.3% of the Spanish population (OECD, 2019). Thus, the analysis of means also establishes that there are no significant differences between the Brazilian and Spanish samples in terms of their perception of risk.

4.2 Fuzzy-set Analysis

The fsQCA approach contributes to identifying causal conditions with the presence of the outcome (the presence of individualism on risk tolerance) and the absence of the outcome (the presence of collectivism on risk tolerance). Based on these criteria, we developed two models, as follows:

Model A: Risk Tolerance = f (INDvsCOLEC, IA)
Model B: ∼Risk Tolerance = f (INDvsCOLEC, IA)

where (∼) indicates the absence of a condition or an outcome (in this case, risk aversion).

4.3 Analysis of Necessary Conditions

The analysis of the necessary conditions in a fsQCA is a necessary step to determine the conditions that must exist to obtain an outcome or the absence of an outcome. Following the threshold of 0.90 [72], we analyzed the necessary conditions to identify these conditions. Table 2 presents the results of this analysis. There is no identified necessary condition for Model A and Model B, as both presented a consistency score under 0.9. Consequently, there is no necessary condition to occur risk tolerance.

4.4 Analysis of Sufficient Conditions

The analysis of sufficient conditions consists of the truth table built to identify potential logical combinations of causality that lead to an outcome's presence or absence. The number of logical combinations was calculated by squaring the total of causal conditions. Thus, there are four probable logical combinations ($2^2 = 4$), each represented by rows in the truth table (Table 3).

Following the recommendation of Schneider and Wagemann [77], the solution consistency for sufficient conditions must be higher than 0.75. Our first model (risk tolerance) eliminated all the configurations from the analysis, as the solution consistency

Table 2. Analysis of necessary conditions. Outcome variable: Risk tolerance

	Presence		Absence	
Independent variables	**Consistency**	**Coverage**	**Consistency**	**Coverage**
Individualism	0.790680	0.539012	0.643338	0.804455
Collectivism	0.713154	0.521551	0.631340	0.846918
Uncertainty avoidance	0.697732	0.494009	0.628159	0.815795
Uncertainty acceptance	0.739830	0.520314	0.610390	0.787418

Table 3. Configurations for the absence of risk tolerance (risk-averse). Intermediate solution

Independent variables							
	Causal conditions						
Path	Individualism	Uncertainty avoidance	Raw coverage	Unique coverage	Consistency	Solution coverage	Solution consistency
1	○		0.63	0.21	0.85	0.84	0.80
2		●	0.63	0.20	0.81		

Legend:
○ = Core causal condition (absent).
● = Contributing causal condition (present).
Blank spaces = "don't care" condition.

result was under this threshold. Moreover, the core causal condition model considering the absence of the outcome was above 0.75, with a solution consistency of 0.80, the solution coverage of 0.84, and the consistency of 0.85. These results point out to which extent these configurations explain the data. Nonetheless, raw coverage and the unique coverage were presented as below 0.75 (Table 3).

For the second model (risk-averse), two combinations (or paths) exhibit a good consistency level (0.81) and are taken into consideration. In the first path, which represents 63% of the cases, there is a lack of risk tolerance when there is an absence of individualism (in collectivist cultures). According to the second path, 63% of the cases avoiding uncertainty also have a lack of risk tolerance. These findings suggest that collectivism and uncertainty avoidance preferences lead to risk aversion.

5. Discussion

There is a long discussion in the academic literature on the forms of national culture and its influence in many respects [14]. Previous studies, particularly in the financial area, explore the idea that individualism is linked to overconfidence and overoptimism, affecting the disposition of financial risk-taking [14, 50].

An increasing number of studies consider national cultures' implications for risk perception [14]. However, the scope can vary from finance literature [14, 50, 51] to health and COVID-19 pandemic implications [13] not only at the country-level, but also at the individual-level of analysis [51, 53]. In this paper, we focused on how individual-level of cultural values of Higher Education impact risk perception. Results may be taken into account when teaching risk management (specially in engineering schools). Authors consider it of special interest in the subject of project management where an important area of knowledge is risk management. The environment (project uncertainty characteristics) affects risk management effectiveness and cultural bias is an interesting variable to be considered.

Our study focuses on the relationship between national cultural dimensions, e.g., individualism-collectivism and uncertainty avoidance, and risk perception. Individualism and collectivism provided an appropriate lens for understanding cultural variations in organizational behavior [44]. It shed light on a particular type of collectivism that influences risk tolerance, showing that the more collectivists individuals are, the more risk-averse. However, the opposite relationship is not significant, i.e., individualists can be both risk-averse or risk-lovers depending on their idiosyncrasies. Uncertainty avoidance is also related to a lack of risk tolerance, and our findings demonstrated that both cultural dimensions should be combined to potentialize risk aversion. Results considering the individualism-collectivism dimensions corroborate the findings in the academic literature [29, 51, 53], which correlate individualism with higher tolerance to risk. Our findings demonstrated a positive impact on risk aversion only considering cultural dimensions: individualism-collectivism and uncertainty avoidance.

Besides, we found a slightly higher individualistic level of Brazilian students compared to Spanish, which could be biased by the socio-economic differences in Brazil that can impact the access to higher education. Nonetheless, the distance between the countries is not so significant compared to high individualist countries, such as the United States [23]. Thus, further studies should be performed to better understand the control effect in modulating the relationship between individualism-collectivism and risk perception, replicating to other cultural clusters, as in Confucian Asia, Germanic Europe, Nordic Europe, Anglo, among others [43].

As limitations, the adopted research protocol needs improvements. Since it was designed many years ago, there are some questions that no longer properly translate the current cultural values. Although culture evolves very slowly, the beginning of the 21st century has seen a revolution in technology and communications, which have abruptly changed the way people interact with others. It is a fascinating result to research and practice that opens the next line of research on scale validation to

identify the variables that best reflect individualism, uncertainty avoidance, and risk perception. The construct of individualism-collectivism can be improved in horizontal and vertical orientations [13, 78]. The sampling process has a bias on respondent profiles composed of engineers in Brazil and Spain) that may limit the extrapolation of results. Moreover, contrary replication sampling strategies in countries with a large distance concerning the profile of individualism-collectivism and uncertainty avoidance should be chosen for future research agendas. Finally, as applied in this research, self-reported measures can lead to limitations such as desirability bias or the hallo effect. A further investigation considering other methods, as an experimental study with students organized in multicultural virtual teams, should be carried out to bring new sheds of light on the impact of cultural values on risk perceptions.

6. Conclusions

This study based on fsQCA has shown that the collectivism and uncertainty avoidance Latin cultural dimensions, considering Brazil and Spain, negatively impacts risk tolerance and foster a risk aversion behavior. Our study contributes to the literature by looking through the lens of collectivism and how it can impact risk perception. Thus, when collectivism drives decision-making, the locus of decision prioritizing the 'we locus' leads to concerns on both self and others' perspectives, which results in higher risk aversion. Further studies are needed to further the research on this behavior. In the COVID-19 pandemic context, studies also pointed out the need to further investigate cultural orientation because it may play an essential role as a protective factor for well-being. Besides, the practical implications pointed out that cultural orientation on collectivism may lead to decision-making that considers the consequences for oneself and the impacts of culture in a broader sense, such as social and environmental aspects. These aspects should be deeper evaluated in future studies to evaluate how these differences in risk perception can impact the academic activities and learning process, as how to lead with deadlines in group assignments within a culturally diversified team, as some perceptions of quality and task completion can be contrasting according to the cultural background.

Research questionnaire: The questionnaire used for this research is available under the following link: https://osf.io/wt2cy/?view_only=5d34cd45-feea4a4ab9aa88ec8b06b40e.

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