A cross-cultural investigation of the Functional Theory of Human Values: Examining its structure and prediction of external outcomes

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Statement of Authorship

The four studies that compose this thesis have all been written for publication. I am the primary author on each paper, having developed the ideas, conducted and interpreted the analyses, and authored the final articles. Study 1 is currently under review by the Assessment Journal. Study 2 is currently under review by the Psychology and Ageing Journal. Study 3 is currently under review by the Political Behavior Journal. Study 4 is currently under review by the Journal of Environmental Psychology.

Study 1

Vilar, R. (under review). Basic Values Survey (BVS): A 20-nation validation study. *Assessment.*

Study 2

Vilar, R., Liu, J. H., & Gouveia, V. V. (in press). Age and gender differences in human values: a 20 nation study. *Psychology and Ageing.*

Study 3

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Study 4

Vilar, R., Araujo, R. C. R., Liu, J. H., Gil de Zúñiga, H. (under review). Explaining concerns with carbon emissions: Considerations from social dominance orientation and human values across 20 countries. *Journal of Environmental Psychology.*

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General Abstract

The present thesis examines the Functional Theory of Human Values in a multi-nation approach. This theory has a claim of parsimony and attempts to explain data from more complex models reported in the literature (Gouveia, Milfont, & Guerra, 2014). However, most of the research using this theory is limited to the Brazilian context. Through four systematic cross-sectional investigations and using the Functional Theory, the present thesis shows (1) an examination of the structure of values, (2) age, and gender differences in values priorities, and (3) values prediction of external outcomes in a multi-nation approach. Study 1 demonstrated that the dimensionality of values is identified using confirmatory multidimensional scaling, and promising results are reported using confirmatory factor analysis with a Bayesian estimation. This study also provides evidence of cross-cultural equivalence using the approximate Bayesian invariance approach and the alignment method. Study 2 demonstrated that patterns of values change over the life span vary in a linear way for almost all the six factors that give structure to the Functional Theory. This study showed that the variation in value importance varies in a harmonic way, mirroring the hypothesis of congruence proposed by Gouveia: that values with similar goals vary in the same direction. This study also showed that values with an interpersonal focus are given more importance from older people and women, and that values with an egocentric focus are given less importance the older the participants get. Men score higher than women in almost all life stages for values with egocentric focus. Study 3 focused on the prediction of values. This study demonstrated a plausible process in which values operate via social capital in influencing people to be more politically active. Study 4 was also focused on the prediction of values, and it showed fresh evidence for the role of values to predict carbon emission concerns. Using multi-level analysis, this shows that existence and suprapersonal values are the main predictors of carbon emission concerns, and that meaningful cross-level interactions are identified. Overall, this thesis contributes with the field of values by presenting cross-cultural evidence of structure and prediction of a parsimonious model of values.

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I would like to thank all the people who helped me either directly or indirectly on this journey to obtain a PhD degree. Doing a degree in a different culture was not easy, especially in a country so distant from home. However, the people I met in this new land – which became my second home – helped me to climb all the steps I had to. This help came via both academic and social support, which sometimes is what recharges our energy to keep on going.

When I was a master's degree student, I received incredible help from the lab that I was part of in Brazil (BNCS) to pursue the dream of gaining a Ph.D. degree abroad. Special thanks go to my former supervisor, Professor Valdiney Gouveia, who motivated me to pursue an academic career, and to the Brazilian Council for Scientific and Technological Development (CNPq), which granted me a scholarship to achieve this qualification overseas with a top researcher in political and cross-cultural psychology (Professor James Liu). Professor Liu guided me through the whole Ph.D. process and passed on to me his considerable skills and knowledge that would help me to become a better researcher. I am deeply grateful for everything I was able to learn from him.

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Chapter 1. General Introduction

Values are a popular construct amongst both the general population and social psychologists. Values are usually seen in popular culture as something that represent abstract ideals (e.g., equality) or norms of conduct (e.g., tradition) that are often used to describe socially desirable habits and approaches to life. For instance, in moments of political, economic, or humanitarian crisis, it is common for political leaders to refer to values as a key resource or guide to help overcome difficult times (e.g., as a form of resilience) or to improve the future, perhaps by promoting values associated with positive changes for society. From a scientific perspective, values have similar connotations (e.g., values guide behaviour and express needs), but they are operationalised in a systematic and comprehensive way, showing their motivational basis and dimensionality to guide behaviour. Giving structure to values and distinguishing them from other constructs like personality and attitude has been one of the main focuses of theorists in this field of psychology (Gouveia, 2003, 2013; Schwartz, 1992, 1994). However, theorists have faced challenges with measurement that either limits the replication of values structures across cultural groups (Knoppen & Saris, 2009) or demands successive adjustments of structure that challenge the parsimony and trustworthiness of the dimensions proposed (Cieciuch, Davidov, Vecchione, & Schwartz, 2014; Schwartz et al., 2012). The present thesis contributes to the discussion around the structure and measurement of values, age, and gender effects on the importance of each value dimension, and the functionality of value dimensions to predict socio-political outcomes (i.e., social capital, political participation, and environmentalism).

The popularity of research on values is recent, and is mainly credited to the massive cross-cultural studies conducted by Shalom H. Schwartz (Schwartz, 1992). This author proposed a universal theory of values and collected data in more than 70 countries to support the adequacy of his model in different cultural contexts. Also arising from Schwartz's studies is the most popular definition of human values, which describes this construct as "concepts or beliefs that pertain to desirable end states of behaviors, transcend specific situations, guide the selection or evaluation of behavior and events, and are ordered by relative importance" (Schwartz, 1992; pp. 4). However, the study of human values precedes Schwartz and can be dated from the early 1900s when a few sociologists and anthropologists were interested in explaining life in society. These authors brought initial characteristics to values that later grounded more complex and refined theories. For instance, the proposition of Ferdinand Tonnies that people can be community (in-group) and society (out-group) oriented (Tonnies,

1887) influenced contemporary theories that postulate that values serve as personal and social goals (Gouveia, Milfont, & Guerra, 2014; Hofstede, 2001; Schwartz, 1992). Other contributions to the definition of values can be found in the work of Thomas and Znaniecki (1918), who distinguished values from attitudes, the work of Parsons (1951), who introduced the idea that values are hierarchically organised and represent motivational goals, and the work of Kluckholm (1951), who argued for the first time that values are socially desirable.

However, it was only with Rokeach that values were studied with more prominence and focus (Rokeach, 1973). This author contributed to the conceptualisation of values by presenting a clear definition, theoretical assumptions, and measurement tools to assess people's values. His work influenced his successors extensively. For instance, Shalom H. Schwartz, who is the most prominent contemporary theorist of values, developed his theory by updating Rokeach's model, since there was a lack of underlining structure capable of originating hypotheses to connect different values and to predict different outcomes. Using the *Rokeach Values Scale* as a source of items, and Facet Theory as a method to determine whether different dimensions could be outlined through a given set of items, Schwartz categorised values according to the interests they serve (individualistic vs. collectivistic) and goals that they represent (terminal vs. instrumental) (Schwartz & Bilsky, 1987). Schwartz (1992) developed a hypothesis that values can be structured in a circular continuum based on the similarities between dimensions. This model became incredibly popular because of its detailed set of dimensions capable of explaining a wide range of attitudes and behaviours, and because the dimensions outlined were empirically more robust than in previous models.

More recently, Gouveia (2003, 2013) proposed a theory aimed at overcoming traditional challenges on the proposition of the structure of values. Gouveia (2013) argues that dimensions of values should originate from theoretical assumptions, not by interpretation of empirical findings from a variety of items. Gouveia's model (2003, 2013) is different from Rokeach's (1973) and Schwartz's (1992) in the logic used to derive dimensions, but the content of their dimensions is quite similar, especially between Gouveia's and Schwartz's models (see Gouveia, Milfont, & Guerra, 2014b). According to Gouveia (2003, 2013), the source of values is grounded in the functions they serve: values guide actions and express needs. This author postulates that the interplay between these two main functions is the origin of the structure of values. In this sense, each category created by Gouveia (2003, 2013) comes from a theoretical hypothesis, which reduces the arbitrariness of selecting the number of possible dimensions that give structure to values.

Rokeach (1973), Schwartz (1992), and Gouveia (2003) theorise values in an individual perspective, which means that values are formed based on personal experiences and choices to guide attitudes and behaviours. However, values have also been theorised as cultural characteristics in which larger systems (e.g., countries) share values, and different systems can emphasise different values depending on cultural distance. Inglehart (1977), Hofstede (1980) and Schwartz (1999) are the main theorists of the cultural perspective. Although these authors introduced their cultural models as being distinct from individual characteristics, recent research has suggested that individual and cultural values are more similar than different in terms of structure and content (Fischer, Vauclair, Fontaine, & Schwartz, 2010). In fact, models of values with an individual perspective are influenced by models with a cultural perspective in defining the different types of goals or motivators that values can serve. For instance, Schwartz (1992) and Gouveia (2003) differentiate values that serve personal and social goals. This is influenced by categorisations that were previously explored in a cultural perspective, such as the cultural values of individualism and collectivism (Hofstede, 1980). Schwartz (1992) and Gouveia (2003) also differentiate values depending on the needs or motivations that values can express. This idea of different needs was first conceptualised by Maslow (1973) and improved by Inglehart (1977), who reduced Maslow's hierarchy of needs to form a cultural model represented by materialistic and post-materialistic values.

The present thesis does not aim at discussing whether values are fundamentally individual or cultural, nor whether individual and cultural values are different in terms of structure and content. This discussion is thoroughly examined elsewhere (Fischer & Schwartz, 2011; Fischer & Portinga, 2012; Fischer et al., 2010). The thesis aims instead at testing the structure and prediction of the Functional Theory of Human Values (Gouveia, 2003), which is theorised as an individual-level construct. As the thesis will be focused on a theory of values conceptualised at the individual level, we will describe in detail the two most contemporary theories. The present thesis will be focused on Gouveia's theory, where further developments can be made, but Schwartz's (1992) theory will also be described, as it is currently the predominant model of values.

Schwartz's Theory of Values

Before introducing Schwartz's and Gouveia's theories of values, I will clarify how these authors name the latent factors in their models. This is important because these authors introduce different nomenclature (motivational types and subfunctions) for the same concept (latent factors). Schwartz (1992) usually refers to his latent dimensions as motivational types (Schwartz, 1992), but motivational domains have also been used (Schwartz & Bilsky, 1987). In Schwartz's most popular categorisation of values, 10 motivational types (e.g., universalism and benevolence) are outlined (Schwartz, 1992). In Gouveia's (2003, 2013) case, his latent factors are usually called subfunctions: there are six subfunctions in this author`s model. This nomenclature was preferred to highlight that each latent factor represents the interplay between two main functions of values. In addition, the term "values" is also used to represent the latent factors. For instance, universalism values can be described as a latent factor/motivational type that gathers three items/values. In the present thesis, "motivational types" will be used when describing Schwartz's theory, and "subfunctions" will be used when describing Gouveia's theory. Also, the term "values" after the name of the latent factor will be used for both theories.

Schwartz is the author of the most successful theory of human values. Since his theory was proposed in the late 1980s, he has gathered data and tested his model in more than 70 countries, resulting in his being the most influential theory of values nowadays.[1] Schwartz and Bilsky (1987) first built on Rokeach (1973), aiming to advance research by outlining an underlining structure of values capable of explaining the relationship both among values and between values and other constructs. The first structure proposed by Schwartz was an arbitrary scientific convenience based on interpreting results from Rokeach's items (Schwartz et al., 2012). The main idea proposed by Schwartz and Bilsky (1987) is that specific values can be gathered to represent motivational types, and the relationship between motivational types is influenced by the interests that they serve. When values were categorised based on their shared characteristics and the interests they serve, seven motivational types were developed. Values motivational types were organised based on individual (self-direction, achievement, and enjoyment), collective (prosocial, and restrictive conformity), and mixed

[1] In a rapid search on Google Scholar it is possible to see the influence of this theory. Searching for the terms "Schwartz Value Survey" and "Portrait Value Questionnaire," which is Schwartz's most used survey measure, we can find about 4,790 citations in the past 10 years. A smaller quantity of text materials are found when the "Rokeach Value Survey" is searched (2,780 results) and much less is found for Gouveia's more recent "Basic Values Survey", in which only 39 results were found in English and 176 in Portuguese. The search was conducted on April 21, 2019, and the terms were inserted between quotes.

(maturity and security) types of interest (see Figure 1A). This organisation of values was later updated by Schwartz (1992), on this occasion using a much more powerful set of results with data from 40 samples in 20 countries. Schwartz (1992) is by far the most cited and influential paper describing Schwartz's theory of values.[2]

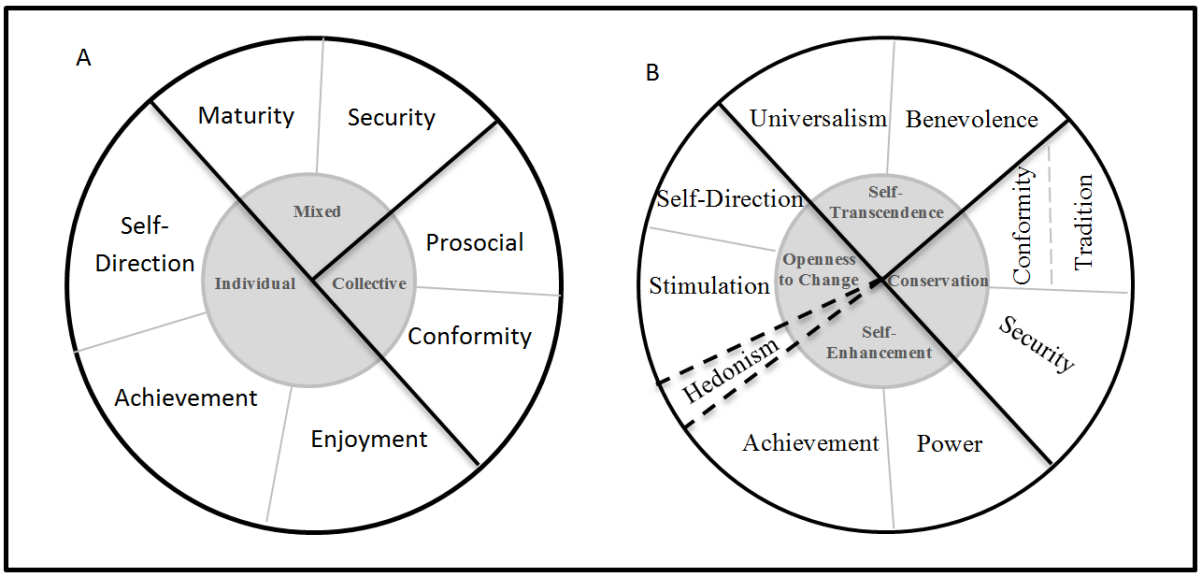

Figure 1. Schwartz's theoretical structure of relations among motivational types of values

Source. Adapted from Schwartz and Bilsky (1987), and Schwartz (1992).

Schwartz (1992) made substantial updates in comparison with Schwartz and Bilsky (1987). The two main changes were on the number of motivational types, as this was updated from 7 to 10, and the higher order factors that configure two or more motivational types, which were updated from three types of interests (facets) to four higher order factors (see Figure 1B). The motivational types of tradition, power, and hedonism were added to the theory. The motivational types of prosocial, enjoyment, and maturity were renamed to benevolence, stimulation, and universalism, respectively. Finally, the motivational types of conformity, security, achievement, and self-direction remained with their original names. Schwartz (1992) also strengthened an idea that was introduced by Schwartz and Bilsky (1987) that values can be organised in a circular continuum depending on the characteristics shared by each motivational type. This idea is strengthened by the hypothesis of compatibility and conflict of values, in which some of them are adjacent because they share interests, while

[2] Schwartz and Bilsky (1987), Schwartz (1992, 1994), and Schwartz (2012) are the four main publications describing the Universal Theory of Human Values of Schwartz. These publications have the following number of citations respectively: 4,789, 14,776, 5,254, and 1,099. Search was conducted on Google Scholar on April 21, 2019.

others are placed more distantly from each other when they have conflicting interests. This circular continuum is one of the main aspects of Schwartz's theory, since it allows derivation of hypotheses about the relationship between motivational types, and hypotheses about how values with different interests should be related with external variables.

The hypotheses regarding the relationship between motivational types are expressed in Figure 1B. In this case, the closer the motivational types are, the stronger they should correlate. However, it is not clear whether the neighbour with the stronger correlation should be the one which represents the same interest, or whether adjacent motivational types should have similar correlations regardless of the interest they serve. For instance, universalism neighbours self-direction and benevolence, but there is no clarity about which correlation should be stronger. Schwartz (1992) and Schwartz et al. (2012) describe nicely the content of each of the 10 motivational types, which are briefly outlined in Table 1.

Although Schwartz proposes 10 motivational types for his theory, several authors (Davidov, Meleumanm Billiet, & Schmidt, 2008; Rudnev, 2014; Vecchione, Alessandri, Barbaranelli, & Caprara, 2011; Dietz, Stern, & Guagnano, 1998), including Schwartz himself (Tartakovsky & Schwartz, 2001), use the higher order factors as manifest variables that collapse adjacent motivational types. For instance, conformity, tradition, and security are often gathered to form the conservation higher order factor. The justification for this practice is that some values serve a similar interest, and it is parsimonious to consider them together (Schwartz, 1992). Other research goes even further, by collapsing different higher order factors as if they were two sides of the same coin. For instance, conservation and openness to change can form a dimension where high values represent conservation, and low values represent openness to change (Dobewall, Tormos, & Vauclair). Although this is a common practice, its consequences on the understanding of how values are related to everyday attitudes and behaviours are unclear. For instance, it is not clear whether collapsing motivational types will limit values predictions since their unique characteristics can be disregarded when different motivational types are considered as a single manifeste variable.

Going in a direction that emphasised the specific importance each motivational type should have to explain external outcomes, Schwartz refined his theory by presenting extra types to form a total of 19 motivational types (Schwartz et al., 2012). According to Schwartz et al. (2015), this update did not contradict Schwartz (1992), but just increased the predictive power and heuristic utility of values. Most of the motivational types added are just a

subdivision of existing ones. For instance, "universalism" can be expressed in three motivational types depending on the items selected (i.e., universalism-tolerance, universalism-nature, and universalism-concern). In this case, depending on the outcome that is being studied, the researcher can either use a broader motivational type of values (e.g., universalism) or more specific motivational type of values (e.g., universalism-tolerance) when investigating their construct of interest. However, it is not clear whether the addition of very similar motivational types is productive or whether this just lacks in parsimony. Also, it is not clear whether motivational types so detailed will mislead in comparisons between value models or whether correlations between values and external outcomes will be overestimated. For instance, a recent paper comparing Schwartz's and Gouveia's models concluded that Schwartz's universalism values predict environmentalism better than Gouveia's suprapersonal values (Hanel, Litzellachner, & Maio, 2018). Nevertheless, this conclusion was mainly supported by the high correlation between universalism-nature and environmentalism, which clearly have overlapping issues.

The variation on the number of motivational types in Schwartz's model seems to be a result of the search for the best fit possible, especially because his model initially emerged from empirical findings and not necessarily from theoretical assumptions. The theory came in a second step to interpret the domains that were emerging when a variety of items were examined. A structure of values is what was missing in Rokeach's model (1973), and it is what Schwartz (1992) added to the values literature. However, the changes in structure that Schwartz has undertaken over the years raised concerns about whether the theoretical arguments that grounded his theory were robust enough or whether changes should be expected (Gouveia et al., 2014). According to Schwartz (2014), the focus of his theory is the continuum of values, and the number of motivational types is arbitrary. In this case, when Schwartz describes seven, ten, or nineteen motivational types, it seems to be like an attempt (or even a guess) to categorise something that, in his view, is not supposed to be discrete. This therefore gives scholars room to use this theory with different configurations, which include decisions *a posteriori* that fit the data the best, which could affect the development of hypothesis and replication of findings. Although Schwartz (2014) does not see this fluidity as a weakness, Gouveia (2003) argues that the science around values can benefit from more constrained structures followed by strong theoretical assumptions. Gouveia (2003, 2013) proposed the *Functional Theory of Human Values*, described next, which will be the focus of the present thesis.

Gouveia's Theory of Values

In a recent chapter published in a book that gathers first-person narratives from the top contemporary psychological scientists from Brazil, Gouveia (2019) explained what inspired his proposition of the *Functional Theory of Human Values*. He had his first contact with values during his doctoral studies, and his dissatisfaction with the speculative approach of the dominant theory of values in that time (Schwartz model) made him dig into classical sociologists and psychologists to better understand how values are formed. For Gouveia (1998), Schwartz (1992) made a huge contribution to the field of values by outlining a structure of values arising from what was missing from Rokeach's model (1973), and by popularising the concept of values with extensive cross-cultural studies. However, Schwartz's model was lacking in explanations about the source of values and a theoretical reason to why values were organised in a circular continuum. Therefore, Gouveia's (2003, 2013) main contribution to the field of values has been presenting a potential explanation for the source of values, which was missing in the literature. Gouveia (2003, 2013) does not introduce his theory as something to replace previous models, but as an alternative that integrates previous models in a more parsimonious way. For this author, a clear conceptualisation of the source of values can drive the proposition of a more rigorous structure with less arbitrariness.

According to Gouveia, the heart of his theory is the proposition of two functions that values serve: "*values guide actions and are cognitive expressions of needs"* (Gouveia et al. 2014, pp. 41). The first function refers to types of orientation that can be social, central, and personal. The propositions of social and personal goals are similar to Rokeach's terminal values with social and personal characteristics, Hofstede's (1980) individualism and collectivism, and Schwartz's (1992) social and personal interests. According to Gouveia (2013), people tend to emphasise groups (interpersonal relations/social goals) or their egocentric interests (intrapersonal relations/personal goals) as a strategy to survive or thrive, and these are aspects important to understand the mechanisms that guide behaviour.

Gouveia (2003, 2013) describes further a central type of orientation that sits between personal and social goals and is theorised as the backbone of all other values. Schwartz and Bilsky (1987) arrived at a similar categorisation of values when they outlined the mixed type of interests, which were the values that did not completely belong to social or personal orientation. In Gouveia (2003, 2013), the explanation for the existence of central values is on the expression of needs. According to Gouveia (2003, 2013), central goals are the purest representation of thriving (suprapersonal values) and survival needs (existence values) and

are the reference point for value factors that resulted from the combination of social and personal goals with thriving and survival needs (Gouveia, 2013). The expression of needs is the second function of values and it is influenced by Maslow's (1954) hierarchy of needs and Inglehart's (1977) materialistic and post-materialistic needs.

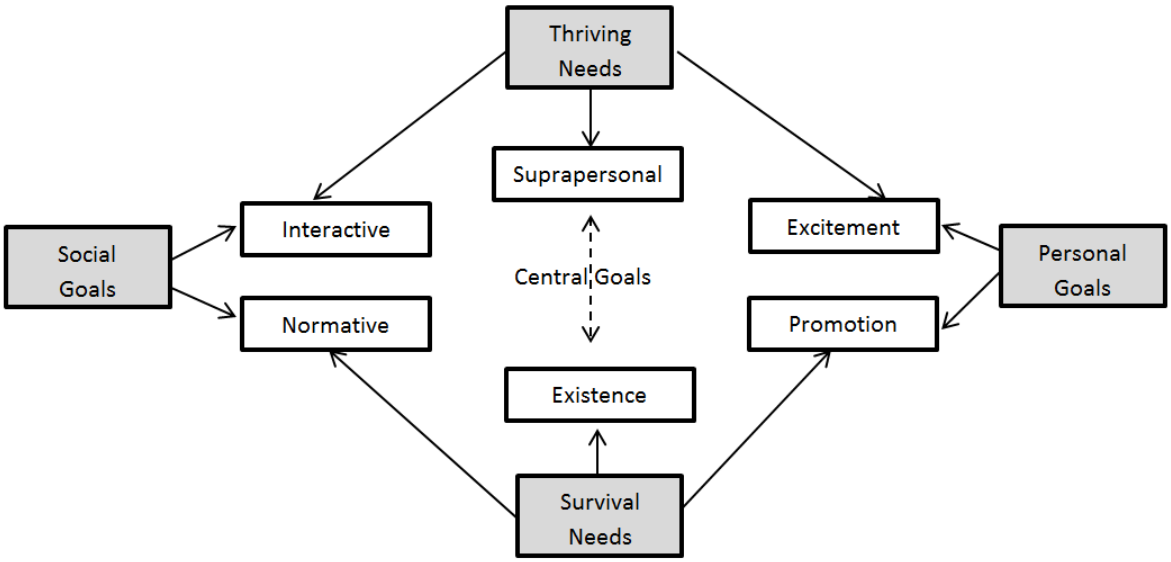

Figure 2. Origin of value subfunctions

In Figure 2, it can be seen how values originate. Social goals generate interactive and normative subfunctions. These two factors differ from each other because of the kind of needs they represent. Personal goals also generate two subfunctions that differ from each other because of the needs they represent (excitement-thriving, promotion-survival). Finally, the suprapersonal and existence subfunctions do not originate from social or personal goals; they are derived from and focus on needs. They are in between the subfunctions originating from social and personal goals because those subfunctions are, in part, representations of needs. Table 1 reports a brief description of the content of each motivational type/subfunction of values from Gouveia and Schwartz. They are organised together to facilitate comparisons, since Gouveia claims that his more parsimonious model can fit Schwartz's values (Gouveia et al. 2014b).

Table 1.

Motivational types of values adapted from Schwartz (1994) and Gouveia et al. (2014)

Schwartz's values	Gouveia's Values
Power (1): social status and prestige, control or dominance over people and resources. *Achievement* (2)*:* personal success through demonstrating competence according to social standards.	*Promotion* (1): focuses on material accomplishments and drives successful social interactions and assistance to institutional functioning.
Hedonism (3)*:* pleasure and sensuous gratification for oneself. *Stimulation* (4)*:* excitement, novelty, and challenge in life.	*Excitement* (2): focuses on physiological needs for gratification and it is conducive to the promotion of change, innovation, and non-conformity.
Self-Direction (5)*:* independent thought and action-choosing, creating, exploring. *Universalism* (6): understanding, appreciation, tolerance, and protection for the welfare of all the people	*Suprapersonal* (3)*:* represents the high-order needs of aesthetics, cognition, and self-actualisation, emphasising more abstract ideas over absolute or material goals.
Benevolence (7): preservation and enhancement of the welfare of people with whom one is in frequent personal contact.	*Interactive* (4): represents the needs of belonging, love, and affiliation, and emphasises social contact as a goal in itself.
Tradition (8): respect, commitment, and acceptance of the customs and ideas that traditional and culture or religion provide. *Conformity* (9): restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms.	*Normative* (5): focuses on social rules with a materialistic guiding principle and reflects the importance of preserving one's culture and conventional norms.
Security (10): safety, harmony, and stability of society, of relationships, and of the self.	*Existence* (6): represents the most basic physiological needs and the need for security.

Note. Dimensions that shows similarities between models according with Gouveia et al. (2014b) are described in the same row. The content of the descriptions was taken from Schwartz (1994) and Gouveia et al. (2014a).

Figure 3 describes the theoretically expected relationship between subfunctions. To describe such correlations, I will introduce Gouveia's (2003, 2013) concepts of values congruence. First of all, Gouveia (2003, 2013) assumes that all values are positively correlated, but because of their proximity in terms of goals and needs, some values are expected to show greater correlation than others. Gouveia (2003, 2013) argues that the level of congruence between values depends first on the goals shared, and second on the needs expressed. For instance, interactive and normative subfunctions represent the same goal (social goals), and because of that these subfunctions should be more strongly related to each other rather than interactive and excitement subfunctions would be. Although interactive and excitement subfunctions represent the same type of needs (thriving needs), they belong to different types of goals. In this sense, subfunctions that share the same goals represent the most congruent values, followed by the same needs, and the lowest correlation/congruence should come from subfunctions with different goals and different needs (e.g., interactive and promotion).

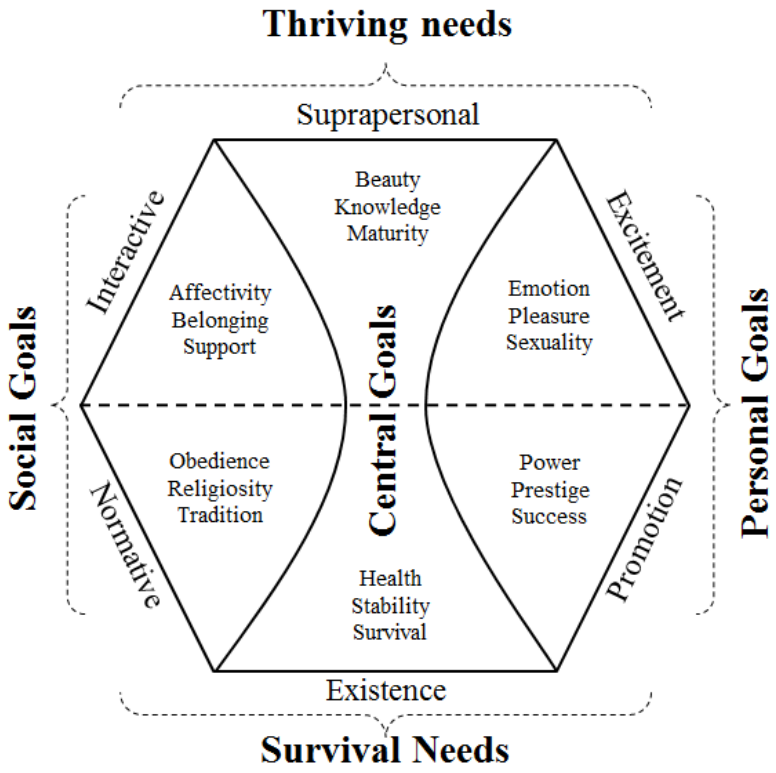

Figure 3. The structure of human values according to the Functional Theory

Note. Continuous lines separate goals and the dashed lines separate needs.

Levels of congruence are applicable for the subfunctions that are formed by the combination of social and personal goals with thriving and survival needs (interactive,

normative, excitement, and promotion). Subfunctions with central goals are not considered in this scheme. This is because they are compatible with all other subfunctions, since they are the purest representation of needs that are considered in subfunctions with social and personal goals. Research has shown that materialistic and post-materialistic values coexist harmoniously (Inglehart, 2011), and that the differentiation between social and personal goals is more evident than comparisons between materialistic and post-materialistic values (Fischer et al., 2011). Because of the aforementioned characteristics, Gouveia (2003, 2013) represents values in a hexagon instead of a circle as it is in the dominant Schwartz (1992) model. Using a hexagon has the advantage of establishing hypotheses of different levels of congruence, whereas in a circle it is not clear whether adjacent motivational types with similar interests (universalism and benevolence) show correlations as strong as adjacent motivational types with different interests (universalism and self-direction).

Testing the Structure of Values and Correlations with External Outcomes

The structure of values has often been examined through multidimensional scaling (Bilsky, Janik, & Schwartz, 2011; Fontaine, Poortinga, Delbeke, & Schwartz, 2008; Koivula & Versalo, 2006; Schwartz, 1994) and, more recently, through confirmatory factor analysis (Davidov, 2010; Gouveia et al., 2014a; Schwartz & Boehnke, 2004; Vecchione, Casconi, & Barbaranelli, 2009). These approaches aim at identifying the number of underlining dimensions that can represent the data (Brown, 2015; Hair, Anderson, Tatham, & Black, 1998). Multidimensional scaling plots values in a bidimensional space to assess similarities between items. This approach is rather loose, since the interpretation depends on the subjective impressions of the researcher (Hair et al., 1998). Multidimensional scaling can also be used in a confirmatory approach in which the researcher informs the coordinates – a priori – and the analysis evaluates whether the data fit them well (Gouveia et al., 2014a). Nevertheless, even if this approach is less loose than a simple multidimensional scaling, it still has a high degree of subjectivity, as it is the researcher who ultimately draws the line separating items (Hair et al., 1998). This approach is therefore not robust enough to affirm that a dimension is completely distinct from others, but is still quite useful to check the ways in which certain dimensions are similar to others. Even if it is not clear whether the dimension is completely separated from others, the researcher can still observe how a group of items is plotted and how other groups of items are adjacent. This makes the confirmatory multidimensional scaling a useful tool to check the structure of values or the hypotheses of similarities between dimensions. For instance, Schwartz (1992) proposes a circular

continuum while Gouveia (2003, 2013) proposes a hexagonal configuration, and they have clear hypotheses about the adjacency of dimensions that can be examined through this statistical approach.

In order to check whether motivational values types or subfunctions present distinct latent factors, a confirmatory factor analysis is the most appropriate approach to be used (Brown, 2015). Using this approach, items are loaded in the latent factor they are supposed to load, and cross-loadings are fixed to zero (Brown, 2015). This gives a higher confidence about the distinctiveness of latent factors. This approach has been used less often with human values. This may be because the assumption that items from different latent dimensions should not be correlated is less realistic for a construct with such a highly correlated structure. As values from different latent factors are highly correlated, it is common to see models being tested with the addition of cross-loadings for model fit improvement (Cieciuch et al., 2014; Davidov, Schmidt, & Schwartz, 2008). Also, confirmatory factor analysis gets more challenging when short scales are being examined, since latent factors might lack homogeneity (Wothke, 1993). If items from a latent factor are not homogeneous enough, correlations between latent factors can be inflated, which can result in a potential problem for model identification. Short scales are very common in values research (Cieciuch & Davidov, 2012; Gouveia et al., 2014a) and they are very important to fit long questionnaires (e.g., European Social Survey).

More recently, a group of researchers have used a strategy to make the testing of models of values simpler, focusing on identifying the main argument that the proposed latent factors are distinct from each other. The confirmatory factor analysis is still used, but not for the entire models, within which model misidentification can be more often shown (Cieciuch, Schwartz, & Vecchione, 2013). Cieciuch et al. (2013) highlight that complex models might introduce sources of misspecification that are unrelated with the goal of examining whether adjacent latent factors are distinct from each other. This concern drove researchers to use the *magnifying glass strategy*, in which adjacent dimensions are examined in simpler two-factor models. For instance, instead of examining Schwartz's ten-factor model, five two-factor models considering the adjacent dimensions can be investigated. This strategy has been frequently used to test Schwartz's model of values (Cieciuch et al., 2013; Knopen & Saris, 2009), but it has not been tested with Gouveia's model yet. This can be a useful way to examine whether the highly congruent subfunctions of Gouveia's model are distinct, since testing this author's full model of values has shown both satisfactory and non-satisfactory

results (Ardila, Gouveia, & Medeiros, 2012; Gouveia et al., 2014a; Marques, Silva, & Taveira, 2018; Mohamed, Elebrashi, & Saad, 2018). In the present thesis, I will examine the structures of values using multidimensional scaling, and examine whether congruent subfunctions are distinct from each other, using confirmatory factor analysis with the magnifying glass strategy.

Focusing not on dimensionality, but on how values priorities change in different life stages also brings up a discussion about the structure of values. In this direction, Bardi et al. (2009) have examined the structure of intra-individual values change, which is basically testing whether congruent dimensions vary in a similar strength and to a similar direction in function of age. According to Bardi et al. (2009), changes in the importance of values are supposed to mirror the values structure that is based on the hypothesis of congruence. This is important because congruent values are supposed to share similar goals, and a conflict in the patterns of change could reflect a conflict with the goals that they represent. Such conflict could ultimately weaken the theoretical arguments for the existence of the motivational types or subfunctions. In the present thesis, a study is dedicated to examining how values vary in importance for different life stages, contributing to a topic that has received increasing interest in recent years (Dobewall, Tormos, & Vauclair, 2017; Gouveia, Vione, Milfont, & Fischer, 2015; Milfont, Milojev, & Sibley, 2016; Robinson, 2012; Vecchione et al., 2016).

After exploring the structure and patterns of values change, it is fundamental to explore how values are connected with external outcomes. Values are often connected to a range of variables that go from more stable psychological phenomena such as personality traits (Parks-Leduc, Feldman, & Bardi, 2015) to more contextual phenomena such as attitudes (Hurst, Dittmar, Bond, & Kasser, 2013) and behaviours (Bardi & Schwartz, 2003). For many researchers, understanding values better may result in a greater understanding of decision-making and actions (Rokeach, 1975; Schwartz, 1992; Gouveia, 2013), and the amount of literature investigating the correlations between values and external outcomes shows its importance in predicting relevant attitudes and behaviours. In the present thesis, I will focus on political participation and concerns about carbon emissions to show the correlates of values using the subfunctions from the Functional Theory. Using multi-nation data, I intend to contribute to the understanding on how values are connected with these variables in several countries, aiming at showing reliable information about the influence of values. The proposed studies are important not only for the broader literature on values, but also for the Functional Theory of Values, which has not yet been examined in a cross-cultural

approach. In Chapters 2 and 3, the structure of values, patterns of values change in function of age, and values prediction of external outcomes will be examined. The instrument of values to be used is Gouveia's Basic Values Survey (Gouveia et al., 2014a), which will be described next.

Measurement in Human Values

The *Rokeach Values Survey-RVS* was the first instrument to measure values as a construct separated from attitudes. Rokeach's scale (1973) was composed of 36 items that assessed terminal and instrumental values. For more than a decade, this was the most important instrument for measurement of values, but limitations regarding the theory regarding underlying value dimensions gave space for the proposition of new theories, and consequently, new instruments of values. The *Schwartz Value Survey-SVS* and the *Portrait Value Questionnaire-PVQ* are now the most popular surveys of values. The SVS was proposed in the early 1990s (Schwartz, 1992), and it was heavily influenced by Rokeach's items. Schwartz (1992) contributed to the literature of values by proposing a more robust theory for the structure of values. Fifty-six items were gathered from the RVS or developed, and they were answered on a nine-point scale varying from -1 (opposed to my values) to 7 (supreme importance). The SVS is supposed to measure ten motivational types (Schwartz, 1992). In the 2000s, Schwartz et al. (2001) proposed the PVQ, which measured the same ten motivational types. The PVQ was proposed with a different methodology, aiming at measuring the same values of the SVS in a simpler approach. The PVQ items are less directed; they are short verbal portraits of another person. The participant has to indicate the extent to which each item (from the portrayed person – gender matched) are similar to themselves. More recently, Schwartz has made refinements in his theories and proposed new measures, but the SVS and PVQ remain his most used instruments (Schwartz et al., 2012).

In the present research, a new measure of values will be considered: the *Basic Values Survey-BVS.* This instrument was developed to examine the structure of values proposed by Gouveia (2003, 2013) to give form to his *Functional Theory of Values*. This author developed a 24-item scale based on Maslow's theory of needs (1954). Two experts evaluated whether the 24 items represented needs as postulated by Maslow, and the six-factor structure proposed by Gouveia (2003) was confirmed with multidimensional scaling (MDS). This scale was later reduced to 18 items (Gouveia, 2013) and showed good fit using both confirmatory factor analysis (CFA) and MDS approaches (Gouveia et al., 2014a). Although the BVS has shown satisfactory psychometric properties (Gouveia et al., 2014a), this instrument has been

scarcely examined outside of Brazil. The present thesis is going to examine the psychometric properties of the BVS and its potential to predict external outcomes using multi-country data. The data used in the present thesis is detailed next.

Data Used in the Thesis

Data for this study comes from a cross-cultural project (World Digital Influence Project) with two waves of panel data, and includes representative samples from 20 countries in the Americas, Europe, Asia and South Africa. The measures used in this study were embedded in a larger survey, including multiple constructs from psychology and communications (for further details, see Gil de Zúñiga, Diehl, Huber, & Liu, 2017; Liu, Milojev, Gil de Zúñiga, & Zhang, 2018). The project was based at Massey University (New Zealand) and at the Media Innovation Lab (MiLab; University of Vienna, Austria). Participants (N = 21,362) were recruited online from September 14-24, 2015, and several steps were taken in order to ensure the quality of the data. A large group of competent scholars worked on the translations and back translations of the surveys. We made use of Qualtrics, an online poll survey platform for data collection, and employed Nielsen, a well-known media polling company that partnered with local providers to generate a stratified quota sample (on gender, age, and region). This was drawn from a massive pool with over ten million potential participants. Countries were selected based on the availability of Nielsen to manage the data collection. Countries where we had collaborators were prioritized to facilitate on the translation process. The number of countries was limited to 20 because of the funds of the project. The average duration for participants to complete the survey was 35 minutes, and the response rate was relatively high for a survey of this length (77%). Rewards received for participation varied across countries, as they were determined by the local commercial survey panel provider. To ensure that the data were representative for each country, we compared the demographics of our data with the census in each country. Table 2 shows information for age and gender, Table 3 shows information about education, and Table 4 shows the source of census (numbers between parentheses refer to the census of each country). The content of Tables 2, 3, and 4 have been previously published by Gil de Zúñiga and Liu (2017), who are the coordinators of the project.

The present doctoral candidate participated in the team that was responsible for designing and revising the survey that was uploaded on Qualtrics. The survey was sent in English to bilingual collaborators in each of the countries. They translated the items using either the committee approach (Brislin, 1980) or the back-translation method (Behling &

Law, 2000) and sent it back for upload to the online platform. Besides being part of the coordination of the logistic to contact collaborators from different countries, the present candidate was part of the team of Brazilian scholars who translated the survey to Portuguese. After we received the translations from each country and uploaded the survey on Qualtrics, data collection was undertaken by Nilsen. When the data collection was finalized, the present doctoral candidate was part of the team that proceeded with data cleaning, transformation of subscales, and organization of the code book.

As data was collected through an online platform, there was only a limited amount of cases with typing issues. For instance, while answering the demographic questions (e.g. age), some people added their year of birth instead of their current age. For these cases, I calculated their age based on their answer. This problem was identified in less than 1% of the data. For most of the items (e.g., human values, social capital, political participation, social dominance, and environmental concerns), the participants simply had to click on the desired option. In this case, there were no possibilities for typing issues to occur. The data we received from the pooling company came from people who had completed the survey. In this case, the number of missing information was very small. For human values, the item with more missing cases was sexuality (1.23%), and the item with less missing cases was success (.55%). Regarding the remaining variables used throughout the thesis, the number of missing information per item was also small. The item with more missing cases was the second item that composes the cluster of reflection of conversations (item = I often think about how my conversations with other people about politics and public affairs relate to other things I know), which represents social capital (see Study 3). The percentage of missing cases for this item was 5.79%. This percentage is higher than all the other items in the survey because there were some technical issues in the data collection in Poland (this item was not included in the survey for data collection in this country). As the number of missing cases was small for all the items used in the current thesis, a pairwise deletion of missing data was chosen when conducting all the analyses.

Table 2.

Demographic Breakdown by Age and Gender for 20 Country Study versus Census Data

	Age Group					Gender	
	18–24	25–34	35–44	45–64	65+	Female	Male
1. Argentina	15.2(17.3)	24(21.4)	20.8(17.6)	34.2(28.4)	5.8(15.3)	51.7(53.1)	48.3(46.9)
2. Brazil	5.7(8.7)	29.4(15.7)	29.4(15.7)	20(13.5)	3.7(13)	49.8(51.4)	50.2(48.6)
3. Chile	26.3(14.8)	30(21.1)	19.7(18.4)	20.7(32.1)	3.2(13.7)	51.3(51)	48.7(49)
4. China	10.5(12.7)	31.5(14.9)	27.9(18.2)	27.2(24.3)	2.9(8.9)	44.4(48.8)	55.6(51.2)
5. Estonia	11.1(9.7)	17.8(17.9)	15.1(17)	33(32.4)	22(23)	54.3(48.2)	50.6(45.7)
6. Germany	11(6.2)	26(15)	43.8(24.6)	8.3(5.1)	10.9(17)	53.9(51)	46.1(49)
7. Indonesia	19.1(12.5)	36.9(24.3)	26.2(21)	13(24.2)	.6(4.8)	59.6(49.9)	38.9(50.1)
8. Italy	10.9(7.1)	21.9(11.5)	27.9(15.1)	34.4(28.7)	5(21.9)	54.8(51.5)	44.2(48.5)
9. Japan	4.1(5.9)	13.4(13.9)	26.7(17.8)	45(32)	10.9(30)	41.6(51.3)	57.1(48.7)
10. Korea	16.7(11.5)	24.4(16.1)	24.3(19.6)	31.7(36.8)	2.8(15.9)	46.7(46.2)	53.3(53.8)
11. N. Zealand	7.1(9.4)	13.2(16.6)	15.2(18.6)	36.7(35.5)	24(19.7)	56(52.1)	43.2(47.8)
12. Philippines	17.7(9.2)	35.3(16.1)	25.9(12.4)	15.8(15.9)	1.3(4.8)	49.7(61.2)	39(50.2)
13. Poland	13.9(10.7)	21.4(19.6)	22.6(18.1)	34.1(33)	8(18.6)	54(52.3)	46(47.7)
14. Russia	18(13.6)	24.2(19.7)	26(16.6)	28.6(34.3)	2.5(15.6)	50.2(53.8)	48.4(46.2)
15. Spain	11.7(7.4)	21.9(14.9)	26.4(16.9)	36.8(25.6)	2.9(17.3)	51.7(50.6)	46.5(49.3)
16. Taiwan	15.4(15.5)	30.6(17.7)	30.6(18.7)	22.6(34.1)	1(13.9)	49.2(50.1)	50.8(49.9)
17. Turkey	-	-	-	-	-	-	-
18. UK	4.3(8.7)	12.8(17.7)	17.6(16.9)	42.7(33.4)	22.6(23)	54.1(51.4)	45.9(48.6)
19. Ukraine	13(7.8)	38.6(19.8)	26.6(17.5)	14.8(25.5)	1(19)	44(54.8)	54.9(45.1)
20. U.S.	8.4(9.9)	13.5(13.6)	14.8(12.8)	42.7(26.2)	20(15.5)	59.5(50.8)	40.5(49.2)

Note. Census data reported in parenthesis, based on official estimates. Dashes indicate demographics not directly comparable. See Table 4 for notes.

Table 3.

Demographic Breakdown by Education for 20 Country Study versus Census Data

	High School or less	Some College	College Degree+	Graduate Degree+
1. Argentina	54(85)	13.1(9.4)	26.7(5.7)	–
2. Brazil	52.2(39.4)	47.8(60.5)	–	–
3. Chile	22.8(80.6)	44.2(12)	33(16.6)	–
4. China	9.3(15)	23(5.5)	58.7(3.7)	7.6(.3)
5. Estonia	44.6(64)	16.5(9.4)	14.5(7.8)	24.2(17.2)
6. Germany	60.9(85.3)	–	7.2(1.3)??	31.8(14.5)
7. Indonesia	25.7(41.6)	13.1(29.2)	53.9(18.2)	4.7(10.9)
8. Italy	52(49.7)	–	31.2(13.5)	–
9. Japan	44.3(62.3)	14.4(16.4)	33.9(19.5)	7.4(1.8)
10. Korea	31.8(56.5)	11.6(14.3)	56.6(29.3)	–
11. N. Zealand	33.5(38.2)	28.3(8.2)	24.4(12.1)	13.7(5.7)
12. Philippines	5.5(7.1)	–	70.2(3.5)	–
13. Poland	48.8(79.4)	15.4(7.6)	35.8(13)	–
14. Russia	25.4(64)	10.6(4.2)	63.9(30.9)	3.5(1)
15. Spain	18.6(46)	44.1(22.1)	37(31.9)	–
16. Taiwan	21.9(57)	18.2(12.2)	46.1(24.6)	13.8(6.3)
17. Turkey				
18. UK	30.2(29.3)	31.9(20.5)	38(27)	–
19. Ukraine	13.7(56.5)	–	31(20.7)	61.7(14.6)
20. U.S.	22.8(40.8)	33.5(29.1)	28.3(18.7)	15.4(11.4)

Note. Census data reported in parenthesis, based on official estimates. Dashes indicate demographics not directly comparable.

Table 4.

Source of the census from each country

	Source
1. Argentina	2014 World Values Survey.
2. Brazil	2013 Brazilian Census data. Numbers for age groups 15–19, 20–29, 30–39, 40–49, 50–59, and 60+. Language in the census differs from the study on education items: High School = High School or less, Some College = High School +. The Brazilian Census the information available is related to the level that people are studying at the moment
3. Chile	2015 population estimates based on INE data.
4. China	2010 Chinese Census made by China's Office for National Statistics.
5. Estonia	2015 population estimates for age and gender; 2014 for education levels.
6. Germany	2014 Statista estimates.
7. Indonesia	2010 BPS estimates.
8. Italy	2015 ISTAT estimates.
9. Japan	2010–2014 Japanese Census Estimates.
10. Korea	2015 population statistics from 2015 resident registration at the Ministry of Government Administration and Home Affairs; 2010 census.
11. N. Zealand	New Zealand 2013 NZ census. In age groups 18 – 24 = 20–24.
12. Philippines	2015 population estimates. In age groups 18 – 24 = 20–24.
13. Poland	Population estimates for 2011 and 2014 by GUS or Eurostat 2012.
14. Russia	2010 census estimates.
15. Spain	2011 Population Census made by the Spanish Statistical Office (INE)
16. Taiwan	2014 Department of Statistics, Ministry of Interior.
17. Turkey	-
18. UK	2014 UK Census (ONS) estimates for age, otherwise 2011 Census data is used.
19. Ukraine	2001 Official census data.
20. U.S.	2014 U.S. Census American Community Survey (1-Year Estimates)

Note. Census data from Turkey was not publicly available by the time this study was written.

Chapter 2. Values structure, invariance, and patterns of value importance based on age and gender

The present thesis is in the form of *thesis by publication*. Four papers were proposed and they are organised in two chapters. Chapter 2 examines the structure of values in two papers. The first paper of Chapter 2 uses techniques of dimensionality (e.g., multidimensional scaling), factor reduction (confirmatory factor analysis), and invariance (multiple-group confirmatory factor analysis and Bayesian approximate invariance) to confirm whether the six dimensions of values fit the data on values across 20 countries. This paper is the first peer-reviewed attempt to examine the suitability of the *Functional Theory of Human Values* across different countries using multi-group approaches. The literature will benefit from information about the psychometric properties of a model that is proposed as more parsimonious and theory-driven than the dominant model on the contemporary literature of values.

The second paper of Chapter 2 examines age and gender differences in human values. This paper evaluates the structure of intra-individual patterns of value change, examining whether values with similar goals show a similar relationship with age. To the best of our knowledge, this is the second attempt to examine how the *Functional Theory of Human Values* behaves for different groups of age and gender, and it is the first time these patterns are examined across different cultures for this theory. This research will contribute to the broader literature of human values, and not only for the *Functional Theory of Human Values*, since attempts to examine these patterns are scarce in the values literature. The two papers that compose Chapter 2 are described next.

Study 1. Basic Values Survey (BVS): A 20-nation validation study

Abstract. The present paper tests the structure and invariance of the Functional Theory of Human Values across 20 countries (N = 21,362). This theory proposes that values have the functions of guiding behaviour and expressing needs. The interplay between these two functions produces six subfunctions that in turn produce distinct content. These subfunctions are operationalised in the Basic Values Survey with three items each, forming an 18-item measure. Although this measure has been used for more than two decades, studies examining its psychometric properties in multiple-group data are scarce. Using multidimensional scaling (MDS), it was found that values were organised in a bidimensional space according to the hypothesised degree of congruence between subfunctions. Also, Confirmatory Factor Analysis (CFA) with a Bayes estimator and approximate zero cross-loadings and residual correlations supported the six-factor structure. A strict CFA with Robust-ML estimator did not support the model. Metric invariance was supported for all the items, except religiosity, using the alignment method and approximate Bayesian invariance.

Keywords: human values, value structure, cross-cultural analyses, invariance, Bayes estimator.

Introduction

Human values are an important construct in psychology that aid in understanding attitudes and behaviours. This has been demonstrated in the literature on values-attitudes-behaviours (Homer & Kahle, 1988; Milfont, Duckitt, & Wagner, 2010) and values-beliefs-norms hierarchies (Stern, Dietz, Abel, Guagnano, & Kalof, 1999), wherein values are theorised as a motivator of human action. Values represent a combination of personal experiences and cultural characteristics, and are defined as "concepts or beliefs that pertain to desirable end states or behaviours, transcend specific situations, guide selection or evaluation of behaviour and events, and are ordered by relative importance" (Schwartz, 1992; pp. 4). Given their central role in social psychology, and importance in guiding people's attitudes and behaviours, the psychometric properties of instruments that measure human values have received considerable attention (Cieciuch, Davidov, Schmidt, Algesheimer, & Schwartz, 2014; Cieciuch, Davidov, Vecchione, Beierlein, & Schwartz, 2014; Davidov, Meulemann, Schwartz, & Schmidt, 2014; Vecchione et al., 2015; Fontaine et al., 2008; Spini, 2003; for assumptions about the universality of values see Schwartz, 1992).

Values have been measured with prominence since the *Rokeach Values Survey*, which measured this construct separated from personality and attitudes for the first time (Rokeach, 1973). However, with Schwartz's (1992) inventory, values can be said to have come of age as a topic in the international literature. Schwartz (1992) theorised that values are organised by a universal motivational typology, and provided empirical evidence for this assertion in more than 70 countries (Schwartz, 1990). Over the years, Schwartz has proposed several instruments and refined his theory by making changes in the structure of his typology, and this has generated some criticism regarding focus and parsimony (Gouveia, Milfont, & Guerra, 2014a; Gouveia, Milfont, & Guerra, 2014b). For instance, Schwartz and Bilsky (1987) initially developed their model with seven motivational domains, but later on refined it to ten (Schwartz, 1992), eleven (Schwartz, 1994), and nineteen (Schwartz et al., 2012) types. In response, the *Functional Theory of Human Values* has been developed (Gouveia, 2013) with a focus on the function values serve, and with a claim of parsimony that has been successful at explaining data generated by Schwartz's more complex typology (Gouveia et al., 2014b). Nevertheless, as a new theory, there have not been enough studies testing its psychometric properties across different cultures, which will be the focus of the present research.

The Functional Theory of Human Values

The *Functional Theory of Human Values* defines values as guiding principles that represent people's needs (Gouveia et al., 2014a). Gouveia (2013), differentiates three types of values orientation according to the function of their pursued goals (social, central and personal), and two types of motivation based on the function of expressing needs (thriving needs and survival needs). The interplay between the three types of orientation and the two types of motivators results in six clusters (see Figure 4) that are commonly used to predict attitudes, intentions, behaviours, etc. Gouveia's clusters are often called subfunctions because they are a by-product of the combination of two main functions; pursuing goals and expressing needs.

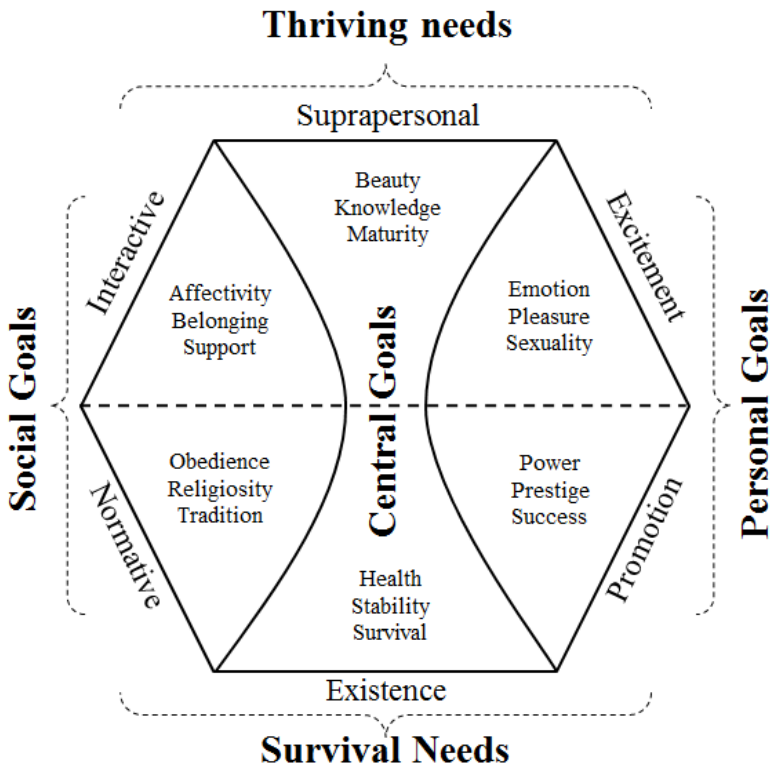

Figure 4. The structure of human values according to the Functional Theory

Note. Continuous lines separate goals and the dashed lines separate needs.

The six subfunctions of the functional model are interactive, normative, suprapersonal, existence, excitement, and promotion (see Figure 4, also Gouveia et al., 2014a; Gouveia, Vione, Milfont, & Santos, 2015). The first two subfunctions represent social goals (i.e., others-oriented), but they differ on motivations. Interactive represents thriving needs, and normative survival needs. While the interactive subfunction is focused on the affective experiences among individuals (e.g., affectivity, social support), the normative subfunction is more pragmatically oriented and focused on the relationship between the individual and social institutions (e.g., tradition, obedience) (Gouveia et al., 2014a; Schwartz, 1992). The suprapersonal and existence subfunctions represent central goals, but they also differ as to their motivation. Amongst all values subfunctions, suprapersonal is the one that best represents thriving needs, and is a reference point for the other two dimensions (interactive and excitement) that also belong to such a motivator (Gouveia et al., 2015). This value subfunction is focused on humanitarian ideas, representing people that are selfless and open-minded (e.g., knowledge, maturity). On the other hand, the existence subfunction is the purest representation of the survival motivator (Gouveia et al., 2015). This value subfunction is focused on pragmatic issues (e.g., health, survival) and is a point of reference for the other

two dimensions that share the same motivation (normative and promotion). Finally, the excitement and promotion subfunctions represent personal goals (i.e., self-oriented), but the first represents thriving needs and the second survival needs. Because of its thriving focus, the excitement subfunction emphasises people's desire for stimulation with a particular focus on enjoying life (e.g., emotion, pleasure). In contrast, the promotion subfunction has a closer relationship with institutions, but differently from that of the normative subfunction; here the focus is therefore on the achievement and progress of one's own career (e.g., prestige, power).

Besides organising values in six subfunctions, each representing specific characteristics, Gouveia et al. (2014) argue further that the six subfunctions of values present degrees of congruence between them, with some being stronger than others. For the *Functional Theory of Human Values*, the subfunctions that share the same goals show the strongest degree of congruence (e.g., interactive-normative and excitement-promotion) and the dimensions that share the same motivator show a moderate congruence (e.g., interactive-excitement and normative-promotion). A low congruence is attributed to the subfunctions that do not share goals or type of motivator (e.g., interactive-promotion and normative-excitement). An exception in the degree of congruence is given to central goals. Gouveia (2013) argues that they are the backbone of all other values, and therefore should be compatible with all the value subfunctions. Even though suprapersonal and existence express different motivators (thriving and survival needs), they co-exist harmoniously (Inglehart, 1991) and should be highly correlated with all the other values. The congruence between values is important because it shows the parts of the model that are theoretically adjacent. For factor analysis, this information is relevant because it can indicate where cross-loadings are most expected.

Human values scales

Considering values from an individual's perspective, where they are understood as a result of people's experiences and cultural influence, the models of Rokeach (1973), Schwartz (1992), and Gouveia (2003) are the most prominent ones. To measure values, Rokeach (1973) developed a scale composed of 36 items that assessed terminal and instrumental values, but the lack of factorial structure testing and criticism regarding the lack of criteria for item selection limited its application. Nevertheless, Rokeach's typology was influential for his successors. Schwartz and Bilsky (1987, 1990), for instance, conceptualised their circumplex theory based on a re-organisation of Rokeach's typology using the

motivational aspects of values as a reference. In the 1990s, Schwartz proposed his first instrument (Schwartz Value Survey - SVS) to measure his 10 or 11 value types (Schwartz, 1992, 1994). The scale was strongly influenced by Rokeach's items, but instruments from other cultures and religious texts were also used to build his new scale, as stated by Schwartz (1992). Fifty-six items were gathered or developed, and they were answered in a nine-point scale varying from -1 (opposed to my values) to 7 (supreme importance).

In the 2000s, Schwartz et al. (2001) proposed a new survey (Portrait Values Questionnaire - PVQ) that measured the same 10 value types. The PVQ is different from the SVS because it uses a different methodology regarding how participants are asked to evaluate the items. This scale became especially popular with its inclusion in the European Social Survey (ESS), but to fit in a large survey like the ESS, the PVQ had to be shortened. The PVQ-21 or ESS human values scale was then developed (Davidov, Schmidt, & Schwartz, 2008). More recently, Schwartz et al. (2012) developed a new scale with 57 items to measure 19 motivational types of values (PVQ-5X) instead of the original 10. New versions (PVQ-R and PVQ-RR) have also been presented to solve problems with model fit on the PVQ-5X (Schwartz, 2017). This plethora of measures for the same construct seems to represent a continuing search for the best-fitting questionnaire, and might confuse scholars who are aiming to use values in their research for the first time.

More recently, Gouveia (2003) proposed the Basic Values Survey – BVS to measure his *Functional Theory of Human Values*. Gouveia (2003) has a claim of parsimony that is novel because of the theory-driven approach adopted to develop his model. In contrast to Schwartz (1992), who built his model and then subsequently changed it based on empirical findings, Gouveia designed a six-factor structure that is theoretically grounded on two hypothesised functions of values. As the number of factors/subfunctions operationalised by Gouveia (2003, 2013) reflects the theoretical function that values serves (values express needs and guide actions), there are no expectations for changes in the number of subfunctions. Gouveia (2003, 2013) built his theory based on the functional perspective of Maslow (1954) but also adapted typologies found by previous researchers, such as Rokeach's social-personal typology (Rokeach, 1973), and Inglehart's materialism and post-materialism typology (Inglehart, 1991).

The basic values survey

Gouveia developed a 24-item scale based on Maslow's theory of needs (1954). Two experts evaluated whether the 24 items represented needs as postulated by Maslow (1954) and the six-factor structure proposed by Gouveia (2003) was confirmed with multidimensional scaling (MDS). This scale was later reduced to 18 items (Gouveia, 2013) and showed good fit using both CFA and MDS approaches (Gouveia et al., 2014) on a large Brazilian sample. The decision to represent values with 18 items was made to contribute to the literature with a short and easy-to-use scale that could fit either short or long questionnaires (Gouveia, 2013), but the number of values items might change. In fact, the structure proposed by Gouveia can even be examined with scales proposed by competing theories, since the focus of Gouveia's theory is on the proposition of six subfunctions of values, and not on the items that are being used (Gouveia et al., 2014b). Since 2003, the BVS has been used with several samples from Brazil (Coelho et al., 2018; Gouveia et al., 2014a; Gouveia, Milfont, Fischer, Coelho, 2009; Gouveia, Vione, Milfont, & Fischer, 2015); two PhD theses (in Portuguese) presented the first cross-cultural findings (Medeiros, 2011; Soares, 2016). They were successful in showing cross-cultural validity through MDS, but a model fit was not satisfactory using CFA. In the present research, I contribute to the literature on human values by evaluating the cross-cultural appropriateness of the BVS scale across 20 countries.

Methods commonly used to examine the structure of values

The structure of Schwartz's and Gouveia's values have usually been tested using a more interpretive approach, multidimensional scaling (Bilsky, Janik, & Schwartz, 2011; Coelho et al., 2018; Fontaine et al., 2008; Gouveia et al., 2014b; Koivula & Versalo, 2006; Schwartz, 1994). Less often, studies have also provided empirical findings using confirmatory factor analysis (CFA) (Davidov, 2010; Gouveia et al., 2014a; Schwartz & Boehnke, 2004; Vecchione, Casconi, & Barbaranelli, 2009). The CFA has presented a great challenge for researchers studying human values for several reasons. One of them is the fact that correlations among values dimensions are naturally high, since values share similar goals or motivators, but in a strict approach, such as CFA, cross-loadings and residual correlations are fixed at zero (Lu, Chow, & Loken, 2017). Values scales are also supposed to cover a vast range of information, and the selection of items might not include items sufficiently homogeneous to represent each dimension, especially in short scales (Knoppen & Saris, 2009). The lack of homogeneity within the items from the same latent factor might complicate the identification of independent latent variables. This is because the lack of

homogeneity would not produce a cohesive factor capable of showing a clear distinction from the other latent variables. For values, the heterogenous pool of items is necessary because the structures proposed in values theories are supposed to accommodate all possible values. For instance, in the circumplex continuum proposed by Schwartz (1992), all possible values can be observed in a circular continuum and they are organized based on their levels of congruence. According to Graham et al. (2011), "it is better to have dissimilar items that are moderately correlated but that each capture a different facet... than it is to have similar items that are highly correlated and capture only a small amount of the [dimensions] scope" (p. 370). In this case, if only very homogenous items are added into a value factor, the set of items will not be representative of the scope conceptualized for the dimension.

As a response to the challenges imposed by CFAs to examine correlated structures and small scales, researchers have employed a different strategy to show evidence of latent structure and invariance called the magnifying glass strategy (Cieciuch, Davidov, Vecchione, Beierlein, & Schwartz, 2014; Cieciuch & Schwartz, 2012). This strategy consists of examining the structure of values considering adjacent dimensions rather than full models. This has shown to be successful because it lessens the complexity of the models and focuses on the question of utmost interest: the extent to which adjacent values are distinct. Also, a closer look into adjacent dimensions can make it easier to detect lack of homogeneity, since the dimensions that supposedly present the highest correlations are emphasised. For instance, by using this strategy, Knoppen and Saris (2009) found that the item "being rich" (i.e., It is important to him to be rich. He wants to have a lot of money and expensive things. ESS/BEING RICH) from Schwartz's power dimension showed greater correlations with the dimension of achievement rather than with other items from the power dimension (i.e., It is important to him to be in charge and tell others what to do. He wants people to do what he says. ESS/IN CHARGE). The power and achievement dimensions are adjacent to each other and are usually combined to form a higher order factor called self-enhancement (Schwartz, 1992). Knoppen and Saris (2009) speculate that one of the reasons for this misspecification might be the fact that "being rich" gives people power, but it is not necessarily a measure of power, as the item "in charge" seems to represent. However, although the magnifying glass strategy has the theoretical relevance of examining whether adjacent dimensions are independent, ignoring cross-loadings and residual correlations between non-adjacent factors limits the application of an overall values model. This is because this strategy does not offer empirical support for using the value subfunctions as latent variables simultaneously.

Bayesian confirmatory factor analysis.

As an alternative to strict CFA, a more liberal CFA with Bayes estimation has been proposed (Muthén & Asparouhov, 2010; Asparouhov et al., 2015). Muthén and Aspahouhov (2011) use the term liberal because it employs a small relaxation on the assumptions to estimate cross-loadings and residual correlations of latent models. Muthén and Asparouhov (2011) affirm that the estimation of approximate zero cross-loadings and residual correlations do not change the meaning of the latent factors, but provide a more appropriate examination of substantive theories like personality and human values, where theorized latent variables are often insufficiently distinct under traditional criteria for CFA. The CFA using the Robust-ML is stricter than the analysis using the Bayes estimator because the model for the Robust-ML is examined with exact zeros for cross-loadings and residual correlations. Muthén and Asparouhov (2010) affirm that approximate zero is more realistic in social sciences and reflect substantive theories better than absolute zeros when examining cross-loadings and residual correlations. These authors argue further that the traditional CFA (with maximum likelihood estimation) is unnecessarily strict and often leads to rejection of models. Indeed, many of the studies examining human values scales have failed to present satisfactory fit, and often demand modification in the model to yield acceptable fit (Ardilla et al., 2012; Cieciuch et al., 2014; Davidov, 2010; Gouveia et al., 2010; Schwartz & Boehnke, 2004; Schwartz & Butenko, 2014). To the best of my knowledge, no study has applied the Bayesian estimation to examine the structure of human values scales, perhaps because the development of statistical packages to apply this method is fairly new (Asparouhov et al., 2015; Muthén and Asparouhov, 2010). However, the CFA with a Bayes estimator has been successfully applied to examine scales in other areas of psychology (De Bondt & Van Petegem, 2015; Dombrowski, Golay, McGill, & Canivez, 2017; Fong & Ho., 2014). Therefore, the structure of values is examined using both the MDS and strict CFA, but also a Bayesian CFA with the estimation of approximate zero cross-loadings and residual correlations.

Studying multiple-group samples

Multi-level confirmatory factor analysis (MLCFA).

When examining hierarchical data, the researcher needs to be careful regarding which strategy is used to analyse the data, in order to avoid presenting biased results. When multiple groups are considered, there are expectations for people to be more similar within their own

group than when compared to other groups, and if this is not specified, then the results will not be reliable (Hox, 2010). There are a few different ways for researchers to analyse a hierarchical dataset. One of them is to analyse groups independently in order to examine the fit of the model, and if there is a consensus about the estimation of the model for each group (satisfactory fit), multiple group analysis can be performed. In multiple group analysis, all groups are estimated at the same time, and constraints are applied to observe the extent to which loadings and/or regressions are similar across groups (Milfont & Fischer, 2010). MGCFA (multiple-group confirmatory factor analysis) and MGSEM (multiple-group structural equation modelling) are examples of multiple group analysis that estimates a model without ignoring the hierarchy of the data. One would be ignoring the hierarchy of the data if analysis were performed for the entire dataset without specifying that there were known groups within the dataset.

More recently, multi-level analyses have been made accessible in different statistical packages to assess hierarchical data. In the factor analysis domain, Fontaine (2008, pp. 75) describes nicely that multi-level models can be applied to CFA "focusing on the question of whether the individual-level associations among indicators (such as covariances or correlations) reveal the same internal structure as the culture-level associations." This is especially important for the field of values because there is great interest in studying the impact of country-level variables on people's individual-level variables (e.g., country-level moderation – see Araujo et al., 2019). According to Fontaine (2008), if one wants to use clusters of values as a country-level variable, an MLCFA should be conducted to see whether the clusters found at the individual level mean the same thing at the country level. This distinction between individual and group levels of analysis has been studied for a long time in cross-cultural research. Leung and Bond (1989) showed the importance of examining factor structure within individuals and between cultures in order to make use of an instrument in both levels of measurement. For these authors, this is important because a given instrument might display a structure within individuals unrelated to a structure originating from an analysis in which culture was the unit of measurement. Van de Vijver and Poortinga (2002) highlight that considering the cross-level equivalence is important to avoid a *level error*, which might happen when characteristics of a lower hierarchical level of aggregation (e.g., a person) are incorrectly attributed to a higher level (e.g., organisation) or vice versa.

However, the set of analysis that the researcher will perform will ultimately depend on the question to be answered. Bond et al. (2004), for instance, were interested in

developing a structure for social axioms at the cultural level. To achieve their goal, factor analysis was based on country aggregates of items. In this case, individuals were not the unit of measurement. The validation of the resulting dimensions was tested through correlations with other cultural dimensions (e.g., individualism vs. collectivism). Hofstede (1980), who proposed one of the most successful structures of values at the cultural level, also based his model on the factor analysis of country aggregates. For this author, the structure of values proposed in the cultural level failed at presenting a similar structure at the individual level. In contrast to Hofstede's argument that the structure of values in the individual and cultural level are distinct, Fischer et al. (2010) showed high similarities between the structure of values at the individual and cultural levels. Several studies have attempted to examine whether the structure of values is in fact represented identically at both individual and group levels (isomorphism) (Fischer, 2009, 2012; Fischer & Poortinga, 2012; Fischer et al., 2010; Fontaine, 2008). However, the application of MLCFA was not adopted to examine the structure of values in these studies.

It is important to highlight that Gouveia's (2003, 2013) theory of values was developed to measure values at the individual level and this is the level that Gouveia's scale is used in the present thesis. Therefore, testing the structure of values at the country level was not the focus of this study. However, since Fontaine (2008) affirms that identifying whether structures present isomorphism is relevant not only to check the appropriateness of using a variable at different levels, but also to understand measurement equivalence, an MLCFA was employed. To the best of my knowledge, despite Fontaine's (2008) theoretical recommendation to examine values with an MLCFA, there is no published study examining the structure of values using this method. Most of the studies have examined isomorphism in values scales through analysis of multidimensional space (Schwartz, 1999; Fischer, 2012; Fischer & Poortinga, 2012; Fischer et al., 2010; Fischer et al., 2011).

Fontaine (2008) proposed three possible outcomes when examining the structure of a given measure at both the individual and cultural levels. The measure can be invariant (where the same measurement holds in each cultural group at the individual level) and displays the same structure at both levels (isomorphism). This would mean that each factor manifests similar content and that can be estimated simultaneously at both levels. However, it might be that the measure is invariant at the individual level, but displays a different configuration when estimated at the country level (non-isomorphism). For this case, the factors at the individual level are thought to possess different content in comparison with factors at the

country level. When a measure is non-isomorphic, a uniform bias is expected, which can be a result of the lack of scalar invariance. In this case, Fontaine (2008, pp. 76) affirms that country averages deriving from individual-level psychological scales cannot be justified, which is an important caveat for cross-cultural research (e.g., Hofstede, 1980). Besides isomorphism and non-isomorphism, Fontaine (2008) also describes a category called "interaction", which represents an interaction between the individual and cultural levels. In this case, individual-level characteristics vary as a function of cultural-level factors (see Fontaine, 2008 and Fischer, 2009). The distinction between isomorphism and non-isomorphism seems to be clear and straight forward, but there is a lack of clarity in the distinction between non-isomorphism and interaction. For instance, Fontaine (2008) uses values as an example of a non-isomorphic scale, but Fischer (2009) claims that values are an example of interaction.

The MLCFA seems to be very flexible and useful on different fronts. For instance, Fontaine (2008) affirms it is a useful method to examine the extent to which variables originally thought to represent individual-level responses can also represent the mean score of groups. In a different perspective, Davidov et al. (2012) use MLCFA to explain the reasons why scalar invariance fails in a given measure, while other researchers have used MLCFA as an analysis of invariance similar to the MGCFA with the application of constraints in loadings and intercepts (Jang et al., 2017; Kim, Cao, Wang, & Nguyen, 2017). In the present study, I do not enter into an analysis of which is the best approach to examine invariance; the use of the MLCFA is employed as an exploratory investigation on whether a model of values can be estimated at both the within and between levels as described by Fontaine (2008) and adopted by Owe et al. (2013).

Measurement invariance.

I provide evidence of invariance using the alignment method (Asparouhov & Muthén, 2014), and approximate Bayesian invariance (Muthén & Asparouhov, 2013). Each of these methods has been used to examine invariance in value scales (Asparouhov & Muthén, 2014; Cieciuch et al., 2014; Cieciuch et al., 2019). However, each values cluster is examined one at a time, since these analyses can be employed for single-factor structures only (Asparouhov & Muthén, 2014; Muthén & Asparouhov, 2013). These methods are seen as more realistic or suited for analysis considering many groups (Davidov, Muthén, & Schmidt, 2018; Marsh et al., 2018; Muthén & Asparouhov, 2018). This is because traditional forms to test invariance

(Multiple group CFA) are too strict and fail to show invariance even when the measure varies in a small degree across groups.

Factor loadings, item intercepts, factor means, and factor variances are estimated for the alignment method without equality restrictions (Asparouhov & Muthén, 2014; Fischer & Karl, 2019). The analysis examines a configural model and applies an optimisation using a component loss function to identify an approximation of invariance. Similar to the alignment method, approximate Bayesian invariance freely estimates factor means, variances, and covariances across groups, but constraints based on priors are applied to variation of loadings and intercepts between groups. For instance, using a prior of .01, the distribution of loadings and intercepts is normal with mean = 0 and variance = .01 (Cieciuch et al., 2014). Simulations have shown that allowing the loadings and intercepts to vary to a small degree (e.g., variance equal to .01 or .05) does not bias conclusions for multiple group comparisons (Muthén and Asparouhov, 2013; Van de Schoot et al., 2013).

Method

Participants and procedure.

Data for this study come from a cross-cultural project (World Digital Influence Project) with two waves of panel data. Representative samples come from 20 countries in the Americas, Europe, Asia and South Africa. The measures used in this study were embedded in a larger survey, including multiple psychological and communications constructs (for further details, see Gil de Zúñiga, Diehl, Huber, & Liu (2017); Liu, Milojev, Gil de Zúñiga, & Zhang, 2018). The project was based at Massey University (New Zealand) and at the Media Innovation Lab (MiLab; University of Vienna, Austria). Participants (N = 21,362) were recruited online from September 14-24, 2015, and several steps were taken in order to ensure the quality of the data. A large group of competent scholars worked on the translations and back translations of the surveys. An online poll survey platform was used for data collection (Qualtrics), and it was employed by Nielsen, a well-known media polling company that partnered with local providers to generate a stratified quota sample (on gender, age, and region) drawn from a massive pool with over 10 million potential participants. The average duration for participants to complete the survey was 35 minutes, and the response rate was 77%. Rewards received for participation varied across countries, as they were determined by the local commercial survey panel provider. To ensure that the data were representative for

each country, the demographics of each country were compared with their respective census (see Gil de Zúñiga & Liu, 2017). A pairwise missing deletion was used because there was only a small number of missing cases per item of human values (less than 2%).

Instruments.

Basic Values Survey (BVS; Gouveia 2003). This self-report instrument is composed by 18 items, representing six value subfunctions. In a Likert scale ranging from 1 (Completely unimportant) to 7 (Of the utmost importance), participants are instructed to indicate the level of importance given to each of the values (items) described as a guiding principle to their lives. Two descriptions are given to each item, aiming at exemplifying the content of the value clearly. For instance, *Affectivity* is described as "To have a deep and enduring affectionate relationship" and "to have somebody to share successes and failures," and *Tradition* is described as "To follow the social norms of your country" and "to respect the traditions of your society." Descriptive statistics and alpha reliability are displayed in Table 5. Average Alphas for all the subfunctions were close to .60 or higher, which is similar to previous research using the BVS (Gouveia et al., 2014a) and other value scales (e.g., Schwartz, 2005). However, these results should be interpreted with caution since most of the alphas fall below .70. Although reliability is often low for scales assessing human values, it is important to notice that results showed low reliability for the items that compose the normative and excitement subfunctions. In the present thesis, the psychometric properties of all items will be examined through multidimensional scaling, confirmatory factor analysis (MLR and Bayes estimators), and multilevel confirmatory factor analysis, which might indicate whether specific items are problematic for the composition of each value subfunction.

Table 5.

Descriptive statistics and alpha reliability for the BVS

	Interactive			Normative			Suprapersonal			Existence			Excitement			Promotion		
	M	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α
Argentina	5.57	.87	.59	5.02	1.02	.53	5.47	.87	.57	5.90	.81	.65	4.97	1.02	.53	4.45	1.08	.60
Brazil	5.44	1.08	.72	5.57	1.22	.68	5.56	1.07	.74	5.88	1.06	.79	4.94	1.11	.59	4.83	1.12	.63
Chile	5.42	.97	.63	4.89	1.07	.50	5.41	.99	.64	5.72	.93	.67	5.05	1.07	.64	4.61	1.06	.54
China	5.22	.94	.78	5.09	.89	.60	5.06	.91	.77	5.43	.94	.77	4.64	.95	.60	4.82	.98	.73
Estonia	5.40	.86	.56	4.64	.89	.44	5.05	.87	.64	5.92	.80	.68	4.47	1.04	.60	4.05	1.02	.70
Germany	5.38	.91	.61	4.33	1.03	.51	5.09	.89	.60	5.65	.83	.59	4.80	.98	.59	3.98	1.07	.64
Indonesia	5.50	.92	.78	5.57	.97	.78	5.30	.94	.75	5.73	.99	.85	4.93	.98	.68	4.83	1.00	.65
Italy	5.40	.96	.68	4.79	1.08	.58	5.32	.97	.72	5.71	.94	.72	4.67	1.10	.63	4.54	1.08	.62
Japan	4.33	.99	.72	3.83	.88	.53	4.16	.92	.68	4.85	1.03	.76	4.13	.95	.61	3.76	.96	.66
Korea	4.93	.85	.69	4.55	.90	.51	4.92	.84	.68	5.41	.88	.76	4.70	.90	.62	4.70	.88	.66
NZ	5.21	.87	.58	4.47	1.05	.52	4.90	.86	.59	5.73	.76	.60	4.38	1.03	.58	4.09	.97	.64
Philippines	5.68	.94	.76	5.50	.94	.63	5.49	.91	.68	6.01	.96	.83	5.15	.99	.63	4.93	1.02	.63
Poland	5.28	.96	.69	4.86	1.08	.65	4.93	.90	.62	5.46	.94	.70	4.49	1.01	.63	4.22	1.00	.61
Russia	5.37	.90	.63	4.67	1.02	.57	5.28	.92	.65	5.70	.94	.71	4.73	1.00	.53	4.60	1.04	.64
Spain	5.33	.97	.64	4.52	1.03	.48	5.24	.97	.70	5.74	.97	.76	4.97	.96	.62	4.37	1.01	.55
Taiwan	5.04	.96	.77	4.74	.94	.65	4.96	.99	.79	5.34	.95	.76	4.53	.97	.60	4.57	.97	.68
Turkey	5.62	1.09	.79	5.31	1.08	.57	5.42	1.02	.70	5.67	1.08	.74	4.62	1.14	.57	4.96	1.11	.66
UK	5.17	.96	.64	4.52	1.14	.57	4.96	.97	.67	5.65	.90	.71	4.48	1.10	.62	4.13	1.10	.67
Ukraine	5.40	.95	.69	4.83	1.02	.56	5.40	.93	.66	5.82	.94	.73	4.50	1.02	.48	4.77	1.03	.59
USA	5.32	.95	.64	4.81	1.17	.61	5.04	.95	.63	5.78	.85	.69	4.36	1.16	.63	4.20	1.07	.65
Average	5.57	.87	.68	5.02	1.02	.57	5.47	.87	.67	5.90	.81	.72	4.97	1.02	.60	4.45	1.08	.64

Data Analysis

I first examined the structure of human values through MDS, which is the most commonly used method to provide evidence of value structure (Bilsky, Janik, & Schwartz, 2011; Fischer et al., 2011; Fontaine, Poortinga, Delbeke, & Schwartz, 2008; Koivula & Versalo, 2006; Schwartz, 1994), and confirmatory factor analysis, which is a stricter statistical procedure used to evaluate latent structures, also used in the values literature (Davidov, 2010; Gouveia et al., 2014a; Schwartz & Boehnke, 2004; Vecchione, Casconi, & Barbaranelli, 2009). Following this, three methods were used to estimate the CFA. I estimated a strict CFA with Robust-ML estimator, a more liberal CFA with a Bayesian estimator that allows approximate zero cross-loadings and residual correlations, and a multi-level confirmatory factor analysis (MLCFA) to examine whether the structure found in the individual level can be replicated in the cultural level. To examine the MDS and CFA with independent data, I split the sample in two random split-halves[3] each composed by approximately 50% of the original dataset. Splitting the data is recommended when one is examining the same model with different methods. That is to check whether a model estimated with one method can be replicated with another method, but with a sample that has not been previously assessed (Cudeck & Browne, 1983). Details of the original dataset and each random half can be seen in Table 6 and details about each method used in the present study are provided as follows.

[3] Data was split in SPSS using the select cases option and the random samples of cases function.

Table 6.

Sample Characteristics

	Full data			First random half			Second random half		
Nation	N	Age (SD)	♀ (%)	N	Age (SD)	♀ (%)	N	Age (SD)	♀ (%)
Argentina	1145	40.8 (14.3)	51.7	560	40.9 (14.9)	51.0	585	40.6 (13.7)	52.4
Brazil	1086	35.9 (12.0)	49.8	541	35.8 (12.1)	52.0	545	35.9 (12.0)	47.6
Chile	964	35.1 (13.1)	51.3	486	35.6 (13.0)	49.4	478	34.4 (13.2)	53.2
China	1005	38.7 (12.0)	44.4	480	38.6 (12.3)	42.8	525	38.7 (11.7)	46.0
Estonia	1168	47.8 (17.2)	48.8	601	47.4 (16.8)	50.3	567	48.1 (17.5)	47.1
Germany	1093	45.1 (15.1)	53.9	539	45.0 (15.0)	56.2	554	45.1 (15.1)	51.6
Indonesia	1080	32.8 (9.8)	39.5	550	33.0 (10.2)	41.4	530	32.5 (9.6)	37.4
Italy	1041	41.7 (12.2)	55.3	543	41.7 (13.3)	57.4	498	41.7 (13.0)	53.0
Japan	975	46.7 (12.9)	42.2	512	46.4 (13.0)	43.0	463	47.0 (12.8)	41.2
Korea	943	38.9 (12.7)	46.7	456	39.3 (12.6)	46.8	487	38.4 (12.8)	46.6
NZ	1157	49.5 (17.3)	56.4	572	49.2 (17.6)	57.4	585	49.8 (17.1)	55.5
Philippines	1064	34.2 (11.0)	61.2	539	34.3 (10.9)	59.6	525	34.0 (11.1)	62.8
Poland	1060	42.0 (14.5)	54.0	539	41.2 (14.6)	52.8	521	42.7 (14.4)	55.3
Russia	1145	38.2 (12.8)	50.9	573	38.7 (13.2)	50.9	572	37.5 (12.3)	51.0
Spain	1019	41.0 (12.6)	52.6	507	40.4 (12.6)	50.2	512	41.4 (12.7)	55.1
Taiwan	1008	36.3 (10.9)	50.8	485	36.0 (10.9)	53.5	523	36.5 (10.9)	48.3
Turkey	961	33.9 (11.0)	44.0	477	33.8 (10.9)	40.1	484	34.0 (11.1)	47.8
UK	1064	50.6 (15.6)	54.1	538	50.9 (15.7)	52.9	526	50.3 (15.5)	55.4
Ukraine	1223	33.9 (9.40)	44.0	624	34.2 (9.7)	43.7	599	33.5 (9.0)	44.3
USA	1161	49.8 (16.4)	59.5	587	50.0 (16.6)	59.3	574	49.5 16.2	59.7

Multidimensional scaling and generalised Procrustes rotation.

Using the first split-half of the data, MDS was implemented using SPSS (version 25.0.0.1), through the Proxscal algorithm, ordinal proximity transformations, Torgerson initial configuration, Euclidean distances measures, and Z-score transformations of values. This statistical technique compares a theoretical framework to the observed data, but instead of fixing the relationships between items and latent factors, MDS uses theoretical hypotheses to fix coordinates for the observed data in a multidimensional space (Gouveia et al., 2014a; Jaworska & Chupetlovska, 2009; Sturrock and Rocha, 2000). I followed the steps described in Gouveia et al. (2014a) to specify the expected coordinates that the data should fit (the coordinates replicate the structure shown in Figure 3). Model fit for the MDS was assessed using S-Stress (Jaworska & Chupetlovska, 2009) following the cut-off criteria recommended by Sturrock and Rocha (2000). These authors recommend a cut-off point of .263 when examining a bidimensional model with 18 items (see Sturrock & Rocha, 2000; pp. 57). S-Stress lower than .263 indicates good fit. I also used the Tucker's coefficient of congruence (Tucker's Phi) to examine the model fit, where values greater than .90 indicate good fit (van de Vijver & Leung, 1997). Besides examining the fit of each country one at a time, I also examined the invariance of the structure of values using MDS (Schwartz & Sagiv, 1995). More specifically, I compared the coordinates derived from each country with the coordinates derived from the pooled within-group correlation matrix. For the comparisons, the Generalised Procrustes Rotation (GPA) was applied. Using the GPA was necessary because coordinates derived from different datasets cannot be directly compared (Fischer et al., 2011). The GPA facilitates the comparisons by rotating the two sets of coordinates that are being examined to correspond as closely as possible to each other without affecting the relative distance between points within each configuration. A total fit congruence coefficient greater than .85 represents fairly similar structures, and greater than .95 represents identical structures (Lorenzo-Seva & Berge, 2016).

Confirmatory factor analysis (CFA).

CFA (Robust-ML and Bayes estimators) and Multi-level CFA.

For the second split-half of the data, confirmatory factor analyses (CFA) were tested in Mplus (version 8.4). Single group CFA were estimated using the Robust-Maximum Likelihood (Robust-ML) and the Bayes estimators. While the CFA with Robust-ML is simple to code and apply, the CFA with a Bayesian estimator demands more coding since all the

possible cross-loadings and residual correlations can be estimated through the application of approximate zero prior variation. I followed the recommendations from Muthén and Asparouhov (2010) and Asparouhov, Muthén, and Morin (2015) regarding prior specifications. Three models were tested using Bayesian estimation. The first model specified small variance for the cross-loadings (i.e., .001) but did not estimate residual correlations; this assumes zero residual correlations. For the second model, small variances for the cross-loadings and for the residual correlations were specified. In both models the prior variance of cross-loadings was specified as .001, which allows a 95% credibility interval of $\pm$.06. In this case, it is expected that cross-loadings will fall between -.06 and +.06 in strength. Regarding the variance in the residual correlations, inversed Wishard priors IW (*dD, d*) were specified. For the value of *d*, Asparouhov, Muthén, and Morin (2015) provide guidelines for starting values depending on the sample size. For instance, if the sample has approximately 500 participants, a starting value of 100 is recommended. The third CFA with a Bayesian estimator was similar to the second, but a stricter value of *d* (150) was applied. According to Asparouhov et al. (2015), the value of *d* can be selected in a post hoc manner. In this case, if the starting value of *d* satisfies the model, one can increase this value to examine whether a more strict prior variation yields good fit. The prior variance associated to a *d* = 100 and d = 150 is available in the results section. Values for *D* were residual variances estimated in the CFA analysis with cross-loadings only.

To examine whether the model fit the data satisfactorily, several indexes were considered. For the CFA with the Robust-ML estimator, model fit was examined using CFI (comparative fit index), SRMR (standardised root mean squared residual) and RMSEA (root mean squared error approximation). The guidelines to indicate reasonably good fit are: CFI must be close to .95 (Hu & Bentler, 1999), but values higher than .90 are considered acceptable (e.g., Carlson & Mulaik, 1993); SRMR must be .08 or less; and RMSEA values must be close to .06 or lower (Hu & Bentler, 1999), but a value of .08 is considered acceptable (Browne & Cudeck, 1993). Regarding the RMSEA's cutoff point, Kenny, Kaniskan, & McCoach (2015) highlight that researchers should be careful when interpreting the RMSEA for models with low degrees of freedom to prevent false rejections. These authors observed that even a cutoff of .10 might present false rejections when the degrees of freedom are too low. A threshold of .10 has been used in the literature to indicate acceptable fit (Zemojtel-Piotrowska et al., 2017). Results for chi-square are also provided, but as this fit index is sensitive to sample size (Chen, 2007), it was not used to accept or reject model fit.

For the CFA with Bayesian estimator, the most used indexes to examine model fit are the Posterior Predictive P-value (PPP) and the 95% credibility interval associated with this value. The PPP indicator compares chi-square values of the replicated and the observed data and represents the proportion of the chi-square of the replicated data that is larger than the values of chi-square attributed to the observed data. According to Asparouhov et al. (2015), PPP values should be higher than .05 to indicate acceptable fit, and values close to .50 are considered excellent fit. Regarding the 95% credibility interval, a good fit is indicated when zero is part of the credibility interval (Asparouhov, Muthén, & Morin, 2015; Muthén & Asparouhov, 2010). Besides the PPP and the 95% credibility interval, a new development in the Mplus statistical package (Version 8.4) makes the fit indexes of CFI and RMSEA available for Bayesian estimation. However, as these fit indexes have been implemented for the Bayesian approach only recently, they are used as supplementary information, not as the main criteria to decide the fit of the models. The criteria used to examine the model fit with CFI and RMSEA are the same as reported for the analyses with a Robust-ML estimator. For all the analysis using a Bayes estimator, the minimum number of Markov Chain iterations was 15,000.

Regarding the MLCFA, this analysis was employed after an acceptable fit was found for the CFA in each group individually (Fischer, 2009; Fontaine, 2008). This is because the goal of the MLCFA is to examine whether a given structure that is established at the individual level can be replicated at the between-groups level (Muthén, 1994). The MLCFA has a within part that accounts for individual-level variation (loadings, intercepts, and residuals), and a between part that addresses across-group variation. The same configuration estimated in single-group CFA is estimated simultaneously in the individual and group levels using the same constraints for both levels. The model fit indexes using the MLCFA with Robust-ML and Bayes Estimators are the same as reported for the single-group CFA.

Multiple-group confirmatory factor analysis (MGCFA).

For the models in which a CFA with Robust-ML is successfully estimated, an examination of invariance using the multiple-group confirmatory factor analysis (MGCFA) is applicable (Mplus version 8.4 was used). In this case, three models are estimated to examine invariance. The first model estimates the proposed structure in all countries at the same time without the specification of constraints (configural invariance). The second model applies constraints on loadings to be equal for all the countries (metric invariance), and the third

model specifies constraints on loadings and intercepts (scalar invariance). To examine the metric invariance, a comparison of CFI between models is considered. The literature posits that the difference between the configural and metric invariance on the CFI should not be higher than .010 for the model to be considered metric invariant (Cheung & Rensvold, 2002). However, recent research has provided evidence that this cutoff is too strict for studies considering many groups (Rutkowski & Svetina, 2014). Rutkowski and Svetina (2014) recommend a cutoff of .020 for analysis of invariance with many groups. If metric variance is established, the researcher can examine whether scalar invariance can fit the data. For that, a comparison between the CFI of the metric and the scalar models is performed. The scalar invariance will be satisfactory if the difference between the CFIs is lower than .01 (Cheung & Rensvold, 2002; Rutkowski & Svetina, 2014). When a given measure is only metrically invariant, but not scalar, it can be used in cross-cultural research for correlational purposes only. Comparisons of means are considered meaningless for a non-scalar invariant scale (Cheung & Rensvold, 2002; Fischer & Karl, 2019; Milfont & Fischer, 2010).

The alignment method and approximate Bayesian invariance.

The invariance test using the alignment method and approximate Bayesian invariance was conducted for the full sample. Information about invariance for the full data is relevant for the remaining studies of this thesis since the entire dataset is used to examine the relationship between values and external outcomes. For the alignment method, Asparouhov and Muthén (2014) suggest that a scale can be considered invariant if parameters are invariant for at least 80% of the groups. Also, these authors suggest that the scale can be considered as non-invariant if there is non-invariance for 25% or more of the groups. Regarding the approximate Bayesian invariance, invariance is considered acceptable when the PPP (posterior predictive p-value) is higher than .050 or close to .500 and includes zero in its credibility interval (Muthén & Asparouhov, 2013; Van de Schoot et al., 2013). The software Mplus (version 8.4) was used to perform these analyses.

Results

MDS and GPA.

MDSs were performed for each country one at a time and for the pooled within-sample correlation matrix. Table 7 shows the fit for each MDS performed, and Figure 5

displays the common space plot of the pooled within-sample correlation matrix. Tucker's Phi was greater than .90 and S-Stress was lower than .263 for all the analyses, indicating that forcing the items to adopt the proposed coordinates fits the data well (Gouveia et al., 2014; Sturrock & Rocha, 2000; van de Vijver & Leung, 1997). The Tucker's Phi and S-Stress parameters reported in the present study are comparable with other studies using the same theory of values (Ardila, Gouveia, & Medeiros, 2012; Fischer et al., 2011; Gouveia et al., 2014a) and also with research using Schwartz's model of values (Gouveia et al., 2014b; Schwartz, 1992). In the appendix, a table with the raw stress for each item is provided (Table A1). Results showed a low raw stress for all items except religiosity. Although there was a satisfactory fit for the overall model, the high score of raw stress for religiosity indicates that this item is poorly estimated. To test the invariance of the structure of values found using the MDS approach, GPA analyses were executed. GPA was used to compare the coordinates derived from the pooled within correlation matrix with the coordinates derived from each individual country.[4] As can be observed in Table 7, the total fit congruence coefficient showed values higher than .85 for all countries, indicating that the structure proposed by Gouveia et al. (2014) is fairly equivalent across 20 countries.

[4] Comparisons between the coordinates derived from the pooled within correlation matrix and the individual countries are performed for each country at a time. In this case, as 20 countries were examined, 20 GPA were performed.

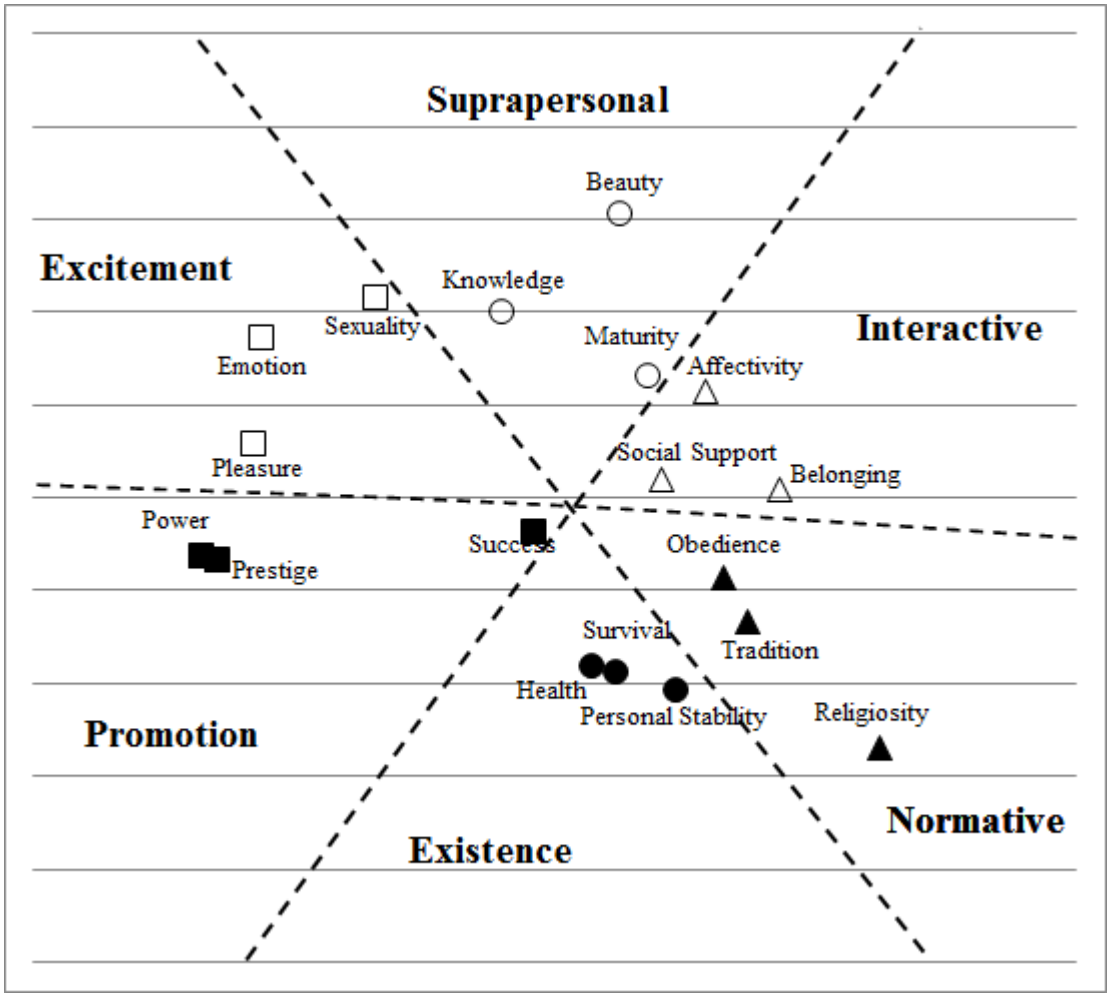

Figure 5. Spatial representation of the marker values from confirmatory multidimensional scaling

Note. Triangles refer to social values, circles to central values and squares to personal values. Black symbols refer to survival values and white symbols refer to thriving values. The plot is based on the pooled within-sample correlation matrix.

Table 7.

Multidimensional scaling and general Procrustes rotation analyses

	Multidimensional Scaling		General Procrustes Rotation	
	S-Stress	**Tucker's Phi**	**Total fit**	**Total Loss**
Pooled within matrix	.187	.969		
Argentina	.195	.965	.981	.018
Brazil	.093	.980	.946	.053
Chile	.224	.969	.968	.031
China	.132	.958	.905	.095
Estonia	.171	.956	.933	.066
Germany	.260	.953	.967	.032
Indonesia	.037	.984	.938	.061
Italy	.196	.964	.949	.050
Japan	.212	.949	.910	.089
Korea	.241	.957	.932	.067
NZ	.190	.967	.973	.026
Philippines	.084	.965	.884	.115
Poland	.152	.977	.967	.032
Russia	.222	.966	.968	.031
Spain	.260	.957	.972	.027
Taiwan	.198	.966	.959	.040
Turkey	.109	.972	.952	.048
UK	.198	.962	.971	.028
Ukraine	.204	.970	.965	.034
USA	.115	.976	.947	.052

CFA with Robust-ML and Bayes estimators.

In the present study, I examined CFAs with Robust-ML and Bayes estimators. When testing the full structure of values (a six-factor model) using the Robust-ML estimator, the model was non-identified for all 20 countries (the correlation matrix was non-positive definite). Detailed examination made it possible to see that the misspecification happened because some of the correlations between latent factors were higher than 1.00. This suggests the need for the specification of cross-loadings. There are different ways to deal with a non-positive correlation matrix. One can make adjustments in the model following modification indices (which can include the addition of cross-loadings and residual correlations), collapse different factors to reduce multicollinearity, eliminate problematic items, or use a different estimation method (Landis, 2013; Sheng, Kong, Cortina, & Hou, 2016; Wothke, 1993).

Although modifications to the model are possible alternatives (e.g., estimation of cross-loadings), research points out that these should be avoided, since the modifications can change the meaning of the factors and bias the interpretation of the results (Fornell & Larcker, 1981). Adding cross-loadings in a short scale like the BVS is even trickier since they will weigh substantially on the new latent factor. Therefore, cross-loadings were not assessed in the CFA analysis with Robust-ML estimator. Excluding problematic items might work if there is a good reason why the excluded item does not fit (Joseph, Ng, Koh, & Ang, 2007), but when short scales are being used, this option is limited. Therefore, the exclusion of items was not employed until all the other alternatives were examined. I then tested whether collapsing subfunctions or using a different estimator (i.e., Bayes estimator) would yield a better fit to the data.

Although collapsing subfunctions is not the best solution based on the Functional Theory of Human Values, alternative structures are worth testing because it might be that the proposed framework makes sense theoretically, but does not work empirically. Gouveia (2003) affirms that the six-factor structure best represents his theory, but models with two factors (thriving and survival needs) and three factors (social, central, and personal goals) are also plausible structures, and they have been tested in previous research (e.g., Gouveia et al., 2010, 2014a; Marques, Silva, & Taveira, 2018; Mohamed, Elebrashi, & Saad, 2018). My results showed that the six-factor structure showed a better fit than the three and two-factor models. When collapsing subfunctions (i.e., adjacent subfunctions were collapsed when testing the three-factor model), although there was no improvement in the model fit (see

Table A2 in the appendix), it was possible to see that the number of countries with a misspecification on the correlation matrix decreased. This suggests that one of the biggest problems in Gouveia's measure is the amount of cross-loadings observed for adjacent dimensions. However, as the more parsimonious models (two and three factors) did not show improvement of model fit,[5] it is likely that residual correlations also play an important role in the lack of model fit.

I examined whether approximate zero cross-loadings and residual correlations would therefore improve model fit. Approximate zero cross-loadings and residual correlations are modelled when using Bayesian estimation. This method has the advantage of estimating a more liberal model without changing the meaning of the latent factors (Asparouhov et al., 2015; Muthén and Asparouhov, 2010). Using Bayesian estimation, I first tested a model with approximate zero cross-loadings (prior variance = .001) but keeping exact zeros for residual correlations. This was to see whether the addition of small cross-loadings would be enough to achieve acceptable fit or whether this addition would improve the model in comparison with the CFA using Robust-ML estimation. Table 8 shows the model fit for the CFA using the Robust-ML (Model 1) versus Bayesian estimation with approximate zero cross-loadings (Model 2). It is possible to identify an improvement in the CFI between the two models, but as the analysis using the Robust-ML showed a misspecification, the CFI is not reliable for this estimator. A positive aspect of the analysis using the Bayes estimator is that the misspecification on the correlation matrix is no longer an issue. Table 10 displays the loadings and cross-loadings for each country using Bayesian estimation and approximate zero cross-loadings. Most of the items loaded strongly on the latent factor they were supposed to belong and most of the cross-loadings fell between -.06 and +.06. However, as the model fit was still non-satisfactory, the most likely reason for the lack of fit is the exact zero residual correlations.

Nevertheless, before examining approximate zero residual correlations, repeating the same strategy employed when examining the CFA with Robust-ML estimation, I examined alternative structures with one, two, and three factors (see Table A3 in the appendix). Although more parsimonious models did not show encouraging results when using the

[5] Besides examining the models collapsing subfunctions, I also examined models keeping the six-factor structure, but adding second order latent factors. I tested models with three, two, and one second order latent factors. Results did not yield acceptable fit and the misspecification on the correlation matrix was still present (see results at Table A5 in the appendix).

Robust-ML estimator, I tested whether using a liberal approach (i.e., approximate zero cross-loadings) would show a better fit for the alternative models in comparison to the six-factor structure. Results showed that the six-factor structure showed the better fit to the data in all cases (see Table 8 and Table A3 in the appendix). However, as the model fit was still non-satisfactory, analyses were examined with approximate zero cross-loadings and residual correlations.

Table 8.

Model fit of the CFA using the Robust-ML and Bayes estimation with approximate zero cross-loadings

	Model 1 MLR estimator				**Model 2** Bayes Estimator Prior = .001 for cross-loadings			
	$S\chi^2$ (120)	CFI	RMSEA	SRMR	PPP	CFI	RMSEA	95% C.I.
Argentina	793.15	.726	.098	.078	.000	.785	.096	634.759, 734.135
Brazil	742.29	.824	.098	.074	.000	.844	.104	753.307, 878.405
Chile	647.61	.759	.096	.081	.000	.823	.090	475.223, 583.915
China	685.42	.848	.095	.090	.000	.900	.088	464.295, 571.182
Estonia	931.85	.740	.109	.096	.000	.797	.108	764.585, 876.730
Germany	775.28	.699	.102	.091	.000	.782	.099	596.319, 706.960
Indonesia	848.30	.830	.107	.138	.000	.902	.095	590.504, 699.935
Italy	801.26	.761	.107	.091	.000	.814	.109	696.590, 807.603
Japan	919.20	.707	.120	.127	.000	.778	.126	909.258, 1019.104
Korea	649.02	.788	.095	.077	.000	.820	.102	600.559, 703.917
NZ	861.06	.695	.103	.091	.000	.785	.097	630.420, 728.490
Philippines	968.53	.782	.116	.088	.000	.837	.114	901.680, 1013.839
Poland	779.21	.734	.103	.112	.000	.796	.105	679.597, 781.401
Russia	860.44	.727	.104	.085	.000	.788	.106	768.749, 883.740
Spain	1029.07	.688	.122	.153	.000	.790	.104	797.777, 916.699
Taiwan	677.29	.827	.094	.076	.000	.851	.104	685.013, 796.763
Turkey	738.19	.805	.103	.081	.000	.824	.110	734.562, 839.989
UK	811.37	.753	.105	.088	.000	.815	.103	639.081, 751.002
Ukraine	838.20	.733	.100	.089	.000	.797	.104	755.264, 877.342
USA	789.18	.755	.099	.085	.000	.817	.094	585.151, 694.580

Table 9.

Model fit of the CFA using the Bayes estimation with approximate zero cross-loadings and approximate zero residual correlations

	Model 3 Bayes Estimator Prior = .001 for cross-loadings and *d*=100 for residuals				**Model 4** Bayes Estimator Prior = .001 for cross-loadings and *d*=150 for residuals			
	PPP	CFI	RMSEA	95% C.I.	PPP	CFI	RMSEA	95% C.I.
Argentina	.389	.997	.020	-46.576, 57.556	.316	.996	.023	-43.242, 68.012
Brazil	.306	.997	.024	-46.146, 73.897	.346	.998	.022	-46.717, 69.089
Chile	.379	.997	.022	-40.079, 63.232	.282	.994	.031	-36.529, 72.951
China	.511	1.000	.000	-51.681, 53.941	.421	.999	.017	-47.530, 54.027
Estonia	.257	.996	.028	-38.801, 75.566	.129	.992	.040	-18.780, 98.744
Germany	.353	.996	.025	-42.276, 66.319	.184	.991	.036	-32.850, 81.734
Indonesia	.390	.999	.020	-45.795, 61.440	.352	.998	.026	-43.854, 71.611
Italy	.274	.995	.029	-39.361, 73.291	.201	.994	.037	-29.956, 83.364
Japan	.269	.995	.030	-33.233, 72.927	.252	.995	.034	-39.010, 69.691
Korea	.370	.998	.020	-43.579, 66.485	.377	.997	.022	-45.136, 64.713
NZ	.334	.996	.024	-41.312, 68.387	.198	.993	.034	-29.803, 79.383
Philippines	.256	.997	.028	-31.561, 77.901	.228	.997	.032	-30.941, 77.405
Poland	.266	.995	.029	-37.057, 69.045	.209	.993	.036	-32.998, 80.600
Russia	.358	.996	.025	-48.281, 71.737	.304	.996	.028	-39.333, 71.944
Spain	.241	.994	.032	-35.000, 80.941	.204	.993	.037	-29.512, 88.405
Taiwan	.310	.997	.026	-38.202, 67.906	.265	.996	.032	-38.900, 72.279
Turkey	.214	.995	.032	-33.093, 80.010	.216	.995	.034	-32.242, 81.439
UK	.361	.997	.023	-41.527, 66.390	.302	.996	.027	-39.139, 71.790
Ukraine	.385	.997	.021	-43.438, 65.953	.321	.996	.028	-48.817, 74.347
USA	.344	.997	.023	-37.826, 64.797	.200	.993	.034	-30.942, 83.731

Table 10.

Loadings and cross-loadings for the CFA with Bayes estimation and approximate zero cross-loadings

	Interactive	Normative	Suprapersonal	Existence	Excitement	Promotion
Belonging	.61*, .59*, .56*, .76*, .68*, .54*, .91*, 69*, .69*, .72*, .64*, .82*, .64*, .61*, .55*, .81*, .74*, .59*, .62*, .63*	.00, -.02, .00, .01, .00, .04, -.02, .01, .00, .01, .01, .00, .02, .05, .01, .04, -.01, .03, .03, .02	-.01, -.01, -.01, -.01, .00, -.01, -.03, -.02, -.01, -.02, -.02, -.02, -.01, -.02, -.02, -.02, -.01, -.01, -.01, -.02	-.02, -.02, -.01, -.01, -.01, -.01, -.04, -.02, -.04, -.02, -.01, -.02, -.01, -.02, -.02, .01, -.01, -.02, -.01, -.01	-.02, .00, -.01, -.01, -.02, .00, -.01, .01, .00, -.01, -.01, -.06*, .00, -.02, .00, -.02, .00, .01, -.02, -.01	.00, .00, .00, -.01, -.01, .01, .00, .01, .00, .00, .00, .00, .00, .00, .00, -.01, .00, .01, .00, .00
S. Support	.65*, .83*, .73*, .79*, .62*, .76*, .75*, .71*, .78*, .73*, .62*, .81*, .73*, .73*, .76*, .77*, .80*, .78*, .75*, .65*	-.01, .00, -.02, -.01, -.01, -.04, -.02, -.03, -.01, -.01, -.01, -.02, -.02, -.03, .00, -.02, .00, -.02, -.03, -.03	.01, .00, .01, .00, -.01, .00, .02, .01, .00, .00, .00, .00, .01, .01, .00, .00, .01, .00, .01, .02	.00, .00, .00, .00, .00, -.01, -.01, .00, .00, .01, .01, .00, .00, .00, .01, -.01, -.01, .01, .00, .00	.01, .00, .01, .00, .01, -.01, .02, .01, .00, .00, -.01, .02, .01, .01, -.01, .00, .02, -.01, .01, .01	.00, .00, .00, .00, .01, -.01, .00, .00, .00, .00, .00, .00, .00, .00, .00, .01, .01, .00, .00, .00
Affectivity	.58*, .71*, .57*, .75*, .53*, .63*, .75*, .68*, .71*, .60*, .47*, .72*, .64*, .63*, .67*, .60*, .76*, .60*, .65*, .55*	-.01, .01, .00, -.02, -.01, -.02, .00, .00, -.01, -.01, -.01, -.01, -.01, -.03, -.02, -.03, .00, -.02, -.01, .00	.00, .00, .00, .01, .00, .00, -.01, .00, .00, .01, .01, .00, -.01, .01, .00, .02, .00, .00, .00, .00	.01, .01, .00, .00, .00, .00, .01, .01, .01, .00, .00, .00, .00, .01, .00, -.01, .01, .00, -.01, .00	.01, .00, .01, .01, .01, .00, -.01, -.01, .00, .01, .01, .02, -.01, .00, .00, .02, -.01, .00, .01, .00	.00, .00, .00, .01, .01, .00, .00, -.01, .00, .00, .00, .00, .00, .00, .00, .01, -.01, .00, .00, .00
Obedience	-.01, -.02, -.02, -.03, -.01, -.01, -.04, -.01, -.02, -.01 -.01, -.04, -.01, -.01, -.02 -.02, -.01, -.01, -.02, -.02	.73*, .94*, .92*, .90*, .83*, .92*, .93*, .89*, .82*, .79*, .86*, .97*, .87*, .78*,1.01*, .85*, .81*, .88*, .88*, .85*	-.01, -.01, -.02, -.03, -.02, -.02, -.04, .00, -.02, -.01, -.02, -.03, -.02, -.01, -.02, -.01, -.02, -.01, -.02, -.02	.00, -.02, -.02, -.02, -.01, -.02, -.03, .00, -.01, .01, .00, -.02, -.01, .00, -.02, -.01, -.01, .00, -.01, -.01	-.02, -.02, -.02, -.01, -.01, -.03, -.01, -.02, -.02, -.02, -.04, -.06*, -.03, -.02, -.03, -.01, -.02, -.02, -.02, -.02	.00, -.01, .00, -.01, .00, -.01, .00, -.01, .00, -.01, -.01, .00, .00, .00, .00, -.01, -.01, -.01, -.01, .00
Tradition	.00, .01, .02, .00, .00, .01, .00, .00, .00, .00, .01, .02, .00, .01, .01, .01, .00, .00, .01, .01,	.65*, .52*, .57*, .80*, .60*, .54*, .82*, .66*, .70*, .58*, .48*, .61*, .68*, .68*, .43*, .76*, .60*, .63*, .55*, .53*	.01, .01, .02, .01, .02, .02, .01, .00, .01, .01, .03, .01, .02, .02, .01, .00, .01, .01, .01, .04	.00, .01, .01, .00, .00, .01, .00, -.01, .00, -.01, .00, .00, .01, .01, .00, .00, .00, .00, .00, .01	.01, .02, .03, .01, .00, .03, .01, .01, .01, .01, .03, .05, .02, .01, .03, .00, .02, .01, .02, .03	.00, .01, .00, .00, .00, .01, .00, .01, .00, .00, .01, .00, .00, .00, .00, .00, .01, .00, .00, .01
Religiosity	.00, .00, .00, .03, .02, -.01, .01, .00, .01, .01, .00, .02, .00, .00, .00, .01, .00, .00, .01, .00,	.32*, .52*, .18*, .18*, .11, .28*, .64*, .23*, .16*, .30*, .40*, .29*, .40*, .29*, .02, .28*, .44*, .31*, .26*, .48*	.00, .00, .00, .04*, .02, .00, .01, -.01, .03, .01, .00, .01, .00, -.01, -.01, .02, .00, .00, .00, -.01	-.01, .00, .00, .01, .00, -.01, .00, -.01, -.03, -.01, .00, .00, -.01, -.02, -.01, -.01, .00, -.01, -.01, .00	.00, .01, .01, .04*, .03, .02, .01, .01, .04, .01, .01, .06*, .01, .01, .02, .02, .00, .01, .02, .00	.00, .01, .00, .02*, .02, .01, .00, .01, .01, .01, .00, .00, .00, .00, .00, .02, .00, .01, .01, .00
Beauty	-.01, -.01, -.01, -.02, -.01, -.02, -.02, -.01, -.01, -.01, -.01, -.02, -.01, -.01, -.01, .01, -.01, -.01, -.01, -.01	-.01, -.03, -.01, .00, .01, -.02, -.02, .01, -.01, -.01, -.01, -.03, -.01, .00, -.03, .03, -.01, -.02, .01, -.03	.61*, .65*, .62*, .80*, .65*, .52*, .78*, .64*, .68*, .63*, .62*, .68*, .59*, .60*, .65*, .72*, .67*, .58*, .62*, .65*	-.01, -.02, -.01, -.01, -.01, -.02, -.03, -.01, -.03, -.02, -.01, -.03, -.01, -.03, -.03, .01, -.01, -.02, -.02, -.01	-.01, .00, -.01, -.01, -.03, -.01, .00, .00, -.01, .00, -.01, .00, -.01, -.01, .00, -.01, -.01, .00, -.02, .00	.00, .00, .00, -.01, -.02, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, -.01, .00, .00, .00
Maturity	.01, -.01, .01, .03, .02, .03, .02, -.01, .03, .01, .02, -.01, .03, -.01, .00, .03, .01, .02, -.01, .04	.01, .03, .05, .04, .02, .04, .03, -.02, .04, .01, .03, .04, .03, -.03, .03, .04, .01, .04, -.02, .07*	.61*, .78*, .59*, .65*, .68*, .63*, .74*, .89*, .59*, .67*, .62*, .83*, .58*, .83*, .80*, .68*, .77*, .69*, .74*, .58*	.01, .03, .02, .03, .04, .04, .05, .01, .09*, .05, .02, .04, .03, .02, .02, .05*, .01, .03, .02, .04	-.01, -.02, -.02, -.01, .00, -.02, -.02, -.02, -.01, -.01, -.02, -.07*, -.03, -.03, -.03, -.02, -.02, -.03, -.01, -.03	.00, -.02, .00, .00, .01, -.01, .00, -.01, -.01, .00, -.01, .00, -.01, -.01, .00, -.01, -.01, -.01, -.01, -.01
Knowledge	.00, .01, -.01, -.01, -.01, -.01, -.01, .01, -.02, .00, -.01, .01, -.02, .01, .00, -.03, -.01, -.01, .01, -.02	-.01, -.01, -.04, -.04, -.05, -.02, -.03, .01, -.03, -.01, -.03, -.04, -.03, .03, -.03, -.05*, -.01, -.03, .00, -.03	.59*, .75*, .71*, .81*, .66*, .58*, .83*, .56*, .76*, .74*, .57*, .61*, .60*, .50*, .58*, .90*, .72*, .67*, .58*, .64*	-.01, -.01, -.02, -.02, -.04, -.02, -.03, -.01, -.05*, -.02, -.01, -.03, -.03, -.01, -.01, -.05*, -.02, -.03, -.03, -.02	.02, .01, .02, .02, .04, .02, .02, .04, .01, .01, .02, .07*, .03, .04*, .03, .02, .03, .03, .03, .02	.00, .02, .00, .01, .02, .01, .00, .02, .01, .00, .01, .00, .01, .01, .00, .01, .02, .01, .01, .00
Stability	-.01, -.01, -.01, -.01, -.02, -.02, -.02, .00, -.01, .01, -.01, -.01, -.01, -.01, -.01, -.01, -.01, -.01, -.02, -.01	.00, .00, -.02, -.03, -.01, .03, -.03, .02, .00, .02, .07*, -.02, .00, .03, .03, -.01, .00, .05*, .01, .03	-.01, -.02, -.01, .01, -.03, -.04, -.01, -.01, .00, -.01, -.02, -.01, -.01, -.03, -.03, -.01, .00, .00, -.03, .00	.65*, .84*, .65*, .75*, .91*, .70*, .88*, .63*, .76*, .79*, .57*, .82*, .69*, .76*, .74*, .83*, .59*, .62*, .81*, .63*	.00, -.01, -.01, .03, -.02, -.03, .01, .03, .01, .00, -.01, .01, .00, -.02, -.01, .00, .01, .02, -.02, .02	.00, .00, .00, .02, .00, .00, .00, .01, .01, .00, .01, .00, .00, .00, .00, .00, .01, .02, .00, .01
Survival	.00, -.01, -.01, -.01, -.01, .01, .00, -.02, -.01, -.02, -.01, -.03, .00, -.01, -.01, -.01, .00, -.01, -.01, -.01	-.02, -.03, .02, .02, -.01, -.06, .00, -.03, -.02, -.02, -.07*, .00, -.02, -.04, -.03, .00, .00, -.04, -.03, -.04	.01, .00, -.01, -.03, .01, .02, -.01, .00, -.02, -.01, .00, -.01, -.01, .01, .00, .00, .00, -.02, .00, -.01	.64*, .84*, .71*, .82*, .71*, .56*, .85*, .86*, .85*, .66*, .63*, .96*, .73*, .79*, .84*, .76*, .82*, .82*, .75*, .68*	-.02, .00, -.03, -.03*, -.01, -.01, -.01, -.03, -.02, -.01, -.02, -.06*, -.02, -.01, -.03, -.01, .00, -.04, .00, -.03	-.01, -.01, .00, -.02, -.02, -.02, .00, -.01, -.01, -.01, -.01, .00, .00, .00, .00, -.01, .00, -.02, .00, -.01
Health	.00, .01, .01, .01, .02, .01, .00, .01, .01, .00, .00, .02, .01, .01, .01, .01, .00, .01, .02, .00	-.01, .00, -.02, -.02, -.01, -.03, .00, .01, .00, -.01, -.03, -.01, .01, -.01, -.03, -.01, -.01, -.02, -.01, -.01	.00, .01, .02, .01, .04, .02, .00, .00, .01, .01, .01, .01, .01, .01, .00, .02, .00, .01, .01, .00	.70*, .64*, .62*, .75*, .46*, .62*, .83*, .67*, .73*, .68*, .58*, .75*, .58*, .61*, .71*, .63*, .81*, .82*, .58*, .75*	.01, .02, .03, .01, .05*, .04, -.01, .01, .01, .01, .02, .05*, .02, .03, .03, .01, -.01, .02, .03, .00	.00, .01, .00, .01, .02, .01, .00, .01, .00, .00, .00, .00, .00, .01, .00, .01, .00, .00, .01, .00
Sexuality	.00, .01, .00, .04*, .01, .01, .04, .02, -.01, .01, -.01, -.03, .02, .02, .00, .02, .01, .00, .02, .00	.00, .03, .02, .06*, .02, .00, .05*, .02, -.01, .01, -.01, -.03, .02, .03, .00, .03, .01, .01, .05, .00	.00, .01, .00, .03, .00, .00, .03, .02, -.01, .00, -.01, -.02, .01, .02, .00, .00, .01, .00, .03, .00	.00, .03, .01, .05*, .02, .01, .05*, .02, -.02, .01, -.01, -.02, .02, .04, .01, .02, .01, .00, .051*, .00	.50*, .61*, .53*, .54*, .51*, .58*, .51*, .49*, .60*, .50*, .54*, .65*, .50*, .55*, .61*, .48*, .39*, .50*, .55*, .49*	.00, -.01, .00, .00, -.01, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00
Emotion	.01, -.01, .00, -.02, -.01, -.02, .01, -.02, -.02, -.01, .01, .01, .01, -.01, -.02, -.01, .00, .00, -.02, .01	.01, -.04, -.02, -.02, -.01, -.02, .01, -.02, -.03, .00, .01, .01, .02, -.01, -.04, -.02, .00, -.02, -.02, .00	.01, -.01, .00, -.01, .01, -.01, .01, -.01, .00, .00, .01, .01, .01, -.01, -.02, .00, .00, .00, -.02, .01	.00, -.03, .00, -.02, -.02, -.03, .00, -.02, -.03, -.02, .01, .00, .01, -.03, -.04, -.02, .00, -.01, -.04, .00	.55*, .55*, .75*, .82*, .78*, .67*, .68*, .74*, .81*, .77*, .70*, .72*, .71*, .61*, .68*, .89*, .81*, .81*, .50*, .68*	.00, .01, .00, .00, .00, .01, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00
Pleasure	-.01, .00, .00, -.01, .00, .03, -.03, .00, .04, .00, .00, .01, -.02, -.01, .01, .01, -.01, .00, .00, .00	.00, .01, -.01, -.02, .00, .05, -.04, .00, .05*, .00, .01, .02, -.03, -.02, .04, .01, -.01, .01, -.02, .00	-.01, .00, -.01, -.01, -.01, .02, -.02, .00, .02, .01, .00, .01, -.02, -.01, .01, .00, -.01, .00, -.01, -.01	.00, .01, -.01, -.01, .01, .05, -.03, .00, .08*, .02, .00, .02, -.02, -.01, .02, .01, -.01, .01, -.01, .00	.59*, .66*, .61*, .56*, .57*, .44*, .75*, .61*, .47*, .56*, .43*, .66*, .67*, .51*, .52*, .36*, .53*, .50*, .51*, .61*	.00, .00, .00, .00, .01, -.01, .00, .00, -.01, .00, .00, .00, .00, .00, .00, .01, .00, .00, .00, .00
Success	.10*, .05*, .07*, .08*, .05*, .07*, .16*, .08*, .07*, .05*, .09*, .14*, .09*, .08*, .09*, .06*, .10*, .09*, .07*, .08*	.09*, .14*, .18*, .11*, .08*, .13*, .19*, .10*, .09*, .06*, .11*, .20*, .09*, .07*, .18*, .07*, .10*, .09*, .10*, .09*	.09*, .05*, .08*, .05, .04, .06*, .13*, .11*, .06*, .06*, .08*, .10*, .07*, .10*, .13*, .02, .07*, .08*, .08*, .08*	.10*, .10.*, .11*, .09*, .09*, .10*, .17*, .10*, .13*, .11*, .06*, .14*, .09*, .13*, .15*, .08*, .08*, .09*, .13*, .07*	.03, -.01, .05, -.02, .00, 03, .02, .01, .05, .03, .05, .09*, .03, .02, .08*, -.02, -.01, .03, .01, .02	.30*, .48*, .17*, .52*, .57*, .46*, .19*, .45*, .32*, .39*, .37*, .20*, .29*, .31*, .12*, .56*, .47*, .43*, .37*, .35*
Power	-.01, -.01, .00, -.04, -.03, -.02, -.01, -.03, -.01, -.01, -.01, -.01, -.01, -.02, .00, -.02, -.02, -.02, -.03, -.02	.00, -.04, .00, -.04, -.04, -.04, -.01, -.04, -.02, -.02, -.01, -.02, -.01, -.02, -.01, -.03, -.02, -.03, -.04, -.02	-.01, -.01, .00, -.02, -.02, -.02, -.01, -.03, -.01, -.01, -.01, -.01, -.01, -.02, .00, -.01, -.01, -.02, -.02, -.01	-.01, -.03, .00, -.04, -.05*, -.03, -.01, -.03, -.03, -.03, -.01, -.01, -.01, -.02, .00, -.03, -.02, -.02, -.042*, -.01	-.01, .00, .00, .01, .00, -.01, .00, .00, -.01, .00, -.01, -.01, .00, .00, .00, .01, .00, -.01, .00, .00	.69*, .65*, .74*, .82*, .73*, .75*, .79*, .82*, .85*, .74*, .90*, .80*, .83*, .76*, .77*, .66*, .76*, .81*, .77*, .70*
Prestige	-.01, -.01, -.01, .01, .00, .00, -.01, .00, .00, .00, -.01, -.01, -.01, .00, .00, -.01, -.02, .00, .01, .00	-.01, -.03, -.02, .00, .00, .00, -.01, .01, -.01, .00, -.01, -.01, -.01, .01, .00, -.02, -.02, .00, .01, .00	-.01, -.01, -.01, .00, .00, .00, -.01, -.01, .00, .00, .00, .00, -.01, .00, -.01, .00, -.01, .00, .00, .00	-.01, -.02, -.01, .01, .00, .00, -.01, .00, .00, .00, .00, -.01, -.01, .00, -.01, -.02, -.01, .00, .01, .00	.00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .00, .01, .00, .00, .00, .00	.70*, .64*, .69*, .69*, .71*, .67*, .82*, .65*, .72*, .75*, .65*, .72*, .70*, .67*, .71*, .62*, .63*, .62*, .64*, .73*

Note. Loadings are highlighted in grey.

I followed the guidelines outlined by Asparouhov et al. (2015) to specify the inverse-Wishart (*dD, d*) prior variation to estimate approximate zero residual correlations. Using a *d* of 100, there was a prior variation of approximately .02 for most of the countries, and the model fitted the data satisfactorily. This prior represents a variation in residual correlations from -.28 to +.28 (see Muthén and Asparouhov, 2010). The value of *d* can be selected in a post-hoc manner (Asparouhov et al. 2015) with greater values indicating stricter prior variation. Increasing the value of *d* to 150 also yields acceptable fit for all the countries (see Table 9), suggesting that the structure of values can be satisfactorily represented in a confirmatory approach when small cross-loadings and residual correlations are estimated. The prior variation for a *d* of 150 showed an averaged prior variation of .005, indicating that the strength of most of the residual correlations fell between -.14 and +.14. Table 11 displays detailed information about the residual correlations for the model with a *d* of 150. If the value of *d* is increased even further to 200, the PPP becomes lower than the .050 cut-off, which represents a non-satisfactory fit (see Table A4 in the appendix). Therefore, a *d* of 150 representing a prior variation around .005 fits the data the best when estimating the residual correlations in the structure of values.

Table 11.

Prior variation of the residual correlations for a d of 150

	Descriptive stats of prior variation				Categorisation of prior variation*								
	Minimum	Maximum	Mean	SD	≤.001	.001-.005	.005-.01	.01-.02	.02-.03	.03-.04	.04-.05	.05-.1	> .1
					1	2	3	4	5	6	7	8	9
Argentina	.001	.021	.005	.004	-	102	38	11	2	-	-	-	-
Brazil	.001	.020	.005	.004	2	92	40	19	-	-	-	-	-
Chile	.001	.026	.005	.004	1	94	43	12	3	-	-	-	-
China	.001	.010	.002	.001	33	116	4	-	-	-	-	-	-
Estonia	.001	.016	.004	.003	8	107	32	6	-	-	-	-	-
Germany	.001	.022	.005	.004	5	94	40	13	1	-	-	-	-
Indonesia	.001	.004	.001	.001	48	105	-	-	-	-	-	-	-
Italy	.001	.023	.005	.004	5	101	33	12	2	-	-	-	-
Japan	.001	.010	.003	.001	-	142	11	-	-	-	-	-	-
Korea	.001	.014	.003	.002	10	125	16	2	-	-	-	-	-
NZ	.001	.026	.005	.004	6	98	34	11	4	-	-	-	-
Philippines	.001	.012	.002	.002	32	107	13	1	-	-	-	-	-
Poland	.001	.017	.004	.003	2	119	25	7	-	-	-	-	-
Russia	.001	.019	.005	.003	3	107	34	9	-	-	-	-	-
Spain	.000	.021	.004	.004	18	91	34	9	1	-	-	-	-
Taiwan	.001	.010	.003	.002	28	109	15	1	-	-	-	-	-
Turkey	.001	.021	.005	.004	-	101	39	12	1	-	-	-	-
UK	.001	.031	.005	.005	3	99	33	13	4	1	-	-	-
Ukraine	.001	.023	.005	.004	-	96	41	15	1	-	-	-	-
USA	.001	.029	.005	.005	-	94	41	16	2	-	-	-	-

* The categorisation of prior variation represents the amount of correlations that fell within each range of prior variation.

Magnifying Glass Strategy.

Besides examining the full structure of the BVS scale, I also examined the structure of values using a different strategy, focused on adjacent dimensions. This is an approach used in the values literature to deal with a lack of acceptable fit when examining the full structure of values scales (Beramendi & Zubieta, 2017; Cieciuch & Schwartz, 2012; Cieciuch et al., 2013; Cieciuch et al., 2014; Knopen & Saris, 2009; McQuilkin, Gardarsdottir, Thorsteinsson, & Schwartz, 2016; Schwartz et al., 2016). This strategy has been referred to as the magnifying glass strategy, and the name is inspired by the fact that the researcher shifts focus from an overall view of the structure of values to take a closer look at the independence of adjacent factors. This strategy does not provide empirical support for the usage of all of the values subfunctions as latent factors in the same model, since it does not examine cross-loadings and residuals correlations between non-adjacent factors. However, it is theoretically useful to examine whether the subfunctions that are supposed to present the highest correlation are independent enough to represent substantively different content. As the analysis examining the full model of values did not show acceptable fit using the Robust-ML estimation, I used the magnifying glass strategy to explore whether the less complex model using the strict CFA yields acceptable fit on adjacent factors.

Tables A6, A7, and A8 in the appendix show the model fit for analysis examining adjacent dimensions. Table A6 shows a two-factor model with the interactive and normative subfunctions, Table A7 shows the suprapersonal and existence subfunctions, and Table A8 shows the excitement and promotion subfunctions. These results showed a decrease in the number of countries that presented misspecification of the non-positive definite matrix (see Model 1 in Tables A6, A7, and A8). However, there were still misspecifications for a considerable number of the countries, especially when testing the models with social goals (interactive-normative) and personal goals (excitement-promotion). I examined the modification indices for each country to check whether there was a particular item impacting on the model fit. For each of the three models, there was one item showing consistent cross-loadings across most of the countries. These items were belonging (interactive), maturity (suprapersonal), and success (promotion). I avoided estimating cross-loadings since these can impact on interpretation of the latent factor (Fornell & Larcker, 1981), but I tested alternative models excluding these items. The three models showed much better fit considering the CFI and SRMR, but results for RMSEA were less encouraging. Finally, to rule out the possibility that the adjacent models were better represented as a single cluster, I examined whether the

two adjacent factors would present better fit if estimated in a one-factor model. Results showed that the two-factor models presented the better fit.

Multiple-group confirmatory factor analysis.

As there was acceptable or close to acceptable model fit for most of the countries when examining the two-factor model (with the deletion of the items of belonging, maturity, and success), I performed a MGCFA to assess invariance. The configural (no constraints), metric (constraints of loadings), and scalar models (constraint of loadings and intercepts) were assessed (see Table 12). Results showed that the difference of CFI between the configural and metric models varied from .011 (suprapersonal-existence) to .018 (interactive-normative). These results are above the criteria of .01 proposed by Cheung and Rensvold (2002), but are below the criteria of .02 proposed by Rutkowski and Svetina (2014) for analyses considering many groups. In this case, metric invariance is achieved only when considering the more liberal cut-off point. Assuming that metric invariance is established with CFI lower than .02, I then examined the difference between the metric and scalar models. Results varied from .131 (suprapersonal-existence) to .298 (interactive-normative) rejecting scalar invariance.

Table 12.

Multiple-group confirmatory factor analysis

	χ2 (DF)	CFI	RMSEA	ΔCFI
Social Goals[a]				
Configural	380.35 (76)	.963	.084	
Metric	582.98 (130)	.945	.078	.018
Scalar	3027.65 (184)	.647	.166	.298
Central Goals[b]				
Configural	294.87 (76)	.974	.073	
Metric	435.77 (130)	.963	.066	.011
Scalar	1593.60 (184)	.832	.120	.131
Personal Goals[c]				
Configural	639.01 (76)	.922	.119	
Metric	810.81 (130)	.905	.100	.017
Scalar	2546.28 (184)	.671	.156	.234

a = Model 2 from Table A6 was tested; b = Model 2 from Table A7 was tested; c = Model 2 from Table A8 was tested.

Multi-level confirmatory factor analysis.

As an acceptable fit for CFA was only achieved for each country when using Bayesian estimation, I assessed a MLCFA using the same estimator. In this case, the six-factor model was examined at the within level with a prior variation of .001 for cross-loadings and with a *d* of 150 to estimate the prior variation for residual correlations. At the between-groups level, the six-factor model was estimated without the specification of cross-loadings and residual correlations. Results showed a PPP above zero, but as it was not higher than .050, the fit is considered unsatisfactory (see Model 1 in Table 13). These results suggest that the model established at the individual level is not replicated at the between-groups level (non-isomorphism). Table 14 shows the loadings and cross-loadings for the within level and loadings for the between-groups level. As can be observed, there are strong loadings for all items in their correspondent latent factors, except for emotion and pleasure at the between level. This suggests that the excitement factor observed at the individual level is not replicated at the between-groups level.

Alternative models with a different configuration at the between level were examined to see whether an improvement in the model fit could be observed. These alternative models were tested because there is an expectation that values will present different configurations with individuals versus with between groups. For instance, Schwartz proposed a model with 10 factors to measure values at the individual level and 7 clusters to measure values at the cultural level (Schwartz, 1992; Schwartz, 1999). It is important to highlight that Schwartz's (1999) recommendations for seven cultural values were not based on MLCFA, but on an analysis using MDS. Table 13 displays the results of the alternative models. I tested models with one, two, and three factors at the between-groups level. The decision to assess these models was not arbitrary, but based on the hypothesis by Gouveia et al. (2014) that values are oriented by three types of goals (Model 2 on Table 13 estimates social, central, and personal goals at the between-groups level) and represent two types of needs (Model 3 on Table 13 estimates thriving and survival needs at the between-groups level). I also tested a model with a single factor to examine whether the distinctions of content based on Gouveia's theory fits the data better than a model with non-distinction of more than one latent factor (Gouveia, 2003, 2013; Gouveia et al., 2014a).

Results showed that the model that fits the data the best is when three factors are examined at the between-groups level (PPP = .012). However, the fit was still non-satisfactory. These findings indicate that the model of values does not work in the same way within and between levels, but they suggest that the model at the between level seems to be better estimated in a more parsimonious way, which goes in the same direction as Schwartz (1999). Nevertheless, a conclusion about the number of cultural dimensions was not achievable using MLCFA. In this case, using country averages of the value subfunctions is not justified.

Table 13.

Multi-level CFA using a Bayesian estimation

	Bayes Estimator cross-loadings (p = .001), residual correlations (d = 100)				
	N factors within	N factors between	PPP	95% C.I.	DIC
Model 1	6	6	.003	35.275, 280.197	552123.761
Model 2	6	3	.012	18.917, 330.571	552125.404
Model 3	6	2	.001	74.366, 822.365	552131.337
Model 4	6	1	.001	77.289, 404.432	552132.649

Table 14.

Loadings and cross-loadings for the within level and loadings for the between level of the MLCFA

	Interactive	Normative	Suprapersonal	Existence	Excitement	Promotion
Belonging	.671*/.868*	.003	-.003	-.001	-.005	-.005
S. Support	.709*/.987*	-.001	.004	.001	.004	.006
Affectivity	.605*/.947*	.000	.001	.001	.003	.001
Obedience	-.001	.742*/.972*	-.002	.000	-.001	-.001
Tradition	.002	.652*/.869*	.004	.002	.005	.004
Religiosity	.000	.366*/.720*	-.001	-.001	-.002	-.001
Beauty	-.003	-.003	.604*/.982*	-.003	-.002	-.003
Maturity	.003	.004	.715*/.956*	.004	.001	.004
Knowledge	.002	.000	.625*/.968*	.000	.003	.001
Stability	.000	.003	-.001	.691*/.877*	-.002	.001
Survival	.000	-.001	.003	.647*/.910*	.002	.000
Health	.003	.000	.003	.657*/.902*	.003	.003
Sexuality	.001	.001	-.001	.000	.540*/.956*	-.001
Emotion	.000	.000	.001	-.001	.565*/.192	.002
Pleasure	.001	.001	.000	.002	.484*/.378	.001
Success	.003	.006	.000	.003	-.004	.763*/.930*
Power	-.003	-.004	-.002	-.003	.002	.423*/.950*
Prestige	-.001	-.002	.000	-.001	.001	.429*/.846*

Note. Loadings for the between level are next to the loadings in the within level (within/between highlighted in grey). There was no estimation of cross-loadings in the between level.

Evidence of invariance using the alignment method and the approximate Bayesian invariance.

Regarding the alignment method and approximate Bayesian invariance, I tested the invariance of each value subfunction one at a time (interactive, normative, suprapersonal, existence, excitement, and promotion). Tables 15 and 16 show the results for the alignment method and Table 17 show the results for the approximate Bayesian invariance. For all the analysis using the alignment method, a fixed alignment was employed. As seen in Tables 15 and 16, most of the items showed invariance for the loadings, which is in line with the previous analyses using MGCFA. Invariance of loadings was observed for the subfunctions of interactive, suprapersonal, existence, excitement, and promotion. When invariance was assessed for the normative subfunction, the model showed a misspecification (the residual covariance matrix is not positive-definite) in five countries (Chile, Estonia, Italy, Spain, and Turkey). I then examined a model for the normative subfunction removing these five countries. For the 15 remaining countries, results showed that only the items of obedience and tradition were invariant in terms of loadings, and none of the items showed invariance of intercepts. The five countries with misspecification seemed to be influenced by the parameters of the item "religiosity," since there was a large residual variance observed for this item across most of the countries. As there were only three items designed for this value subfunction, an alternative model for normative values was not examined. Besides religiosity, the item emotion should be used with caution since it was right on the cut-off point of 25% non-invariance.

In line with the analysis using MGCFA, the alignment method shows a large degree of measurement (non)invariance for intercepts (see Tables 15 and 16). For most of the items there was (non)invariance of intercepts in more than 25% of the countries, suggesting that the items do not achieve scalar invariance. Although there was non-invariance for most of the intercepts, some items in each dimension showed promising findings with non-invariance in less than 20% of the countries. They were social support (interactive subfunction), beauty (suprapersonal subfunction), health and personal stability (existence subfunction), and pleasure (excitement subfunction).

Table 15.

Alignment invariance for interactive, normative and suprapersonal values

Items	(Non)Invariant countries	% (NI)	Fit	R^2
Interactive				
Intercepts				
Belonging	AR BR CL **(CN)** ES **(GE) (IN)** IT **(JP)** KO NZ **(PH)** PL RU SP **(TA) (TU)** UK UR US	35%	-111.768	.56
Social Support	AR BR CL CN ES GE **(IN)** IT JP KO NZ PH **(PL)** RU SP TA TU UK UR US	10%	-75.204	.89
Affectivity	AR BR CL **(CN)** ES GE IN IT JP **(KO)** NZ **(PH)** PL RU SP **(TA)** TU UK **(UR)** US	25%	-85.509	.87
Loadings				
Belonging	AR BR CL CN ES GE IN IT **(JP)** KO NZ PH PL **(RU) (SP)** TA TU UK UR US	15%	-78.438	.46
Social Support	AR BR CL CN ES GE IN IT JP KO NZ PH PL RU SP TA TU UK UR US	0%	-76.683	.47
Affectivity	AR BR CL CN ES GE IN IT JP KO NZ PH PL **(RU)** SP TA TU UK UR US	5%	-67.137	.74
Normative				
Intercepts				
Obedience	**(AR)** BR **(CN)** GE **(IN)** JP KO NZ PH PL RU TA UK UR US	20%	-47.46	.85
Tradition	AR **(BR)** CN GE IN JP KO NZ PH PL **(RU)** TA UK UR **(US)**	20%	-56.95	.29
Religiosity	AR **(BR) (CN)** GE **(IN)** JP **(KO)** NZ **(PH) (PL)** RU **(TA)** UK UR **(US)**	53%	-98.73	.50
Loadings				
Obedience	AR BR CN GE IN JP KO NZ PH PL RU TA UK UR US	0%	-43.94	.50
Tradition	AR BR CN GE **(IN)** JP KO NZ PH PL RU TA UK UR US	6%	-48.05	.00
Religiosity	AR **(BR) (CN)** GE IN **(JP)** KO NZ PH PL RU TA UK UR **(US)**	26%	-58.21	.28
Suprapersonal				
Intercepts				
Beauty	AR BR CL CN ES **(GE)** IN IT JP KO NZ PH PL RU SP TA TU UK UR US	5%	-73.645	.92
Maturity	AR BR CL **(CN)** ES GE **(IN)** IT JP KO NZ PH PL RU SP **(TA)** TU UK **(UR)** US	20%	-85.539	.83
Knowledge	AR **(BR)** CL **(CN)** ES GE **(IN)** IT JP **(KO)** NZ **(PH) (PL)** RU SP **(TA)** TU UK UR **(US)**	30%	-86.182	.89
Loadings				
Beauty	AR BR CL CN ES GE IN IT JP KO NZ PH PL RU SP TA TU UK UR US	0%	-69.213	.38
Maturity	AR BR CL CN ES GE IN IT JP KO NZ PH PL RU SP TA TU UK UR US	0%	-76.394	.51
Knowledge	AR BR CL CN ES GE IN IT JP KO NZ PH PL RU SP TA TU UK UR US	0%	-69.202	.62

AR = Argentina, BR = Brazil, CL = Chile, CN = China, ES = Estonia, GE = Germany, IN = Indonesia, IT = Italy, JP = Japan, KO = Korea, NZ = New Zealand, PH = Philippines, PL = Poland, RU = Russia, SP = Spain, TA = Taiwan, TU = Turkey, UK = United Kingdom, UR = Ukraine, US = the United States.

Table 16.

Alignment invariance for existence, excitement and promotion values

Items	(Non)Invariant countries	% (NI)	Fit	R^2
Existence				
Intercepts				
Per.Stability	AR BR **(CL)** CN ES GE IN IT **(JP) (KO)** NZ PH PL RU SP TA TU UK UR US	15%	-89.589	.80
Survival	AR BR CL CN ES **(GE) (IN)** IT JP **KO (NZ) (PH)** PL RU SP TA TU **(UK)** UR **(US)**	35%	-105.590	.51
Health	AR BR CL CN **(ES)** GE IN IT JP KO NZ PH PL RU SP TA TU UK UR US	5%	-76.041	.57
Loadings				
Per.Stability	AR BR CL CN ES GE IN IT **(JP)** KO NZ PH PL RU SP TA TU UK UR US	5%	-72.603	.56
Survival	AR BR CL CN ES GE IN IT JP KO NZ PH PL RU SP TA TU UK **(UR)** US	5%	-64.319	.93
Health	AR BR CL CN **(ES)** GE IN IT JP KO NZ **(PH) (PL)** RU SP TA TU UK **(UR)** US	20%	-81.345	.40
Excitement				
Intercepts				
Sexuality	AR BR CL **(CN) (ES)** GE **(IN) (IT)** JP KO NZ **(PH) (PL) (RU)** SP **(TA)** TU UK **(UR)** US	45%	-124.880	.32
Emotion	**(AR) (BR)** CL CN ES **(GE)** IN **(IT)** JP KO NZ **(PH)** PL RU **(SP)** TA TU UK **(UR)** US	35%	-114.055	.06
Pleasure	AR BR CL CN ES **(GE)** IN IT **(JP)** KO NZ PH **(PL)** RU SP TA TU UK UR US	15%	-97.129	.56
Loadings				
Sexuality	AR BR CL CN ES GE IN IT JP KO NZ PH PL RU SP TA TU UK UR US	0%	-68.737	.82
Emotion	**(AR) (BR)** CL CN ES GE **(IN)** IT JP KO **(NZ)** PH PL RU SP TA TU UK UR **(US)**	25%	-93.208	.00
Pleasure	AR BR CL CN ES GE IN IT **(JP)** KO NZ PH PL RU SP **(TA)** TU UK UR US	10%	-93.105	.00
Promotion				
Intercepts				
Success	**(AR)** BR **(CL) (CN)** ES GE IN **(IT) (JP)** KO NZ **(PH)** PL **(RU) (SP) (TA)** TU UK **(UR) (US)**	55%	-156.520	.39
Power	**(AR)** BR **(CL) (CN)** ES GE **(IN)** IT **(JP) (KO) (NZ) (PH) (PL) (RU) (SP) (TA) (TU) (UK)** UR **(US)**	75%	-72.789	.94
Prestige	**(AR)** BR **(CL)** CN ES GE **(IN)** IT JP KO **(NZ)** PH **(PL) (RU) (SP)** TA TU **(UK)** UR US	40%	-94.255	.77
Loadings				
Success	AR BR CL **(CN) (ES)** GE IN IT JP KO NZ PH PL RU **(SP) (TA)** TU UK UR US	20%	-103.449	.27
Power	AR BR CL CN **(ES) (GE)** IN IT JP **(KO)** NZ PH PL RU SP TA TU UK UR US	15%	-94.643	.00
Prestige	AR BR CL CN ES GE IN IT JP KO NZ PH PL RU SP TA TU UK UR US	0%	-67.190	.51

AR = Argentina, BR = Brazil, CL = Chile, CN = China, ES = Estonia, GE = Germany, IN = Indonesia, IT = Italy, JP = Japan, KO = Korea, NZ = New Zealand, PH = Philippines, PL = Poland, RU = Russia, SP = Spain, TA = Taiwan, TU = Turkey, UK = United Kingdom, UR =

Regarding Bayesian approximate invariance, invariance was observed for most of the items, except religiosity (see Table 17). As can be seen in Table 17, invariance for the interactive, suprapersonal and existence value dimensions were achieved with a prior of .01. For promotion, the prior had to be increased to .02; for excitement, a prior of .03 was necessary to achieve invariance. For the normative dimension, invariance was not achieved even with a prior of .05. However, the exclusion of the item religiosity improved the fit, and invariance was established with a prior of .01. As the loadings and intercepts are estimated at the same time, these findings suggest a partial metric and scalar invariance for all the subfunctions, except for the item religiosity. Nevertheless, as scalar invariance failed in the MGCFA and alignment methods, these results need to be interpreted with caution.

Table 17.

Approximate Bayesian invariance and intra-class correlation

	Approximate Invariance B [95% C.I.]	ICC per Item B [95% C.I.]
Interactive	Prior (.01) = .099 [-20.12, 91.70]	
Belonging		.075 [.043, .144]
Social Support		.058 [.033, .114]
Affectivity		.074 [.043, .143]
Normative	Prior (.01) =.000 [428.25, 598.24]	
	Prior (.01) = .217 [-25.07, 59.67][a]	
Obedience		.110 [.065, .204]
Tradition		.062 [.036, .121]
Religiosity		.200 [.123, .341]
Suprapersonal	Prior (.01) =.285 [-39.70, 69.33]	
Beauty		.072 [.041, .139]
Maturity		.071 [.041, .138]
Knowledge		.083 [.048, .158]
Existence	Prior (.01) =.100 [-22.27, 94.25]	
Personal Stability		.078 [.045, .150]
Survival		.080 [.046, .152]
Health		.045 [.025, .090]
Excitement	Prior (.01) =.000 [197.54, 349.56]	
	Prior (.03) = .110 [-22.45, 96.24]	
Sexuality		.077 [.044, .148]
Emotion		.075 [.043, .144]
Pleasure		.089 [.051, .167]
Promotion	Prior (.01) = .004 [28.54, 154.18]	
	Prior (.02) = .178 [-29.27, 84.74]	
Success		.088 [.051, .167]
Power		.087 [.051, .166]
Prestige		.086 [.050, .164]

a = The item religiosity was removed from the analysis.

Discussion

The present study aimed to assess the structure and invariance of the six subfunctions (interactive, normative, suprapersonal, existence, excitement, and promotion) proposed by the *Functional Theory of Human Values.* Liberal (MDS, GPA, CFA with Bayes estimator, alignment invariance, and approximate Bayesian invariance) and strict methods (CFA with Robust-ML estimator, MGCFA, MLCFA) were used to examine the psychometric properties of the BVS. This variety of methods was employed because the literature on values has shown inconsistent findings when strict approaches are examined (e.g., Ardilla et al., 2012; Cieciuch et al., 2014; Davidov, 2010; Gouveia et al., 2010; Schwartz & Boehnke, 2004; Schwartz & Butenko, 2014). However, there are more promising findings when more liberal approaches are used (e.g., Bilsky, Janik, & Schwartz, 2011; Fontaine, Poortinga, Delbeke, & Schwartz, 2008; Gouveia et al., 2014b; Koivula & Versalo, 2006; Schwartz, 1994.

The rather more recent CFA with Bayesian estimation (Muthén & Asparouhov, 2010; Asparouhov et al., 2015) has not yet been applied to examine the structure of values, but it has shown to be useful to examine the structure of other variables in psychology (e.g., De Bondt & Van Petegem, 2015; Dombrowski, Golay, McGill, & Canivez, 2017; Fong & Ho., 2014). This method is not as liberal as MDS, or as strict as CFA with a Robust-ML estimator, and is described by Asparouhov et al. (2015) and Muthén and Asparouhov (2010) as a more realistic approach to examining substantive theories. The proposed six-factor structure of values (Gouveia, 2003, 2013) was supported when using both MDS and CFA with Bayesian estimation. These results bring novelty to value research, showing that their structure fits the data in a confirmatory approach if small cross-loadings and residual correlations are allowed. This is different from the approach usually applied in the values literature, in which cross-loadings/residual correlations are estimated in a data-driven approach (following modification indices) and without constraints regarding their strength (Cieciuch et al., 2014; Davidov, 2010). According to Muthén and Asparouhov (2010), there is a large chance of misspecification when one uses modification indices to adjust the model. On the other hand, the approximate zero cross-loadings and residual correlations do not impact on the meaning of the latent factors (Asparouhov et al., 2015; Morin, Arens, & Marsh, 2016; Muthén & Asparouhov, 2010). These techniques therefore represent an important venue to examine complex structures like values (Gouveia et al., 2014a), personality traits (McCrae et al., 1996), and moral foundations (Davies, Sibley, & Liu, 2014), which usually fail to fit strict CFA criteria.

Examining the structure of values with the strict CFA (Robust-ML) and MLCFA was discouraging. Model misspecification was found for all the countries because correlation between latent factors was greater than 1. However, neither collapsing subfunctions nor using second order latent factors improved model fit, suggesting that the problem was not the number of proposed latent factors, but on the existence of cross-loadings and residual correlations. Items did load strongly enough solely on their corresponding subfunctions, but zero cross-loadings and residual correlations did not seem realistic for the model. One way around this problem is using the magnifying glass strategy. This is because the values model seems to display acceptable fit when adjacent factors are examined instead of the full structure. This approach has been applied frequently in the values literature (Beramendi & Zubieta, 2017; Cieciuch & Schwartz, 2012; Cieciuch et al., 2013; Cieciuch et al., 2014; Knopen & Saris, 2009; McQuilkin, Gardarsdottir, Thorsteinsson, & Schwartz, 2016; Schwartz et al., 2016). In this case, if the researcher is interested on examining how central goals are related with external outcomes, they can estimate the suprapersonal and existence subfunctions as latent factors, but the maturity item will likely have to be excluded because of the high cross-loading it has with the existence subfunction.

Nevertheless, the lack of fit for the strict CFA for the full structure of values does limit the methods that can be used with the BVS. For instance, if one is interested in examining a structural equation model (SEM) with values as predictors, estimating the subfunctions as latent factors would result in a misspecified model. In this case, the problem would not necessarily be on the lack of correlations between values and the external outcomes, but from the estimation of the structure of values itself. This is a considerable limitation since structural equation modelling is one of the most robust techniques to examine the relationship between different variables. This problem with the BVS is also the same for the much larger literature using Schwartz values. Therefore, despite Gouveia's claim of parsimony and theoretical contributions, there is quite a long way to go before Gouveia's theory can be considered to have advanced the literature on values beyond Schwartz.

A way that values subfunctions can be simultaneously used is if they are estimated as a manifest variable (mean of items). This approach is less sophisticated and presents relevant limitations, but would not depend on the correct estimation of cross-loadings and residual correlations. This is the way many studies in the values field have assessed the association between values and external outcomes (Araujo et al., 2019; Schwartz et al., 2016; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). It is important to highlight that using manifest

variables does not mean one can ignore factor analysis. On the contrary, evidence of factor analysis still needs to be provided, but it does not need to be a test of the full model (i.e., magnifying glass strategy) (Schwartz et al., 2016; Vecchione et al., 2015), or even a strict CFA (i.e., Exploratory Factor Analysis or MDS). However, if a strict CFA is not provided for the full model, typically, latent variable modelling is not employed (i.e., structural equation modelling).

After finding that the six-factor model of values fits the data when small cross-loadings and residual correlations were allowed, I examined whether the structure found at the individual level could be replicated at the group level. This analysis is relevant because if the model can be estimated at both the individual and cultural levels, the subfunctions could be also used as country-level variables. Although Gouveia (2003, 2013) does not propose an application of his subfunctions as country-level variables, developments in other models of values encourage pursuing this question. For instance, Schwartz proposed a model of values in both the individual and cultural level, each with a different configuration (Schwartz, 1992, 1999). I thus examined the six-factor structure within individuals and between groups. Results suggested that the subfunctions of values as proposed by Gouveia were not replicated at the cultural level. This means that Gouveia's scale is non-isomorphic, meaning that the subfunctions at the individual level are different from the country level. Therefore, one cannot interpret the structure at the between level in the same way Gouveia theorised about each subfunction for the individual level (Fontaine, 2008). Results were slightly better when three factors were estimated at the between-groups level, but as the model fit was not satisfactory, a reliable configuration of values to be used as a country level variable could not be justified.

Finally, analyses of invariance showed evidence that the loadings of the BVS were equivalent across the 20 countries, except for the item of religiosity. GPA showed that the coordinates from every country were identical to the coordinates derived from the pooled-within correlation matrix. Using the alignment method and approximate Bayesian invariance results showed that all the items from the subfunctions of interactive, normative, suprapersonal, existence, excitement, and promotion were metric invariant, except for the item religiosity. When using the alignment method to examine the normative subfunctions, there was a misspecification in five countries that was influenced by high residuals associated to the item of religiosity. Excluding the five countries (namely Chile, Estonia, Italy, Spain, and Turkey), results showed that obedience and tradition were metric invariant, but not

religiosity. Approximate Bayesian invariance was also sensitive to the variation of the item religiosity across countries and showed poor fit when this item was included on the analysis. Once the item religiosity was excluded, the model showed acceptable fit. Metric invariance for all the subfunctions was also found when using the MGCFA with a more liberal threshold for the ΔCFI (<.02) (Rutkowski & Svetina, 2014). However, three items were deleted for the MGCFA models because of a high demand for the estimation of cross-loadings. Scalar invariance was only supported using approximate Bayesian invariance. Although these results for scalar invariance are encouraging, they demand caution since other liberal approaches (i.e., alignment method) did not show the same conclusion. It is also important to highlight that the item emotion was in the threshold (25% non-invariance) to represent a non-invariant item when the alignment method was used. However, as this item showed metric invariance when using the MGCFA and approximate Bayesian invariance, I decided not to exclude it from the remaining studies of the present thesis. Nevertheless, results should be interpreted with caution when using the excitement subfunction.

Conclusion

This study examines cross-cultural validation of the Basic Values Survey (BVS) and its invariance in 20 countries/societies. The data used is especially robust because it is representative of the countries in terms of age, gender, and region (Gil de Zúñiga & Liu, 2017). Also, it includes data from Latin America and Asia, which are often neglected in psychological research (Henrich, Heine, & Norenzayan, 2010). The findings suggest that the six-factor structure proposed by Gouveia (2003, 2013) using the Basic Values Survey is appropriate when liberal methods of factor analysis are employed. Muthén and Aspahouhov (2011) uses the term liberal because it employs a small relaxation on the assumptions to estimate cross-loadings and residual correlations of latent models. Muthén and Asparouhov (2011) affirm that the estimation of approximate zero cross-loadings and residual correlations do not change the meaning of the latent factors, but provides a more appropriate examination of substantive theories like personality and human values. However, Gouveia's model did not fit a strict CFA. In future studies, a refinement of Gouveia's items should be conducted to examine whether a strict CFA can be fitted using a larger item set. Future research can also examine whether the structure proposed by Schwartz (1992) fits the data using the CFA with a Bayesian estimator, and a replication of Gouveia et al. (2014b) could assess whether Gouveia's framework can be fitted with Schwartz data using an approach less liberal than the MDS.

Study 2. Age and gender differences in human values: a 20-nation study

Abstract

This study examines age and sex differences in human values, with GDP, GGI (Gender Gap Index), and individualism-collectivism as culture-level moderators, using representative data for age and sex across 20 countries with substantial cultural variability (N = 21,362). Cross-sectional findings revealed that all values dimensions varied in importance over the life span and that males and females are slightly different across most life stages. Specifically, older adults scored higher than younger adults in values with social (interactive and normative) and central (suprapersonal and existence) goals, whereas values with personal goals (excitement and promotion) showed the opposite pattern. In general, females were higher on social and central goals and males were higher on personal goals. Interactions between age and sex showed that males and females were identical in excitement values when young, and in interactive values when old, but there were significant differences between them in almost all other life stages. There was almost no moderation effect of culture, supporting the lifespan development psychology idea that values reflect a universal pattern of human agency in facing challenges over the lifespan.

Keywords: values, lifespan development, age differences, sex differences, cross-cultural

Introduction

There is a growing body of literature interested in the patterning of values across the life span (Dobewall, Tormos, & Vauclair, 2017; Gouveia, Vione, Milfont, & Fischer, 2015; Milfont, Milojev, & Sibley, 2016; Robinson, 2013; Vecchione et al., 2016). This research has also examined whether such patterning varies as a function of sex (Gouveia et al., 2015; Milfont et al., 2016). The studies have had the common goal of examining the extent to which values vary across the lifespan (Inglehart, 2015; Rokeach, 1973; Schwartz, 1992). However, definitive conclusions in this field are still being developed, including the question of whether there is variability across cultures in how values are patterned across the lifespan for men and women (Dobewall et al., 2017; Fung et al., 2016; Robinson, 2013). In the present research, we examine values across the lifespan in representative samples in terms of age and sex across 20 countries (N = 21,362) with substantial cultural variability (e.g., Brazil, China, Indonesia, USA). We highlight that for some countries there was a limited number of people with age higher than 65, which might limit the interpretation of the results as a representation of the lifespan. Although the patterns of age were somewhat similar to the data provided by the census in each country (see Table 2), some countries differed substantially from the census for the older age groups (e.g., Brazil, Italy, Russia, Ukraine). Therefore, results should be interpreted with caution.

Age differences in human values according to lifespan developmental psychology

In the functional theory proposed by Gouveia, Milfont, and Guerra (2014a), values guide behaviour and express needs. But from the perspective of lifespan developmental psychology (Carstensen, Isaacowitz, & Charles, 1999), values may express different needs, and guide different optimal behaviours as a person develops across the lifespan to meet age-typical challenges. From this perspective, people are understood to adapt to the challenges brought by maturation and aging through a balancing and re-balancing of their pursuit of gains and regulation of losses over time (Baltes, 1987; Baltes, Reese, & Lipsitt, 1980). For instance, Heckhausen, Wrosch, and Schulz (2019) theorise that people adjust their values, expectations, and attributions in accord with prototypical opportunities (and constraints) common in different stages of the lifespan. These adjustments are shaped by both biological (e.g., the physical vitality of youth compared to the health deficits of old age) and socio-cultural (e.g., building up a career and finding a mate in early adulthood, avoiding losses and maintaining close relationships in old age) factors.

Theories of life-span developmental psychology

According to Heckhausen, Wrosch, and Schulz (2010, 2019), a central challenge of development is to learn how to take agency to appropriately regulate goals and motives over the course of a lifespan. While these theorists did not specifically research values, it is clear that part of the process of taking agency is to prioritise different values, encompassing different goals and motives, over the course of a lifetime where opportunities, gains, and losses vary as a function of life stage. For example, all people actively pursue goals, but younger individuals pursue goals that are more oriented towards growth, or the acquisition of developmental gains, whereas older people tend to focus more on maintaining a given state of functioning and avoiding losses. For Heckhausen et al. (2010), young adulthood and middle age is when the individual encounters a peak of opportunities and personal vitality.[6] This characterises a period when the individual is the most active (e.g., seeking a mate, accumulating knowledge and resources, establishing a career), and thus may value goals oriented towards primary control, like self-promotion or stimulation. After middle age, opportunities start declining because of biological and societal constraints, and this prompts the individual to become more selective regarding resource investment, and more effective in dealing with failure. An increase in physical health problems toward the end of life can lead a person to become more socially-oriented towards close and meaningful relationships, perhaps as a means of maintaining secondary control, while self-promotion and excitement goals become less relevant (Heckhausen et al., 2010).

Another major theory is the socioemotional selectivity theory of Carstensen et al. (1999), where a shift between knowledge-related goals (related to achievement) and emotional related goals (related to promotion of well-being) occurs over the course of a lifespan. For these authors, time perspective is the key: the young have a more expansive and future-oriented view, where time is plentiful. Older adults are more present-focused, as they more often view their time as limited, and see relationships with significant others as more precious given this limitation. The future orientation of the young facilitates a focus on gaining knowledge, opening possibilities, and preparing for the future, while the present focus of older adults is driven by the need to maximise their limited time, health, and social relationships. Carstensen et al. (1999) theorise that knowledge-related goals are high during the early years of life and decline gradually over the life course. But when individuals get

[6] Heckhausen et al. (2010, pp. 4) describe an inverted U curve for primary control capacity, with a steep increase during childhood and adolescence, a peak in young adulthood and middle age, and a decrease in old age.

older, their time horizon grows shorter, and obtaining more knowledge and creating more opportunities becomes less urgent. On the other hand, emotion-related goals rise from later adulthood into old age, since social support and emotional goals become more important as people approach the end of life (Carstensen et al., 1999).

These theories are highly relevant for interpreting research on human values. Research has shown that in early life, people are more likely to prioritise values related to egocentric gains and personal achievement (Gouveia et al., 2015; Milfont et al., 2016). This is similar to the focus on knowledge acquisition and preparedness identified by Carstensen et al. (1999), and is compatible with seizing opportunities while they are readily available (Heckhausen et al., 2010). Values related to social goals are also reported to be more important for older people (Gouveia et al., 2015; Milfont et al., 2016), and this is compatible with a focus on loss-avoidance (Heckhausen et al., 2010) and effective emotional regulation (Carstensen et al., 1999). Hence, the aforementioned theories on lifespan developmental psychology are valuable theoretical tools to understand findings on age differences in human values (see a review of the link between lifespan theories and personality traits in Fischer, 2017).

The functional theory of human values

The majority of the studies in this literature have used Schwartz's *Universal Theory of Basic Values* (Schwartz, 1992). However, more recently, the *Functional Theory of Human Values* has offered fresh perspectives on recurrent challenges regarding the structure and function of values, claiming parsimony and clearer theoretical assumptions regarding the constitution of value dimensions (see Gouveia et al., 2014a). Nevertheless, even though these theories show important differences (i.e., the number of dimensions that give structure to values), they overlap in content (Gouveia, Milfont, & Guerra, 2014b; Schwartz, 2014), and this overlap allows studies from one model to serve as the basis for theoretical interpretation using the other (Hanel, Litzellachner, & Maio, 2018). For instance, an empirical study has shown that Gouveia's structure of values fits Schwartz's data, with the difference that Gouveia proposes fewer value dimensions than Schwartz (Gouveia et al., 2014b). Table 18 shows a brief description of each dimension of Schwartz's and Gouveia's models of values (where values that are similar in the two theories are placed in the same row, in accord with empirical findings reanalysing Schwartz's data using Gouveia's model).

Table 18.

Description of Schwartz's and Gouveia's value dimensions

Schwartz's values	Gouveia's Values
Power (1): social status and prestige, control or dominance over people and resources. *Achievement* (2)*:* personal success through demonstrating competence according to social standards.	*Promotion* (1): focuses on material accomplishments and drives successful social interactions and assistance to institutional functioning. Examples are power, prestige, and success.
Hedonism (3)*:* pleasure and sensuous gratification for oneself. *Stimulation* (4)*:* excitement, novelty, and challenge in life.	*Excitement* (2): focuses on physiological needs for gratification and is conductive to producing change, innovation and non-conformity. Examples are emotion, pleasure and sexuality.
Self-Direction (5)*:* independent thought and action-choosing, creating, exploring. *Universalism* (6): understanding, appreciation, tolerance, and protection of the welfare of all people.	*Suprapersonal* (3)*:* represents the high-order needs of aesthetics, cognition and self-actualisation, emphasising more abstract ideas over material needs. Examples are beauty, knowledge, and maturity.
Benevolence (7): preservation and enhancement of the welfare of people with whom one is in frequent personal contact.	*Interactive* (4): represents the needs of belonging, love and affiliation, and emphasises social contact as a goal in itself. Examples are affectivity, belonging, and social support.
Tradition (8): respect, commitment, and acceptance of the customs and ideas that traditional culture or religion provide. *Conformity* (9): restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms.	*Normative* (5): focuses on social rules with a materialistic guiding principle and reflects the importance of preserving one's culture and conventional norms. Examples are obedience, religiosity, and tradition.
Security (10): safety, harmony, and stability of society, of relationships, and of the self.	*Existence* (6): represents the most basic physiological needs and the need for security. Examples are health, stability, and survival.

Note. Dimensions that shows similarities between models according with Gouveia et al. (2014b) are described in the same row. The content of the descriptions were taken from Schwartz (1994) and Gouveia et al. (2014a).

Interactive values (left side of Figure 6) originate from socially-oriented goals, and a humanitarian/idealistic type of need. They represent the needs of belonging to a group and being socially accepted, and include goals such as maintaining relationships and obtaining social support. Normative values have the same type of orientation (social goals), but with materialistic needs as a motivator: they reflect the importance and preservation of group norms, cultural patterns and tradition. People who give high importance to normative values follow societal rules as a means to fulfil survival needs, and tend to be goal-directed to preserve order and maintain social stability (Gouveia, 2003, 2013; Gouveia et al., 2014a).

The six latent factors proposed by Gouveia originate from two theoretical functions of values: (1) to guide behaviour (goal type), and (2) to express needs (motivation type). According to Gouveia et al. (2014a), social/interpersonal, personal/intrapersonal, and central/general are the three types of goals that orient values to guide behaviour. There are also two types of needs that motivate values: humanitarian/idealistic and materialistic/pragmatic. The combination of these two functions of values yields a 3x2 structure with six subfunctions, detailed below.

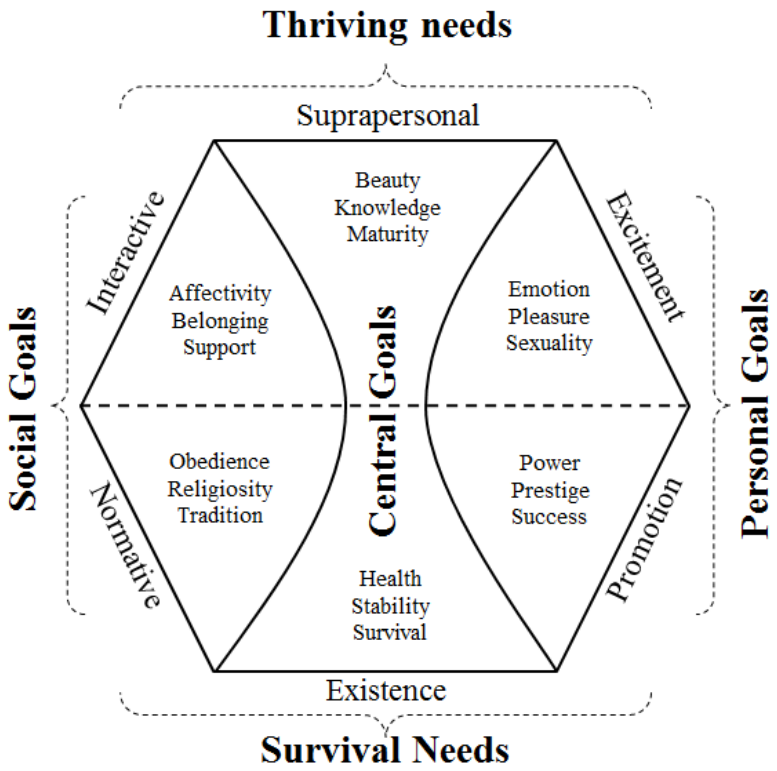

Figure 6. The structure of human values according to the Functional Theory

Note. Continuous lines separate goals and the dashed lines separate needs.

By contrast (see right side of Figure 6), excitement values serve personal/intrapersonal goals, and fulfil needs for emotion, sexuality, and pleasure. Excitement values are often present in youthful risk-takers, and represent humanistic thriving needs rather than survival needs. Also, in line with personal, individualistic goals, but with a more survival-oriented and materialistic motivator, promotion values highlight the importance given to achieving goals, obtaining success and power, and being recognised by one's peers. Promotion values fulfil basic needs for status and achievement (Gouveia, 2003, 2013; Gouveia et al., 2014a).

Finally, at the centre of Gouveia's theoretical scheme are central values, compatible with the whole range of human goals. Suprapersonal values have a humanitarian type of motivator, and represent needs for cognition, maturity and aesthetic thriving. This is common in open-minded people who are willing to absorb different information from their surroundings. Existence values, by contrast, focus on the materialistic component of central values, emphasising basic needs for health, stability, and survival rather than broader, more humanistic needs for growth and thriving (Gouveia, 2003, 2013; Gouveia et al., 2014a).

Values as a function of age

Studies on age differences in values have demonstrated both value stability and evidence of small but meaningful differences regarding the importance of values in different stages of life (Dobewall et al., 2017; Gouveia et al., 2015; Milfont et al., 2016; Robinson, 2013, Vecchione et al., 2016). In general, there seems to be consistency regarding an increase in values of conservation and self-transcendence the older the participant is, using both cross-sectional and short-term longitudinal methods. On the other hand, a decrease in values of openness to change and self-enhancement with age are observed in most cases. It is important to highlight that according to Schwartz (1992), conservation (tradition, conformity, and security), self-transcendence (universalism and benevolence), openness to change (stimulation, self-direction, and hedonism), and self-enhancement (achievement and power) are high order dimensions of values that configure the more specific dimensions described in Table 18.

Schwartz (2005) describes the value priorities that are theoretically expected for different stages of life. He argues that early adulthood should involve concerns with establishing oneself and finding a mate, and this results in an emphasis on the values of promotion and excitement. These patterns are in accord with lifespan developmental theories

where youth is considered to be a period of high opportunity, and when excitement values can be adaptive in guiding exploration of possibilities for development (Heckhausen et al., 2010). Further, at a stage when much effort has to be expended to establish oneself, the value of promotion, with its goals of achievement and gaining status, is consistent with lifespan adaptations that focus on gaining knowledge and preparing for the future (Carstensen et al., 1999).

In mid-adulthood, due to work and family responsibilities, the importance that once was devoted to promotion/achievement and to excitement/stimulation is likely to be shifted to concerns regarding security of the family, stability in the workplace, and certainty that social and governmental institutions will work. These aspects should be conducive to greater importance being given to interactive/benevolence, normative/tradition-conformity, and existence/security values. For late adulthood, a trend is expected towards giving lower importance to promotion and excitement values, and higher importance to interactive, normative, and existence values (see Schwartz & Rubel, 2005). This can be explained by the fact that at this life stage there tend to be more constraints on the enjoyment of life and ability to change career; there is more dependence on social traditions, more of a requirement for stability, and more health-related concerns. This shift in value priorities is in line with theories of lifespan development that predict a decrease in the importance given to achievement/self-promotion, and a greater focus on the regulation of emotion and management of losses in later life (Carstensen et al., 1999; Heckhausen et al., 2010).

Furthermore, the literature reports that greater priority is given to suprapersonal/universal values as individuals age (Dobewall et al., 2017; Gouveia et al., 2015; Milfont et al., 2016; Robinson, 2013; Vecchione et al., 2016). Suprapersonal/universal values emphasise goals and needs larger than the self, often being focused on social issues like tolerance, equality, and social justice (Schwartz, 2005). These map loosely onto issues identified by Erikson's (1982) later psychosocial development stage of generativity versus stagnation. Gouveia (2013) points out that suprapersonal values represent knowledge that comes with maturity and life experience. Sheldon and Kasser (2001) also have reported that maturity, as in being concerned with generativity and ego integrity, mediates the link between age and wellbeing. This type of wellbeing outcome might be more salient for people who are approaching the end of life (Carstensen et al, 1999). Hence, we expect that suprapersonal values will be more prioritised by older people.

Finally, previous research has also investigated linear and non-linear effects of age in human values (e.g., quadratic and cubic). Although the findings converge in similar directions (increase or decrease), the shape of the slope or curve that is reported varies across studies (Dobewall et al., 2017; Gouveia et al., 2015; Milfont et al., 2016; Vecchione et al., 2016). The current research will examine linear and curvilinear effects in an effort to bring some clarity regarding age differences in human values.

Sex Differences in values

Besides age differences, it is also of interest to know whether sex plays a role in values importance and whether this variable interacts with age. We are aware of only two studies that have examined values as a function of age and sex. One of these studies reported an interaction between sex and a linear aging term to predict interactive values, and an interaction between sex and a quadratic age term to predict normative, excitement and promotion values (Gouveia et al., 2015). The other study showed an interaction only for conservation values (Milfont et al., 2016). Even though most published studies have not explored interactions between age and sex, there is a consistent theme in the literature showing that males score higher than females on the values of promotion/power-achievement and excitement/stimulation-hedonism (Schwartz & Rubel, 2005). On the other hand, females tend to score higher than males on interactive/benevolence and suprapersonal/universalism-self-direction values. They also show higher scores than men, though less consistently, on existence/security and normative/conformity-tradition values (Gouveia et al., 2015; Schwartz & Rubel, 2005).

These findings are consistent with either evolutionary theory (Buss, 1998), or social role theory (Eagly, 1987). They are insufficiently exact to permit a "critical test" between the two (see Eagly & Wood, 2011). Rather, the perspectives provided by the two theories can be understood through Gouveia's functional theory (see Figure 6). The most consistent findings in the literature are that socially-oriented goals (see left side of Figure 6), producing interactive and normative values, are accorded more importance by women; and personally-oriented goals (see right side of Figure 6) emphasising excitement and promotion values, tend to be rated as more important by men. This is consistent with an evolutionary theory account (see Schwartz & Rubel, 2005), where sexual selection is theorised to orient men towards promotion values, because the ability to provide resources (acquired through achieving power, prestige, and success) signals that they are desirable mates and good providers (see Buss, 1998). Similarly, asymmetrical parental investment in reproduction is theorised by

Trivers (1972) to lead men (who invest less in pregnancy and parenthood) to prefer casual sex more than women; hence they emphasise excitement values more. These patterns are also consistent with social role theory (Eagly, 1987), where different societal expectations lead men and women to experience different rewards and costs for the same social behaviours. This results in men and women prioritising different values, as they are adaptive for the social roles prescribed by institutions and culture. According to social role theory, the proximal influences on sex differences in values are societal expectations affording men greater opportunities in the workplace and greater freedom in the gender hierarchy. Similarly, there are high expectations for women to fulfil social roles as nurturers, caregivers, and transmitters of moral values within the family (Eagly, Wood, & Diekman, 2000). Social role theory and evolutionary theory thus make similar predictions: men are expected to prioritise values involving personal goals, and women are expected to prioritise social goals.

According to Schwartz and Rubel (2005), a challenge for evolutionary theory is the consistent tendency for women to prioritise universalism/suprapersonal values more than men. These values do not appear to be driven by evolutionary mechanisms of sexual selection or parental investment, but rather accord with a more general, socially inscribed tendency for women to adopt roles as "universal caregivers" and be supporters of high-minded ideals in society. At the other end, women, typically having lower physical strength than men, might also tend to emphasise security/existence values for their own protection (see central vertical axis of Figure 6).

Role of Culture

Finally, an important methodological consideration in this literature is whether a study employs a cross-sectional or longitudinal design. In the present study, we employ a cross-sectional design, where the results may be interpreted as a function of either aging or cohort effects (e.g., Glenn, 1976). Our strategy to focus interpretation of the pattern of results between age and values is to analyse the data using culture as a potential moderator of the relationship between age and values. Because cultures vary significantly in human development (Welzel, Inglehart, & Kligemann, 2003), and are likely to have passed through different historical events and eras over the lifespan of our participants (Liu & Hilton, 2005; Liu et al., 2009), they may capture some of the variance associated with cohort effects.

Studies investigating the influence of culture on the relationship between age and values have typically been conducted using Growth Domestic Product-GDP (Dobewall et al.,

2017; Robinson, 2013; van Herk & Poortinga, 2012) and/or Hofstede's dimension of individualism and collectivism (Fung et al., 2016) as the culture-level moderator(s). Most of these studies were conducted with European samples only. Although cross-level interactions using values as predictors of external outcomes are usually presented in cross-cultural research with clear hypotheses (Davidov, Meulemann, Schwartz, & Schmidt, 2014; Vecchione et al., 2015), studies examining the influence of culture on the link between age and values have been carried out in an exploratory manner only. Perhaps this is because effects have generally been non-significant or very small, suggesting that the patterns of values changing as a function of age are more universal than culture-influenced.

In the present study, we examine the extent to which the effect of age on values varies across countries, and whether this variation can be explained by objective and subjective country-level characteristics. To make our study comparable with previous studies that have examined country-level moderation effects on age differences in values (Dobewall et al., 2017; Fung et al., 2016; Robinson, 2013; van Herk & Poortinga, 2012), we use both GDP and individualism vs. collectivism as country-level moderators. Extending this literature, we also test the effects of a country-level measure of gender equality (the Gender Gap Index) on age- and sex-related differences in human values. This is because social role theory would predict that more gender equality at the country-level should result in smaller sex differences in human values for members of that society (see Eagly & Wood, 1999, p. 416).

Our study has the advantage of including representative data from countries with different cultural backgrounds (e.g., Latin America, Europe, Confucian Asia), and not only from different European countries as in most previous research (Dobewall et al., 2017; Robinson, 2013; van Herk & Poortinga, 2012). In addition, we examine relationships with age according to each value dimension of the *Functional Theory of Human Values*. We believe this is important because collapsing dimensions with distinct content, as it was done in most studies investigating cultural differences on the link between age and values (Dobewall et al., 2017; Fung et al., 2016; van Herk & Poortinga, 2012), may have obscured meaningful effects.

Method

Participants.

The data used in this study was part of the Digital Influence Project. It was collected online in a two-wave panel data design, involving representative samples from 20 countries. Besides multiple psychological constructs, variables from other fields, such as communications, were collected (for further details on the sample and methods used, see Gil de Zúñiga & Liu, 2017). The project was based at the Media Innovation Lab (MiLab; University of Vienna, Austria) and at Massey University (New Zealand). For this study, we used the first wave of data collection (recruited online from September 14-24, 2015; N = 21,362), as human values were not included in the second wave. Data were collected online through Qualtrics, using a panel provided by a media polling company (Nielsen) that partnered with local providers to generate a stratified quota sample (on sex, age, and region) drawn from a massive pool with over 10 million potential participants. Surveys were administered in the dominant language for a given country. Translations were developed through either the committee approach or by back-translation. The average duration for participation was 35 minutes. There was a relatively high response rate (77%) considering the length of the survey. Besides the questions detailed on the measures section, many other topics outside of the scope of the current research were addressed as part of the overall project (e.g., mental health, internet usage, personality traits, etc.). Rewards received for participation varied across countries, as they were determined by the local commercial survey panel provider. A summary of sample characteristics and country-level moderator scores can be found in Table 19. A pairwise missing deletion was used because there was only a small number of missing cases per item on the Basic Values Survey (less than 2%). The data used in this study is the same data used in Study 1, but with a different focus.

Table 19.

Summary of samples and country-level moderator scores

				Country-level moderators		
Country	N	Age (SD)	♀ (%)	GDP	INDCOL	GGI
Argentina	1145	40.8 (14.3)	51.7	22,375	46	.733
Brazil	1086	35.9 (12.0)	49.8	15,690	38	.686
Chile	964	35.1 (13.1)	51.3	23,563	23	.698
China	1005	38.7 (12.0)	44.4	14,189	20	.682
Estonia	1168	47.8 (17.2)	48.8	28,781	60	.794
Germany	1093	45.1 (15.1)	53.9	47,033	67	.779
Indonesia	1080	32.8 (9.8)	39.5	11,111	14	.681
Italy	1041	41.7 (12.2)	55.3	35,664	76	.726
Japan	975	46.7 (12.9)	42.2	38,210	46	.670
Korea	943	38.9 (12.7)	46.7	36,528	18	.651
New Zealand	1157	49.5 (17.3)	56.4	35,966	79	.782
Philippines	1064	34.2 (11.0)	61.2	7,318	32	.790
Poland	1060	42.0 (14.5)	54.0	26,402	60	.715
Russia	1145	38.2 (12.8)	50.9	23,744	39	.694
Spain	1019	41.0 (12.6)	52.6	35,269	51	.742
Taiwan	1008	36.3 (10.9)	50.8	47,407	17	.651
Turkey	961	33.9 (11.0)	44.0	20,276	37	.624
United Kingdom	1064	50.6 (15.6)	54.1	40,958	89	.758
Ukraine	1223	33.9 (9.40)	44.0	7,989	25	.702
United States	1161	49.8 (16.4)	59.5	55,904	91	.740

Note. Age distribution per country is available in the supplementary materials. GDP = Gross Domestic Product based on purchasing-power-parity and current international dollars; INDCOL = Individualism vs. collectivism; GGI = Gender Gap Index. Data for GDP and GGI are from the year of 2015.

Instruments.

Basic Values Survey (BVS; Gouveia, 2003). In this self-reported 18-item measure, participants indicated how important each of the items/values was as a principle guide to their lives on a Likert-type scale ranging from 1 (completely unimportant) to 7 (of the utmost importance) (Gouveia et al., 2014a). For each item/value, two descriptors were given (e.g., "Social Support: to obtain help when you need it; to feel that you are not alone in the world"). In the present research, the item religiosity ("To follow my religion; to participate in the activities of my religion") was excluded because it was not invariant across the 20 countries used in this study (reliability and invariance are reported in the supplementary materials). Sex was coded as 1=Male, 2=Female.

Country level moderators.

Gross Domestic Product (GDP) was based on purchasing-power-parity and current international dollars for the year 2015. We used the data as reported by the International Monetary Fund (https://www.imf.org/external/pubs/ft/weo/2015/02/weodata/index.aspx). In the present sample, GDP per capita ranged between $7,318 (Philippines) and $55,904 (United States); *M* = $28,718, SD = $13,793.

Gender Gap Index (GGI) for the year 2015 was retrieved from the website of the World Economic Forum (http://reports.weforum.org/global-gender-gap-report-2015/rankings). The scores ranged from 0 (*inequality*) to 1 (*equality*). In the present sample, GGI ranged between .624 (Turkey) and .794 (Estonia); *M* = .718, SD = .048.

Individualism-collectivism (Hofstede, 1980) was retrieved from Hofstede's personal website (https://geerthofstede.com/research-and-vsm/dimension-data-matrix/). The scores ranged from 0 (collectivistic) to 100 (individualistic). In the present sample, individualism-collectivism ranged between 14 (Indonesia) and 91 (United States); *M* = 46.4, SD = 24.4.

Data analysis.

Considering the hierarchical structure of the data (individuals and countries), analyses were conducted using multi-level regression models (Hox, Moerbeek, & Schoot, 2017). Prior to performing these regressions, we confirmed that there was variance in the outcome accounted for differences between groups (intra-class correlation coefficients for each value dimension can be seen in Tables 20 and 21). Then, we examined individual-level regressions

in which age differences in human values were tested for the entire sample. The model included the main effects of age and sex, and interactions between age and sex. Age was examined with linear, quadratic and cubic terms. After that, cross-level interactions were examined using GDP, GGI, and individualism-collectivism. To perform the analyses, we used a Bayesian estimator because it does not rely on large-sample theories of normality and is robust for multi-level models with low number or culture-level units (Kruschke, Aguinis, & Joo, 2012; Stegmueller, 2013). For all analyses, regressions were estimated with random intercepts and random slopes. The software Mplus (version 8.4) was used to perform the analyses.

Results

Descriptive statistics and correlations between the variables of interest are reported in supplementary materials. Multi-level regressions examined age and sex, and interactions between age and sex as predictors of human values. Age was examined with linear, quadratic and cubic terms. For easy visualisation of the results, when cubic or quadratic effects were not identified, they were removed from the model and the analyses were conducted again using a less complex model. Tables 3 and 4 report analyses using random intercepts and random slopes.

Multi-level regression: Individual level.

Regression results showed that for all six value dimensions, the linear term of age was statistically different from zero (see Tables 20 and 21). A quadratic age term also significantly predicted the values of interactive, normative, and existence. Interactive, normative, and existence values received higher importance the older the participants were, but the significant quadratic term indicated that age differences were less evident for participants above the age of 40. An inverse linear relationship was found for excitement and promotion values: the older participants were, the less important these values were (see Figure 7). Finally, suprapersonal values showed a positive linear relationship with age.

Table 20.

Multi-level analysis predicting interactive, normative, and suprapersonal values: Individual level effects

	Interactive (ICC = .089)		Normative (ICC = .093)		Suprapersonal (ICC = .106)	
	B	95% C.I	B	95% C.I	B	95% C.I
Fixed Parameters						
Intercept	5.247*	5.081, 5.415	5.264*	5.078, 5.452	5.098*	4.942, 5.254
Level 1						
Sex (M=1/F=2)	.189*	.129, .250	.112*	.066, .159	.120*	.073, .166
Age	.104*	.076, .132	.178*	.149, .207	.050*	.025, .075
Age x Sex	-.029*	-.056, -.001	-.021	-.055, .013	.002	-.023, .027
Age^2	-.017*	-.033, -.001	-.026*	-.041, -.011		
Age^2 x Sex	-.006	-.024, .012	.001	-.018, .020		
Random parameters						
Level 1						
Intercept	.129*	.071, .268	.162*	.089, .335	.113*	.062, .234
Level 2						
Sex	.011*	.004, .030	.003*	.001, .012	.006*	.002, .017
Age	.002*	.001, .006	.003*	.001, .007	.002*	.001, .005
Age x Sex	.001	.000, .004	.003*	.001, .008	.001	.000, .004
Age^2	.001	.000, .002	.001	.000, .001		
Age^2 x Sex	.001	.000, .002	.001	.000, .002		

*parameters which the 95% C.I. did not include zero in the confidence interval and are therefore statistically different from zero. *Note.* The model to examine suprapersonal values was specified as $Y_{ij} = \gamma_{00} + \gamma_{10}(gender_{ij}) + \gamma_{20}(age_{ij}) + \gamma_{30}(age \times gender_{ij}) + \mu_{0j} + \mu_{1j}(gender_{ij}) + \mu_{2j}(age_{ij}) + \mu_{3j}(age \times gender_{ij}) + r_{ij}$. The model to examine interactive and normative values was specified as $Y_{ij} = \gamma_{00} + \gamma_{10}(gender_{ij}) + \gamma_{20}(age_{ij}) + \gamma_{30}(age \times gender_{ij}) + \gamma_{40}(age^2_{ij}) + \gamma_{50}(age^2 \times gender_{ij}) + \mu_{0j} + \mu_{1j}(gender_{ij}) + \mu_{2j}(age_{ij}) + \mu_{3j}(age \times gender_{ij}) + \mu_{4j}(age^2_{ij}) + \mu_{5j}(age^2 \times gender_{ij}) + r_{ij}$.

Table 21.

Multi-level analysis predicting existence, excitement, and promotion values: Individual level effects

	Existence (ICC = .074)		Excitement (ICC = .064)		Promotion (ICC = .106)	
	B	95% C.I	B	95% C.I	B	95% C.I
Fixed Parameters						
Intercept	5.584*	5.442, 5.727	4.770*	4.655, 4.884	4.542*	4.396, 4.686
Level 1						
Sex (M=1/F=2)	.221*	.167, .275	-.157*	-.202, -.113	-.112*	-.156, -.067
Age	.107*	.082, .131	-.045*	-.076, -.014	-.063*	-.092, -.032
Age x Sex	-.017	-.043, .009	-.056*	-.086, -.026	-.012	-.039, .016
Age^2	-.018*	-.034, -.003				
Age^2 x Sex	.001	-.017, .018				
Random parameters						
Level 1						
Intercept	.093*	.051, .193	.060	.033, .125	.098	.054, .202
Level 2						
Sex	.008*	.002, .023	.005*	.001, .015	.005*	.001, .015
Age	.002*	.001, .004	.003*	.001, .008	.003*	.001, .007
Age x Sex	.001	.000, .003	.002*	.001, .006	.001	.000, .004
Age^2	.001	.000, .002				
Age^2 x Sex	.001	.000, .002				

*parameters which the 95% C.I. did not include zero in the confidence interval and are therefore statistically different from zero. *Note.* The model to examine excitement and promotion values was specified as $Y_{ij} = \gamma_{00} + \gamma_{10}(gender_{ij}) + \gamma_{20}(age_{ij}) + \gamma_{30}(age \times gender_{ij}) + \mu_{0j} + \mu_{1j}(gender_{ij}) + \mu_{2j}(age_{ij}) + \mu_{3j}(age \times gender_{ij}) + r_{ij}$. The model to examine existence values was specified as $Y_{ij} = \gamma_{00} + \gamma_{10}(gender_{ij}) + \gamma_{20}(age_{ij}) + \gamma_{30}(age \times gender_{ij}) + \gamma_{40}(age^2{}_{ij}) + \gamma_{50}(age^2 \times gender_{ij}) + \mu_{0j} + \mu_{1j}(gender_{ij}) + \mu_{2j}(age_{ij}) + \mu_{3j}(age \times gender_{ij}) + \mu_{4j}(age^2{}_{ij}) + \mu_{5j}(age^2 \times gender_{ij}) + r_{ij}$.

Regarding sex, women scored higher on interactive, normative, suprapersonal, and existence values, and men scored higher on values of excitement and promotion (see Tables 20 and 21). These values were consistently and significantly different for almost every age group. Differences between men and women were non-statistically different from zero only for ages above 61 for interactive values, ages below 25 for excitement values, and ages above 57 for normative values. Comparisons were calculated using the Wald test for each age.

Interactions between age and sex were identified for interactive and excitement values only, both of them for a linear age term (age x sex). For interactive values, women scored higher than men did at almost every age, but the difference was smaller for older participants. With greater age, there was less importance placed on excitement values (linear effect) for both men and women, but this negative relationship was more accentuated for women (see Figure 7).

Because the values subfunctions were highly correlated with one another, we decided to examine whether an analysis removing the overlap between subfunctions would still yield effects statistically different from zero. For this analysis, we followed the same approach as Chopik, Edelstein, & Fraley (2013), in which they regressed each variable on all the others and saved the residuals. A second analysis used the residualised values as the dependent variables. Thus, correlations between the different values were removed by saving the residualised scores for each value subfunction after it was regressed on all other subfunctions. Results were mostly similar for values with social and personal goals. However, the age effects for central goals became mostly non-statistically different from zero (see supplementary materials). For central values, age differences were observed only for women (an age x sex interaction) on suprapersonal values. The interactions between age and sex for predicting interactive and excitement values (see Tables 20 and 21) remained statistically different from zero only for the later subfunction. Finally, sex differences remained statistically different from zero for all of the value subfunctions, but there was a change in the direction of the relationship between sex and normative values. According to Schwartz & Rubel (2005), the link between sex and values to do with conformity and tradition are the most inconsistent among all values dimensions, where weak results or lack of consistence regarding the direction of the relationship with gender were observed.

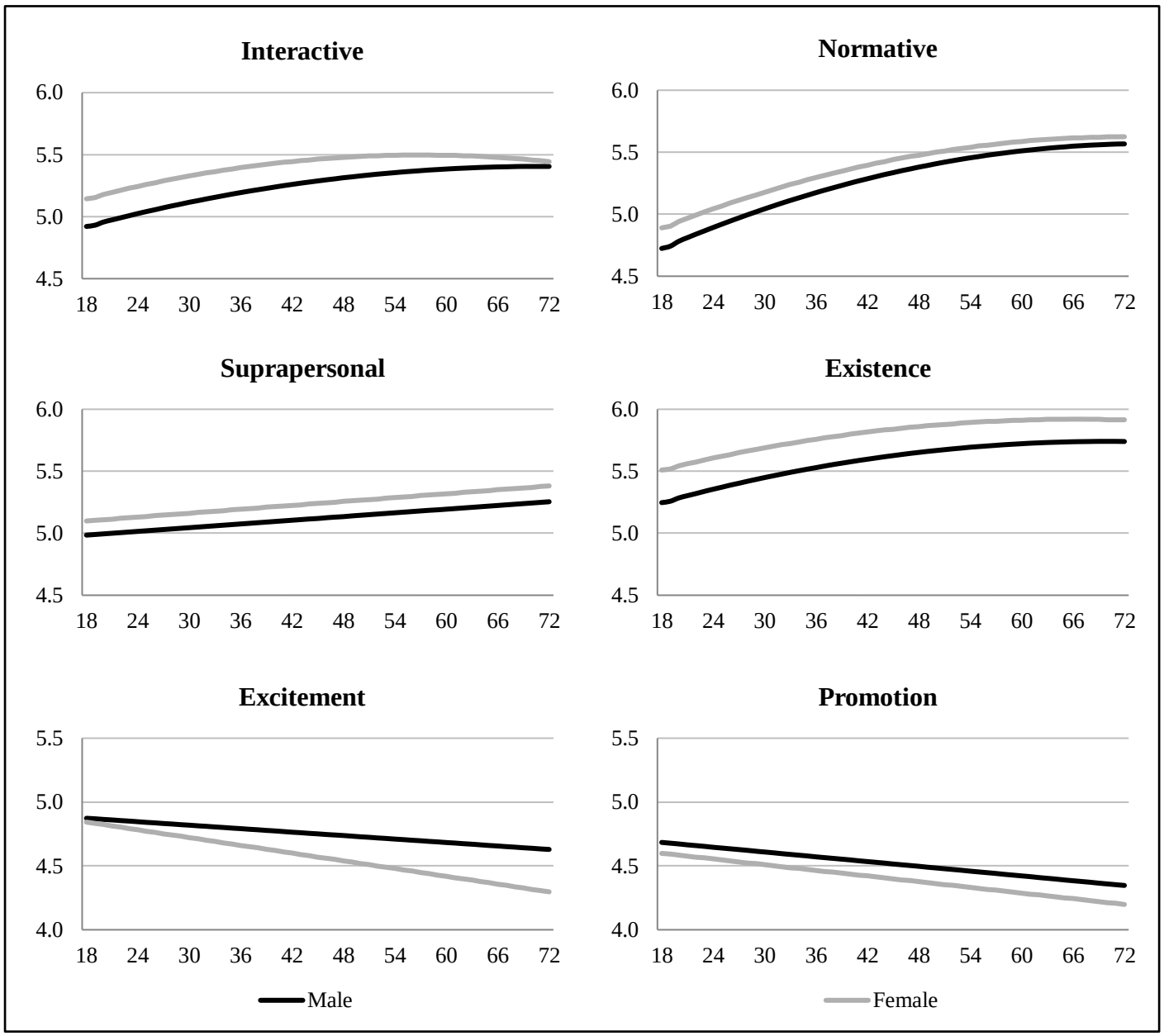

Figure 7. Age and sex differences in human values

Note. The figures are based on the results reported in Tables 3 and 4. The y-axis represents value scores (ranging from 1 to 7) and x-axis represents age.

Multi-level regression: Cross-level interactions.

After examining age and sex differences in human values, we examined whether there were differences in the regressions for different countries. Following previous studies, we examined the effect of GDP, GGI, and individualism on the link between age and values. We also examined the moderation of culture on the prediction of sex and the interaction term between age and sex. As the random effects were statistically different from zero mostly for sex and the linear effect of age, we assessed the moderation of culture only for these two regression coefficients (see Tables 22 and 23). Results showed that the link between age and values was moderated by a country-level variable only for promotion values. More specifically, the negative relationship between age and promotion values was stronger for countries with higher gender inequality and higher scores in collectivism (see row 6, Table 23). Similarities between countries are illustrated in the supplementary materials with analysis conducted for each country one at a time, and displayed in country clusters.[7]

Overall, the lack of many significant cross-level interactions is consistent with other studies examining cultural effects (see Dobewall et al., 2017; Fung et al., 2016; Robinson, 2013). The small random effects identified in the regression equations (see Tables 20 and 21) suggest that the patterns found for age and sex differences in values are more similar than different across countries.

Regarding the predictions of sex (see Tables 22 and 23), a cross-level interaction indicated that the gap between males and females in interactive values was larger in more developed countries (row 5, Table 22), and the gap between males and females with respect to existence values was larger for countries with low gender inequality (row 7, Table 23). These findings are not consistent with the expectations of social role theory, which predicts that smaller sex differences should be found in countries with lower gender inequality.

[7] The positive relationship between age and the subfunctions of interactive, normative, and existence were statistically different from zero for almost all countries analysed individually as in the supplementary materials. Age differences for suprapersonal, excitement, and promotion, and gender differences for all the subfunctions were less consistent, although in the expected direction. However, the examination of hierarchical data is more robust and appropriate using multilevel models as presented in the main text (Hox, 2017).

Table 22.

Multi-level analysis predicting interactive, normative, and suprapersonal values: Country level effects

	Interactive		Normative		Suprapersonal	
	B	95% C.I	B	95% C.I	B	95% C.I
Moderator on Outcome						
GDP	-.211*	-.338, -.085	-.302*	-.422, -.182	-.210*	-.337, -.085
GGI	.041	-.115, .198	-.019	-.204, .165	-.009	-.168, .149
INDCOL	-.076	-.234, .080	-.195*	-.360, -.033	-.108	-.262, .043
Cross-level Interaction						
GDP x Age	-.014	-.042, .015	-.003	-.029, .022	-.016	-.038, .006
GDP x Sex	.053*	.004, .103	.020	-.021, .062	.018	-.030, .067
GGI x Age	-.005	-.033, .024	-.005	-.030, .020	.007	-.017, .030
GGI x Sex	.018	-.036, .072	.020	-.019, .060	.017	-.030, .064
INDCOL x Age	-.005	-.034, .024	-.005	-.031, .020	-.005	-.028, .018
INDCOL x Sex	.042	-.009, .094	.024	-.017, .064	.018	-.029, .066

*parameters which the 95% C.I. did not include zero in the confidence interval and are therefore statistically different from zero. *Note*. Each moderator was examined at a time. The model to examine the cross-level interactions was specified as $Y_{ij} = \gamma_{00} + \gamma_{01}\,(\text{moderator}_j) + \gamma_{10}\,(\text{gender}_{ij}) + \gamma_{20}\,(\text{age}_{ij}) + \gamma_{11}\,(\text{moderator}_j)(\text{gender}_{ij}) + \gamma_{21}\,(\text{moderator}_j)\,(\text{age}_{ij}) + \mu_{0j} + \mu_{1j}\,(\text{gender}_{ij}) + \mu_{2j}(\text{age}_{ij}) + r_{ij}$

Table 23.

Multi-level analysis predicting existence, excitement, and promotion values: Country level effects

	Existence		Excitement		Promotion	
	B	95% C.I	B	95% C.I	B	95% C.I
Moderator on Outcome						
GDP	-.163*	-.277, -.052	-.080	-.189, .028	-.201*	-.314, -.091
GGI	.075	-.053, .200	.057	-.053, .167	-.113	-.248, .021
INDCOL	-.038	-.174, .095	-.040	-.154, .074	-.175*	-.295, -.056
Cross-level Interaction						
GDP x Age	-.022	-.045, .001	-.024	-.054, .006	-.015	-.043, .013
GDP x Sex	.035	-.011, .081	-.026	-.073, .020	-.003	-.048, .043
GGI x Age	-.009	-.033, .015	-.019	-.048, .012	-.036*	-.057, -.013
GGI x Sex	.043*	.002, .085	.009	-.039, .056	-.031	-.071, .010
INDCOL x Age	-.017	-.041, .006	-.035	-.061, -.009	-.036*	-.058, -.015
INDCOL x Sex	.039	-.005, .083	-.032	-.078, .013	-.025	-.067, .017

*parameters which the 95% C.I. did not include zero in the confidence interval and are therefore statistically different from zero. *Note*. Each moderator was examined at a time. The model to examine the cross-level interactions was specified as $Y_{ij} = \gamma_{00} + \gamma_{01}\,(\text{moderator}_j) + \gamma_{10}\,(\text{gender}_{ij}) + \gamma_{20}\,(\text{age}_{ij}) + \gamma_{11}\,(\text{moderator}_j)(\text{gender}_{ij}) + \gamma_{21}\,(\text{moderator}_j)\,(\text{age}_{ij}) + \mu_{0j} + \mu_{1j}\,(\text{gender}_{ij}) + \mu_{2j}(\text{age}_{ij}) + r_{ij}$

Discussion

The present research had two main goals: (1) to examine age and sex differences in human values, and (2) ascertain whether these patterns varied across cultures, and in accord with moderators. Focusing on the first goal, findings supported the idea that the importance individuals give to values differs across life stages. Despite some existing theoretical assumptions that values become stable after early socialisation (Hofstede, 2001; Rokeach, 1973), our findings were in line with more recent literature reporting small but significant variations across the course of life (Dobewall et al., 2017; Fung et al., 2016; Gouveia, Vione, Milfont, & Fischer, 2015b; Milfont et al., 2016; Robinson, 2012; van Herk & Poortinga, 2012).

The most important patterns found were consistent with theories of lifespan developmental psychology (Carstensen et al., 1999; Heckhausen et al., 2010). We found that across cultures, for both men and women, older age is associated with greater importance given to values with social goals (interactive and normative), and lesser importance given to values with personal goals (excitement and promotion). This is consonant with the idea that people at different stages in life face different challenges, for which different values are adaptive. The fact that younger people on average scored higher on excitement and promotion values across cultures is consistent with the idea that the goal orientations underlying these can be helpful in building a career (e.g., promotion) and finding a suitable mate and other interaction partners (e.g., excitement). As an individual gets older, it becomes agentic for them to orient toward social goals, since they are likely to have family-related responsibilities (see Schwartz, 2005) and greater engagement with community and governmental institutions (Liu, Milojev, Gil de Zúñiga, & Zhang, 2018). Normative and interactive values are adaptive in facing these types of challenges. Furthermore, the more limited time horizons that come with aging induce a shift from gain-oriented goals and needs to more loss prevention-oriented goals and needs related to emotions and emotional regulation (Carstensen et al., 1999; Heckhausen et al., 2010).

Less empirically robust (results were statistically different from zero only when the overlap between subfunctions was not controlled) but nevertheless theoretically relevant patterns were found for suprapersonal and existence, the "central values" – higher levels of these values were associated with older age. Gouveia (2013) theorised that central values should be positively correlated with all other values, so his theory would probably not be disturbed by this finding. However, researchers interested in apportioning variance in the

relationship of values to other variables should exercise caution when it comes to central values.

For the association of aging with suprapersonal values, there is an expectation that people will focus on growth/thriving needs as they age, having dealt with challenges, and having become more mature (Erikson, 1982; Gouveia, 2013). In addition, seeking stability and managing the deterioration of health later in life explains the greater importance of existence values found with older people here (Carstensen et al., 1999; Heckhausen et al., 2010; Schwartz, 2005). These patterns are consistent with the literature on age and values (Dobewall et al., 2017; Gouveia et al., 2015; Milfont et al., 2016; Robinson, 2013, van Herk & Poortinga, 2012, Vecchione et al., 2016). However, the previous studies that reported consistent age differences in suprapersonal/universalism and existence/security values did not perform analysis controlling for the overlap between values.

Regarding sex differences in values, the overall patterns were striking in their regularity across different life stages. Men generally rated excitement and promotion values as more important than women, and the opposite was true for interactive and normative values. These sex differences are consistent with evolutionary accounts (Kenrick & Keefe, 1992) that predict invariance across cultures. We did not find the predicted cross-cultural moderation of sex differences by country-level gender inequality, as would be expected from social role theory. The small number of countries in this study (20) might be responsible for this latter outcome, as Eagly and Wood (1999) found significant country-level correlations in their 37-culture study (albeit using less rigorous statistical methods than those employed here).

Finally, we investigated whether the patterns found for age and sex differences in human values were moderated by culture. We replicated the recent literature reporting little to no variability in the patterns of age differences in human values across cultures, using a wider sample of countries than those employed by Dobewall et al. (2017); Robinson (2012); and van Herk and Portinga (2012). We are aware of only one previous study that used samples from more than one continent (Fung et al., 2016). Using a broad sample of countries, including those from Asia, South America and the Middle East, we found similarly weak country-level effects. These weak effects for culture weaken the narrative that the value priorities of different age cohorts are a function of historical events, because participants in our samples experienced a vast array of different culturally significant historical events in

their lifetimes (e.g. Indonesia was not an independent state until 1949; Brazil, Argentina and Chile experienced coups and military dictatorships at different times in the 2nd half of the 20th century; NZ and the USA were relatively stable politically over the same time period). The cross-cultural patterns found strengthen the narrative that values assume different importance depending on life stage more than on historical circumstances, and that the challenges, social roles, and expectations people face in these life stages are relatively consistent for different industrialised (or industrialising) countries (Baltes, 1987; Erikson, 1982).

In addition to these main findings, we also examined the less well-understood phenomenon of non-linear relationships between age and values, and sex differences in human values. Previous research has suggested that there might be quadratic and cubic effects of age on values (Gouveia et al., 2015; Milfont et al., 2016). However, results were inconsistent across the two previous studies. We also found similar overall patterns for the linear positive and negative relationships between age and human values as Gouveia et al. (2015) and Milfont et al. (2016), but we did not replicate the curvilinear effects they reported. We found quadratic effects for the values encompassing interpersonal goals, interactive and normative: both of these showed higher scores for older people that levelled off towards an asymptote later in life (after 40). There was a similarly significant quadratic term for existence values. These curvilinear relationships might be theoretically important, as they suggest that values may change until a certain point in the lifespan and then crystallise (Costa & McCrae, 2006) but at a later age than previously theorised. For normative and existence values, this crystallisation appears to take place as people hit their 50s. These findings, unlike the others we have reported, are preliminary. There appears to be little consensus in the literature, possibly for methodological reasons. For instance, Gouveia et al. (2015) reported cubic effects, but their sample was heavily skewed towards younger participants, and had few older participants, so they might have found an unreliable cubic effect. Milfont et al. (2016) used a much smaller sample than ours, but it was longitudinal rather than cross-sectional. Future studies are needed to better clarify non-linear age differences in human values.

The take home message of the present research, however, is clear. The priority given to different values varies across the human lifespan, with excitement and promotion values (personal) less prioritised, and interactive and normative values (social) more prioritised with advancing age. Across most stages of adult life, men placed more emphasis on personal values, and women more emphasis on social values. The consistency of these findings across 20 cultures suggests that continued dialogue and interplay between lifespan development

theories and theories of human values will offer significant opportunities for research advancements in the future.

Chapter 3. Values function to predict political outcomes

Chapter 3 is focused on the correlations between values and external outcomes. Two papers will demonstrate how the subfunctions of the Functional Theory of Human Values are related with political participation (Study 3) and carbon emission concerns (Study 4). The first paper attempts to show a comprehensive view of how values, social capital, and political participation are related. The literature on values has shown that there is a relative distance between an abstract construct like values and more palpable constructs such as intentions or behaviours (Bardi & Schwartz, 2003), and researchers have argued that comprehensive hierarchical models are important to better understand the mechanisms to guide behaviours (Homer & Kahle, 1988). Also, this research aims to show how a more parsimonious set of values can predict external outcomes that have been investigated often in the literature.

The second paper is focused on the link between values and environmental concerns. This is the first attempt to use multi-level models with the *Functional Theory of Human Values.* Testing robust statistical approaches is useful to show whether the more parsimonious set of values shows similar results to the ones currently reported with a more complex configuration of values. In this study, we advance research by examining competing effects between values and SDO in predicting environmentalism. The literature has shown that values and SDO are strongly related to each other (Cohrs, Moschner, Kielmann, Maes, & Moschner, 2005) and that both are important predictors of environmental outcomes. Using both constructs in the same model will reveal whether there is multicollinearity and whether each construct has an independent relationship with environmentalism. The measure of environmentalism that I use is also innovative because it focuses attention on the guidelines from the IPCC (2014) that acknowledgment of the human impact on the environment and international collaboration are the key aspects for large scale changes on public policies around the world to fight climate change. These ideas have not been researched much yet.

Study 3. Values, Social Capital and Political Participation: A path analysis across 20 countries

Abstract: We examined a structural equation model that flows from human values through social capital to political participation, using cross-sectional representative data from 20 countries (N = 21,362). Indirect effects confirmed that social capital is a mid-range variable that bridges human values (highly abstract) and political participation (more concrete). We used different modalities of social capital to derive specific hypotheses. Social capital offline was nourished by the value orientation of social goals; social capital online was predicted by personal goals, and reflection on conversations was preceded by suprapersonal values. All forms of social capital predicted different forms of political participation. Overall, results demonstrated a plausible process through which values operate via social capital to influence people to be more politically active.

Keywords: Human values, social capital, political participation, voting, cross-cultural study

Introduction

Several reasons might lead people to act politically (e.g., the demand for improvements to their communities, or the urge to combat corruption), and this kind of behaviour can be an efficient vector for changes in the structure of societies (e.g., massive protests influenced the impeachment of the Brazilian and South Korean presidents in 2016). However, not everyone is politically active (Putnam, 1995, 2000), and even when political actions do not necessarily expose the individual to risk (e.g. voting), many people still prefer not to engage (Caprara, Vecchione, & Schwartz, 2012). To understand these individual differences, some scholars have addressed the relevance of involvement in community (social capital; Fukuyama, 1995), and others have investigated the role of axiological principles to explain political participation (human values; Vecchione et al., 2015). In the current research, these two variables are employed to delineate plausible pathways to political participation across cultures.

Social capital has been often considered as a concept that embraces community actions. Putnam (1995) and Fukuyama (1995) define this construct as the establishment of norms and relations of trust that enable people to act together in a more effective way to pursue shared interests. This social integration seems to create a sense of support that makes people more resilient in the face of community problems, and more concerned about the

welfare of others in their orbit (Aldrich & Meyer, 2014), which can lead them to be more preoccupied with politics in their society (Bevelander & Pendakur, 2009; Gil de Zúñiga, Jung, & Valenzuela, 2012). In a study conducted by Gil de Zúñiga, Barnidge and Scherman (2016), it was found that social capital predicts political participation online, offline, and in voting behaviour. This link between social capital and political variables has also been documented by others (Albarracin & Valeva, 2011; Jackman & Miller, 1998; Klesner, 2007; Teorell, 2003), but little is known regarding the psychological mechanisms that precede such relational involvement. The current research brings in human values to add a cognitive-motivational explanation for why people create bonds with certain groups and maintain certain social networks, and how all these contribute to political participation.

Human values incorporate cultural mechanisms and personal experiences, being defined as a guide for people's behaviours, and as a psychological mechanism that expresses their needs (Gouveia, Milfont, & Guerra, 2014; Schwartz, 1992). However, values are highly abstract variables that vary across cultures, hence the theoretical distance from values to behaviour is large and their relations should therefore be indirect. This methodological issue has been well documented regarding values, attitudes, and behaviour (Ajzen & Fishbein, 1977; Bardi & Schwartz, 2003). In order to deal with this distance, researchers have suggested building more comprehensive mediational models (Homer & Kahle, 1988; Sotirovic & McLeod, 2001; Schwartz, Caprara, & Vecchione, 2010). In this article, we propose a cognitive-motivational explanation where values provide content about social relations, and these directly impact on behaviour. We argue that human relations in the form of social capital turns values into a more palpable condition that enables this construct to fulfill its function of guiding behaviour. We advance this topic by presenting coherent set of mediational paths replicable in several countries using cross-sectional and representative survey data.

Literature review

Human Values.

Values can be defined as "concepts or beliefs that pertain to desirable end states of behaviours, transcend specific situations, guide the selection or evaluation of behaviour and events, and are ordered by relative importance" (Schwartz, 1992; pp. 4). This construct has held a central role in social psychology due to its ability to absorb cultural and personal experiences to assist people in making decisions, to link them to political or religious

ideology, and to guide them to present themselves appropriately in society through a process of social comparison (Rokeach, 1973). Indeed, this construct has brought contributions to a better understanding of attitudes, intentions and behaviour in several domains (Davidov, Meulemann, Schwartz, & Schmidt, 2014; Maio & Olson, 1995). For instance, human values can be used to explain community engagement (Schwartz, 2007) and political participation (Augemberg, 2008; Caprara, Schwartz, Vecchione, & Barbaranelli, 2008; Caprara et al., 2012; Vecchione et al., 2015), which together are the focus of the present research. Following many theories that have already been developed on values (Rokeach, 1973; Schwartz, 1992), a parsimonious and theory-driven model was proposed by Gouveia (1998, 2003, and 2013). Given its functional aspects and the advantages these provide in terms of predicting pathways to action, this theoretical framework will be adopted in this paper to guide hypothesis generation, described as follows.

Gouveia's framework.

According to Gouveia, various demands from society lead to a functional and integrated set of values that act cognitively together in a certain configuration to (1) guide actions (Gouveia et al., 2014; Rokeach, 1973; Schwartz, 1992) and (2) express needs (Inglehart, 1977; Maslow, 1954). In Gouveia's (1998, 2003, 2013) framework, the first function outlines a theoretically derived structure of goals that serve to provide three types of orientation (personal, central, and social) that guide human behaviour (Gouveia et al., 2014). The second function is characterised by two levels of needs that represent a humanitarian (thriving needs) or materialistic focus (survival needs). The combination of these functions generates a three-by-two framework, which generates six subfunctions (interactive, normative, suprapersonal, existence, excitement, and promotion), as seen in Figure 8.

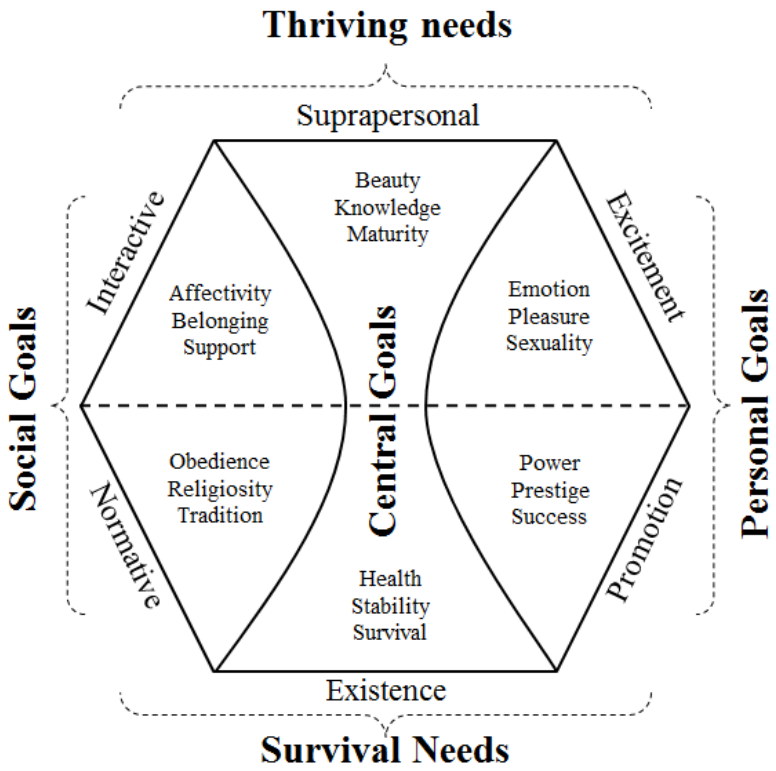

Figure 8. The structure of human values according to the Functional Theory

Each one of the generated subfunctions embraces different content that is shared with the others in different degrees. Gouveia (2013) postulates that the subfunctions of excitement and promotion combine to form highly congruent personal goals, and the same applies for the interactive and normative subfunctions: both of them can be considered to combine to form social goals. These combinations are possible because the goals these subfunctions share are compatible; they are logically related. For instance, it is expected that people who score high on the interactive subfunction will also give more importance to values that compose the normative subfunction than they would give to values involving promotion or excitement (see Figure 8).

Regarding the central goals, the subfunctions that compose this type of orientation cannot be understood in terms of levels of congruence, because their role is to provide a frame of reference for all the other subfunctions (Gouveia, 2013). The values that compose the central goals are more heterogeneous than the values that compose the social and/or personal goals. While the subfunction of existence represents the reference point for a wide range of survival needs, the suprapersonal subfunction serves as guidance for thriving needs (for more details about each of the six subfunctions see Gouveia et al., 2014, and Gouveia,

Milfont, Vione, Santos, 2015), which are a distinctly different set of needs. With that in mind, we describe next what we expect to be the contribution of values in understanding the formation of social capital and in driving political participation.

Social goals are composed by the interactive and normative subfunctions, which represent involvement in society through affiliation to established networks, such as religious groups, neighborhood associations, and social networks in general (Gouveia, 2013). Established social relations provide a system of restraint to new initiatives because the individual is trying to fulfill the goal of remaining true to significant others. This set of values thus represents people who are less open to new experiences and are more guided by their values to endorse and maintain pre-existing relationships and meaning (Schwartz, 1992; Vilar, Araújo, Coelho, Granjeiro & Gouveia, 2017). Because of these characteristics, it is expected that social goals will be strongly related to face-to-face interaction in communities. Schwartz (2007) suggests that these values support being concerned about caring for others and fulfilling interpersonal obligations; following this idea, we argue that social goals can motivate people to engage with their communities and to act politically in favor of collective endeavours (Gouveia, 2013).

Personal goals, on the other hand, are composed of excitement and promotion subfunctions, which are related more to individualism (Gouveia, 2013; Schwartz, 1992). According to Bagchi, Udo, Kirs, & Choden (2015), these values encourage people to follow their own interests and curiosities, which may lead them to explore the world of social interactions online. Thus, people high in personal goals will be more likely to participate in community through exciting and open platforms, including those online. As the internet is a dynamic environment open to numerous possibilities in the way people communicate and get news, we expect that personal goals will lead people to connect with others to form on-line communities that potentiate new social actions (Bagchi et al., 2015). In addition, the emphasis of personal goals on autonomy and freedom of expression might push people to engage in civic and political activities as a mode of self-expression and empowerment (Vecchione et al., 2015). Thus, personal goals are expected to work through social capital online to predict political participation online and offline as both these forms of participation may represent sources of excitement. However, research on the relationship between values and voting has shown that non-voters tend to be higher in personal goals than voters (Caprara et al., 2012). Also, Caprara, Schwartz, Capanna, Vecchione and Barbanelli (2006) and Caprara et al. (2012) showed that personal goals do not predict political choices like voting, and count little for the explanation of ideological self-placement (Caprara et al., 2017).

Because voting is a private activity typically involving little or no public exposure or risk in established democracies, we expect that personal goals will not affect voting.

Suprapersonal values, by contrast, have an idealistic motivator, which guides people more universally to care for the welfare of others and to act selflessly (Vecchione et al., 2015). Such values help people to categorise society in a meaningful way, providing clarity and stability in one's life (Gouveia et al., 2015). This self-transcendent phenomenon seems to make people more self-critical, both about themselves and their society, which might lead them to reflect more about their own actions and to be more aware about social issues. They might consider voting a civic duty, and become politically active as a way to fight for the welfare of others (e.g., defending liberal policies – see Vecchione at al., 2015). For instance, Caprara et al. (2012) found that centre-left voters place high importance to suprapersonal values. According to Welzel (2010), self-expression values such as suprapersonal values imply a basic sense of human equality and they might be conducive to civic behaviours like altruism and collective action in favour of shared benefits (Welzel, Inglehart & Deutsch, 2005). As political participation for common good addresses self-reflection about humanitarian issues, such as social justice and equality, we expect that reflection on conversations will mediate the effect of suprapersonal values on political participation (online and offline) and voting intentions. To better understand the role of each of the mediating mechanisms previously mentioned, we describe the different modalities of social capital and our hypotheses in the following section.

Social Capital.

According to Coleman (1988) social capital is an abstract concept that comprises ideas of how relationships among individuals facilitate social actions through the norm of reciprocity, where people fulfill their obligations with other members of community and, as a consequence, build up their levels of trustworthiness. Following Coleman, Putnam defines social capital as "features of social organization, such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (Putnam, 1995, pp.66). Social capital has been applied to the study of several kinds of personal and collective outcomes, such as wellbeing (Chipps & Jarvis, 2015), happiness (Leung, Kier, Fung, Fung, & Sproule, 2010), health (Kunitz, 2004), community resilience (Aldrich & Meyer, 2014), citizenship (Fukuyama, 2001), and political participation (Gil de Zúñiga et al., 2012).

Researchers have also paid attention to implications of different modalities of social capital. For instance, Gil de Zúñiga et al. (2016) found relevant distinctions between social capital online and face-to-face social capital. Scholars have also indicated that a reflexive

component from people's interactions is also an important aspect of the development of social capital (Pingree, 2007). Thus, we operationalise social capital in three modalities in order to achieve a more comprehensive understanding of social connectedness, as described below.

Social capital online and offline, and reflection on conversations.

Even though different modalities of social capital are expected to flow to the same direction (e.g., civic activity), we argue that these different modalities might be influenced by different psychological mechanisms. For instance, social capital offline represents a more predictable way of communicating due to the normative constraints that are related to face-to-face interactions (Chan & Cheng, 2004). These interactions are often based on close relations (like kin, friends, workmates, and neighbours), representing high levels of trust and quality of relationships when compared to online interactions (Antheunis, Valkenburg, & Peter, 2012; Okdie, Guadagno, Bernieri, Geers, & Mclarney-Vesotski, 2011). For instance, research has found that face-to-face interactions involve interdependence, understanding, commitment, and network convergence (Chan & Cheng, 2004), which seems to foster mutuality of support (Vergeer & Pelzer, 2009) and commitment to collective benefits (Dean, Fielding, Lindsay, Newton, & Ross, 2016). Thus, we expect that this modality of social capital will be motivated by social goals because of the social affiliation and social constraint characteristic of these values, and we also expect that this modality of social capital will explain political participation because it is one important way to achieve collective benefits. We therefore hypothesise that:

Hypothesis 1: Social capital offline will mediate the relationship between social goals (interactive and normative), political participation (online and offline), and voting behaviour.

Social capital online, on the other hand, represents a source of stimulation, where people might feel excited by exposing and defending their ideas in an open, risky, and less controlled environment (Correa, Hinsley, & Gil de Zúñiga, 2010), and also by having contact with a greater scope of heterogeneous ideas (Kobayashi, Ikeda, & Miyata, 2006). As well as its offline modality, social capital online can be also be related to relations of trust and reciprocity (Gil de Zúñiga et al., 2016; Kobayashi et al., 2006). However, not using digital platforms or using them for particular acts of political participation can be related to different demographic and attitudinal characteristics (Reisdorf & Groselj, 2015). For instance, research has shown that social capital online is different from social capital offline, although some

correlation between them exists (Gil de Zúñiga et al., 2016; Kobayashi et al., 2006). This finding led us to include both modalities of social capital in order to test whether different psychological mechanisms motivate their operation in an overall path analysis. We expect that individuals who are willing to accept the risks present in online social platforms, which provide the advantages of faster communication and more far-flung social networks, will tend to be guided by individualistic axiological principles such as personal goals, which gather values representing independence and encouragement to pursue new experiences (Bagchi et al., 2015). Nevertheless, even though we argue that social capital online and offline have different motivators, we also expect that they will be related, with political participation occurring online and offline, as shown in previous research (Gil de Zúñiga et al., 2016; Valenzuela, Park, & Kee, 2009). Regarding voting, research has shown contrasting results. Even though social media has been used to encourage voting in political campaigns (Rainie, Smith, Schlozman, Vrady, & Verba, 2012), research has found negative relationships between social capital online and voting (Gil de Zúñiga et al., 2016). This might be a consequence of indifference regarding this matter from people who score high in personal goals, or the lack of excitement that might surround this rather conventional action. Personal goals are the value dimension most related with the usage of digital platforms (Bagchi et al., 2015). We therefore hypothesise that:

Hypothesis 2: Social capital online will mediate the relationship between personal goals (excitement and promotion) and political participation (online and offline), but NOT for voting behaviour.

Finally, reflecting about the communicative interactions made during the day is a normal process of learning from experiences (Daudelin, 1996). For instance, reflecting about the news helps in comprehending such news, and increases political knowledge and political participation (Eveland, 2004; Eveland & Hively, 2009). According to Schön (1991), reflecting on experience is a dynamic process that is integrally connected to people's interactions with others. Research has found that people with high levels of reflection tend to encourage tolerance and to engage in politics and community activities (Rojas et al., 2005), which realises a link between this construct and universalistic motivations. This suggests that when people establish social connections with others, they concomitantly think about what has happened, thus fostering meaningful links as a component of their social capital. As suggested by Nakamura and Yorks (2011), social structure, social relations, and reflective

practices are interrelated to one another to foster social capital. In this case, a reflective component may be intrinsic to social relations, and ruminating about the interactions people have with others might be a way for them to engage in community and to act for its improvement. Thus, we expected that reflection on conversations will be nourished by suprapersonal values and will also predict political participation. We therefore hypothesise that:

Hypothesis 3: The relationship between suprapersonal values and political participation (online and offline) and voting will be mediated by reflection on conversations.

Study overview.

The current study aims at investigating a comprehensive model capable of explaining psychological paths leading to political participation across a range of countries. We suggest that human values should predict political participation through the mediation of social capital (Hypotheses 1, 2, and 3) and that these relations should be replicable across different cultures. All the hypotheses will be tested with representative cross-sectional data (the hypothesised model is shown in Figure 9).

Method

Participants and Procedure.

The data used in this study is part of a cross-cultural project with representative data from 20 countries (details can be seen in Gil de Zúñiga, Diehl, Huber, & Liu, 2017). Participants were recruited online from September 14-24, 2015 by a global media polling company based in the United States. The present study comprises 21,362 participants from 20 countries with representative data with respect to age, and gender (see Gil de Zúñiga & Liu, 2017). The sample used in the present study was also used for Studies 1 and 2 of this thesis. Analyses were conducted using the pairwise missing deletion because the number of missing cases was small per item. With the exception of the item "I often think about how my conversations with other people about politics and public affairs relate to other things I know" from the "reflection on conversation" cluster (that had 5.79% of missing data), all the other items had a missing data rate of less than 2%. The higher number of missing cases for the "reflection on conversation" item was due to a technical issues that prevented this item from being collected in Poland. As reflection on conversation is used as a manifest variable in

the present study, we still included Poland in the analyses. For all countries, “reflection on conversations” results from the mean of two items. For Poland, however, this cluster is represented by a single item. We highlight that this is a limitation of the current study. Surveys were administered in the dominant language for a given country. Translations were developed through either the committee approach or by back-translation. The average duration for participation was 35 minutes. There was a relatively high response rate (77%) considering the length of the survey.

Instruments

Basic Value Survey (BVS): The BVS (Gouveia, 2003) is originally composed of 18 values; participants rate how important each value is to them on a scale from 1 (*totally non-important*) to 7 (*totally important).* The structure of values based on the Functional Theory is theorised to represent six clusters representing distinct content from each other. Descriptive statistics and alpha reliability for each of the clusters are displayed in Table 5 (Study 1). Analysis of factor structure and invariance are also provided in Study 1.

Social Capital: This variable represents people’s community interactions in daily life. We used three factors: the first one concerned face-to-face interactions (e. g., “In my community, we talk to each other about community problems”), the second was about online interactions (e. g., “I use social media to connect community members to each other”), and the third concerned reflection on conversations (e. g., “I often find myself thinking about my conversations with other people about politics and public affairs after the discussion has ended”). Descriptive statistics and alpha reliability for each of these factors are displayed in Table 24.

Political Participation: Political participation consisted of three different ways people participate politically in democratic societies. The first factor was represented by political participation offline (e.g., “I have attended a political rally, participated in any demonstrations, protests, or marches”), the second one by political participation online (e. g., “I have participated in an online question and answer session with a politician or public official”), and the third one by voting (e.g., “I have voted in national or presidential elections”). Descriptive statistics and alpha reliability for each of these forms of political participation are displayed in Table 24.

Table 24.

Descriptive statistics and alpha reliability of social capital and political participation

	SC Offline			SC Online			Reflection			PP Offline			PP Online			Voting		
	M	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α
Argentina	3.89	1.35	.90	3.33	1.69	.95	4.24	1.60	.87	1.83	1.20	.87	1.73	1.11	.82	6.37	1.33	.91
Brazil	3.85	1.45	.93	4.03	1.70	.95	4.05	1.69	.90	2.17	1.52	.93	1.98	1.49	.93	5.74	1.78	.96
Chile	3.71	1.40	.91	3.53	1.68	.95	3.87	1.57	.87	1.94	1.32	.91	1.97	1.34	.91	4.71	2.30	.93
China	4.14	1.28	.95	4.15	1.32	.93	4.13	1.31	.88	2.66	1.47	.95	2.54	1.49	.94	2.63	1.51	.88
Estonia	3.96	1.25	.94	2.47	1.34	.95	3.36	1.46	.92	1.31	0.72	.87	1.26	0.66	.85	6.05	1.68	.96
Germany	4.12	1.31	.91	2.62	1.67	.96	4.29	1.45	.82	1.72	1.17	.90	1.52	1.07	.90	5.43	2.05	.95
Indonesia	4.37	1.30	.93	4.32	1.45	.94	3.88	1.43	.91	2.33	1.54	.95	2.27	1.55	.95	4.91	1.79	.92
Italy	3.69	1.42	.94	3.50	1.72	.96	3.90	1.63	.89	1.98	1.39	.93	1.82	1.35	.94	5.73	1.77	.97
Japan	3.17	1.28	.94	2.21	1.39	.97	4.05	1.26	.93	1.32	0.86	.96	1.25	0.76	.95	4.77	2.29	.98
Korea	3.30	1.46	.95	3.18	1.53	.94	3.33	1.53	.91	1.61	1.14	.95	1.79	1.24	.94	5.16	2.06	.93
NZ	3.79	1.28	.91	2.47	1.46	.95	3.19	1.70	.93	1.46	0.89	.90	1.36	0.82	.84	5.67	1.89	.88
Philippines	4.03	1.18	.91	4.26	1.46	.94	4.12	1.33	.88	2.23	1.39	.93	2.17	1.44	.93	5.10	1.96	.98
Poland	4.02	1.31	.93	3.32	1.58	.95	3.46	1.74	-	2.01	1.30	.93	1.80	1.28	.94	5.28	1.84	.95
Russia	3.84	1.43	.93	3.48	1.66	.96	3.67	1.53	.90	1.68	1.14	.92	1.61	1.14	.93	4.64	2.02	.90
Spain	3.77	1.35	.92	3.27	1.69	.97	4.06	1.56	.90	2.03	1.34	.91	1.87	1.31	.93	5.47	1.90	.96
Taiwan	3.92	1.32	.96	3.83	1.32	.91	3.55	1.40	.91	1.95	1.25	.94	1.82	1.24	.96	4.78	2.03	.97
Turkey	4.15	1.41	.94	4.07	1.62	.93	4.20	1.51	.88	2.59	1.54	.92	2.48	1.59	.92	6.02	1.56	.96
UK	3.43	1.46	.93	2.21	1.55	.97	3.14	1.77	.94	1.58	1.07	.92	1.45	1.03	.91	5.39	2.14	.95
Ukraine	3.32	1.39	.94	3.13	1.58	.95	2.98	1.42	.84	1.73	1.14	.92	1.61	1.12	.92	4.14	2.20	.96
USA	3.73	1.39	.92	2.38	1.53	.96	3.32	1.80	.93	1.72	1.13	.89	1.43	1.00	.91	5.37	2.09	.93

Note. SC Offline = Social capital offline, SC Online = Social capital offline, Reflection = Reflection on conversations, PP Offline = Political participation offline, PP Online = Political participation online. In Poland reflection on conversations was measured by a single item.

Data Analysis

Structural equation modeling and indirect effects were estimated for each country using the R package *lavaan* (Rossel, 2012). We used the robust-maximum likelihood (Robust-ML) estimator, and 5,000 bootstrap simulations were performed for the indirect effects. The six factors of values were estimated as manifest variables because this structure failed at presenting acceptable fit when the Robust-ML estimator was considered. However, as more liberal approaches supported the six-factor structure (i.e., MDS and CFA with Bayes Estimation), I am confident that each of the clusters proposed by Gouveia is meaningful and can be used in regression models, except as a latent variable under the assumptions of the strict CFA (see Study 1). Regarding social capital and political participation, evidence of factor structure is provided in the current study. Confirmatory factor analysis and multiple-group confirmatory factor analysis are used to examine factor structure and invariance. Additionally, multi-level confirmatory factor analysis is performed to examine whether the structure found at the individual level can also be observed at the between-groups level.

Model fit was examined using CFI (comparative fit index), SRMR (standardised root mean squared residual) and RMSEA (root mean squared error approximation). The guidelines to indicate reasonably good fit are: CFI must be close to .95 (Hu & Bentler, 1999), but values higher than .90 are considered acceptable (e.g., Carlson & Mulaik, 1993), SRMR must be .08 or less, and RMSEA must be close to or lower than .06 (Hu & Bentler, 1999), but a value of .08 is considered acceptable (Browne & Cudeck, 1993). A threshold of .10 has also been used in the literature to indicate acceptable fit for RMSEA (Zemojtel-Piotrowska et al., 2017). For invariance, a threshold of .01 for ΔCFI is the most common criteria for metric equivalence (Cheung & Rensvold, 2002), but a threshold of .02 is considered acceptable for analysis with many groups (Rutkowski & Svetina, 2014). To achieve scalar invariance a threshold of .01 for ΔCFI is necessary (Cheung & Rensvold, 2002; Rutkowski & Svetina, 2014).

Results

Invariance of human values was examined with the same data in a previous study using the alignment method and the approximate Bayesian invariance approach (see Study 1). Results showed invariance for all the six dimensions, except for normative values. This dimension had invariance established after the exclusion of the item religiosity, which showed high variation across 20 countries. In the current study, the item religiosity was not considered. Regarding social capital, a previous study reported important differentiation

between social capital online and offline (Gil de Zúñiga et al., 2016), but invariance was not assessed across different countries. The item of emotion from the excitement subfunction should be examined with caution because it showed poor invariance when using the alignment method. However, as the item of emotion showed acceptable invariance when using the MGCFA and the approximate Bayesian invariance, this item was used in the present research.

We examined the structure and invariance of social capital using three dimensions: social capital offline, social capital online and reflection on conversations (see Table 25). Results showed satisfactory model fit for the three-factor model in 19 countries. Poland was the only country where the model fit was not assessed. The reason is that, because of a technical problem in the data collection, one item from the dimension of reflection on conversations was not answered by Polish participants. Therefore, a latent dimension with only one item could not be assessed. Metric invariance was achieved for the 19 countries (ΔCFI = .005), but scalar invariance was not achieved (ΔCFI = .025).

Factor structure and invariance of political participation was also assessed (see Table 26). We first checked whether a three-factor structure could be found examining the items of political participation offline, online, and voting. Analysis showed that the voting items were too correlated with each other and could not form a latent dimension. When the two items that composed the voting variable were included in the model, there was a non-positive definite correlation matrix misspecification. We then examined whether political participation would form two independent factors in a latent model. Results showed satisfactory fit for all the countries, and a test of invariance supported metric invariance for all countries. We also examined whether the structure of the social capital and political participation models could be observed both at the individual and group levels, but results showed unsatisfactory fit (see supplementary materials).

We then assessed the hypothesised SEM model (see Figure 9). Values were estimated as manifest variables because a poor fit was found when examining the value structure using the strict CFA (see Study 1). Reflection on conversations and voting were also used as a manifest variable because they were each composed of only two items. Also, when examining the voting items as a latent variable, there was a non-positive correlation matrix misspecification. Results yielded acceptable or close to acceptable model fit for each country (see Table 27). Poland was included, but the reflection on conversation dimension was represented by a single item for this country. Constraining all the loadings and regressions to

be equal across 20 countries, showed satisfactory fit. A model without constraints revealed a better fit, but with a small difference of model fit (ΔCFI = .006). However, as the chi-square difference test was significant ($\Delta SB\chi^2$ = 2,380.79; $p < .01$), these results suggest that the hypothesised model makes sense across countries, but there is specific variation between countries that prevents it from being cross-culturally equivalent.

Table 25.

Summary of model fit and invariance for social capital offline, online and reflection on conversations

Models	Model Fit				Invariance	
	SBχ^2 (df)	CFI	SRMR	RMSEA	ΔCFI	ΔSRMR
Model fit by country						
Argentina	250.98 (41)	.967	.034	.067	-	-
Brazil	238.49 (41)	.968	.025	.067	-	-
Chile	121.40 (41)	.984	.028	.045	-	-
China	196.55(41)	.976	.028	.061	-	-
Estonia	287.49(41)	.967	.025	.072	-	-
Germany	209.44(41)	.973	.046	.063	-	-
Indonesia	198.32 (41)	.971	.029	.060	-	-
Italy	200.23 (41)	.977	.023	.061	-	-
Japan	187.25(41)	.974	.024	.060	-	-
Korea	128.75(41)	.984	.026	.048	-	-
NZ	131.80(41)	.986	.028	.044	-	-
Philippines	114.18(41)	.985	.023	.041	-	-
Poland[a]	-	-	-	-	-	-
Russia	273.96(41)	.966	.028	.070	-	-
Spain	161.56(41)	.980	.030	.054	-	-
Taiwan	132.84(41)	.983	.039	.047	-	-
Turkey	303.43(41)	.949	.027	.082	-	-
UK	140.64(41)	.985	.034	.048	-	-
Ukraine	124.57(41)	.987	.024	.041	-	-
United States	191.16 (41)	.977	.039	.056	-	-
Equivalence across all countries						
Configural	5014.40 (779)	.976	.033	.058	-	-
Metric	4305.94 (923)	.971	.038	.059	.005	.001
Scalar	7227.78 (1067)	.946	.048	.074	.025	.015

a = Poland had only one item for the reflection on conversations dimension answered by the participants, and because of that its latent model could not be assessed or included in the invariance testing.

Table 26.

Summary of model fit and invariance for political participation offline and political participation online

Models	Model Fit				Invariance	
	SBχ^2 (df)	CFI	SRMR	RMSEA	ΔCFI	ΔSRMR
Model fit by country						
Argentina	215.44 (26)	.922	.040	.082	-	-
Brazil	220.94 (26)	.941	.028	.085	-	-
Chile	167.58 (26)	.949	.025	.077	-	-
China	131.09 (26)	.978	.020	.065	-	-
Estonia	91.03 (26)	.956	.032	.047	-	-
Germany	118.55 (26)	.957	.032	.059	-	-
Indonesia	142.84 (26)	.974	.015	.066	-	-
Italy	96.40 (26)	.977	.020	.052	-	-
Japan	89.69 (26)	.932	.023	.051	-	-
Korea	84.58 (26)	.974	.018	.050	-	-
NZ	48.67 (26)	.986	.022	.028	-	-
Philippines	220.67 (26)	.937	.034	.087	-	-
Poland	81.41 (26)	.975	.018	.046	-	-
Russia	143.78 (26)	.959	.024	.064	-	-
Spain	116.41 (26)	.968	.027	.059	-	-
Taiwan	143.35 (26)	.955	.021	.069	-	-
Turkey	189.88 (26)	.953	.030	.084	-	-
UK	60.88 (26)	.979	.020	.036	-	-
Ukraine	96.72 (26)	.972	.024	.048	-	-
United States	120.42 (26)	.954	.034	.057	-	-
Equivalence across all countries						
Configural	2400.26 (250)	.960	.026	.060		
Metric	2800.64 (653)	.954	.039	.057	.006	.003
Scalar	4812.88 (786)	.915	.062	.071	.039	.014

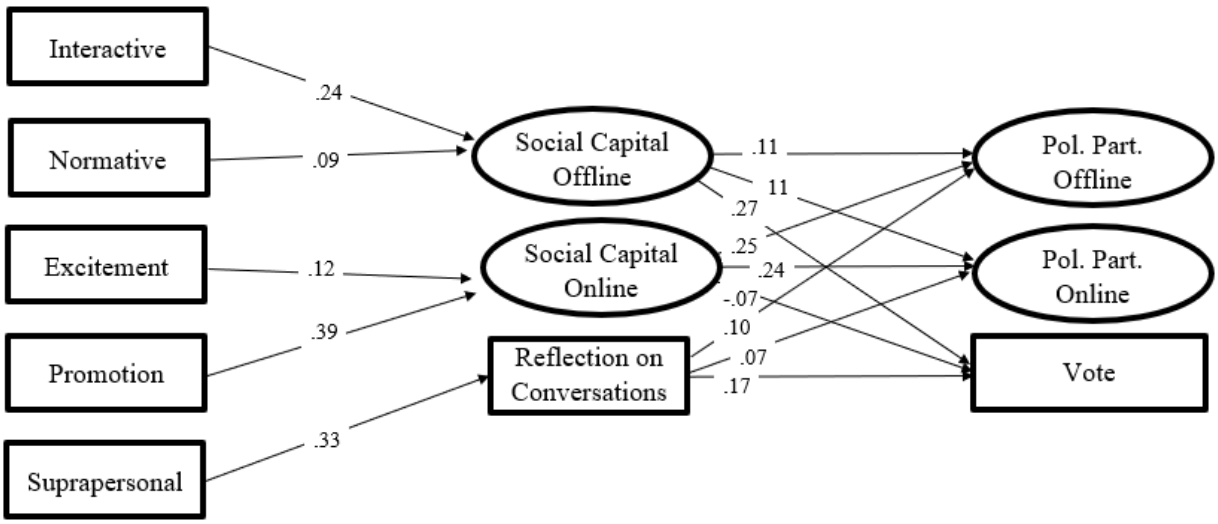

Figure 9. Proposed conceptual model

Note. Mid-range variables were allowed to correlate. Control variables were age, gender, and political orientation. All the endogenous variables were regressed onto the control variables. Regression coefficients are the unstandardised parameters from the constraint multi-group SEM. All paths are significant ($p < .01$).

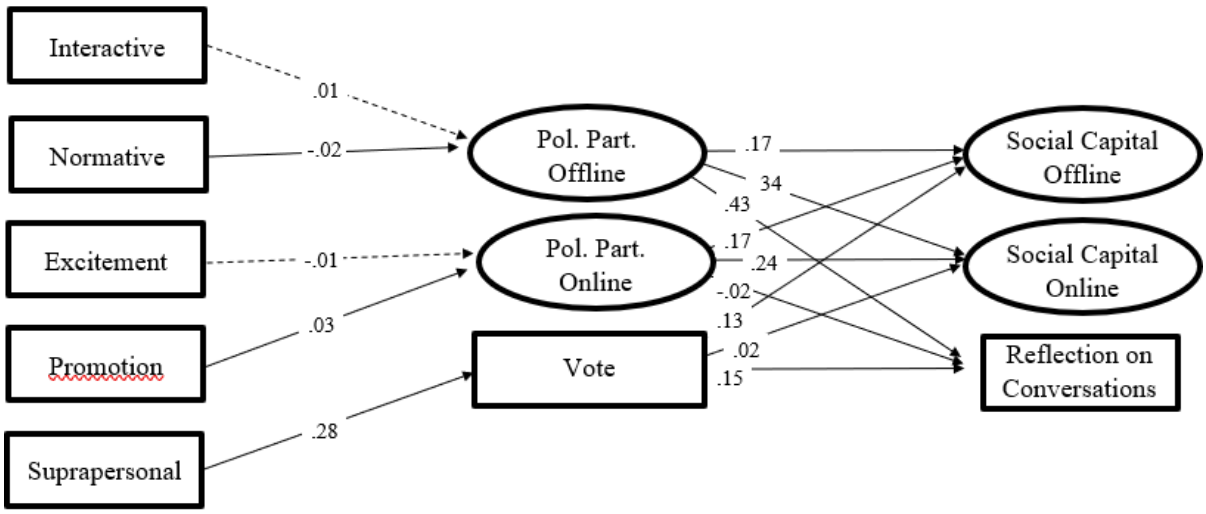

Figure 10. Alternative SEM model

Note. Mid-range variables were allowed to correlate. Control variables were age, gender, and political orientation. All the endogenous variables were regressed onto the control variables. Regression coefficients are the unstandardised parameters from the constraint multi-group SEM. Dashed arrows represent non-significant paths.

Table 27.

Model fit by country of the proposed path model

	Proposed Model					Alternative Model					Model Comparison
	$SB\chi^2$ (df = 294)	CFI	RMSEA	SRMR	BIC	$SB\chi^2$ (df = 294)	CFI	RMSEA	SRMR	BIC	ΔBIC
Argentina	1174.50	.920	.055	.056	60959.937	1280.60	.911	.058	.065	61080.469	-120.532
Brazil	1241.188	.929	.059	.074	55948.421	1342.79	.921	.062	.083	56068.281	-119.86
Chile	858.47	.946	.048	.061	49651.530	923.76	.940	.051	.068	49726.601	-75.071
China	1075.61	.949	.054	.069	48596.189	1327.26	.932	.062	.120	48898.644	-302.455
Estonia	926.68	.945	.045	.053	49835.076	1073.79	.932	.050	.068	50023.077	-188.001
Germany	839.39	.951	.044	.059	53602.678	1097.18	.928	.054	.087	53917.550	-314.872
Indonesia	1110.98	.947	.054	.073	51925.320	1257.49	.938	.059	.095	52102.121	-176.801
Italy	904.82	.956	.047	.060	52700.015	1026.73	.947	.052	.076	52849.334	-149.319
Japan	793.02	.945	.044	.041	34287.536	926.22	.930	.050	.084	34537.396	-249.86
Korean	746.60	.961	.044	.055	41026.832	813.80	.955	.047	.074	41116.805	-89.973
NZ	644.42	.966	.034	.040	55641.413	791.94	.951	.040	.067	55829.240	-187.827
Philippines	1144.43	.923	.058	.071	49308.543	1209.44	.918	.060	.081	49388.687	-80.144
Poland	843.74	.957	.045	.063	51672.062	1016.13	.944	.052	.088	51888.787	-216.725
Russia	1087.56	.946	.051	.054	55640.566	1264.99	.934	.057	.081	55855.792	-215.226
Spain	934.94	.950	.049	.067	51742.166	1102.16	.937	.055	.083	51957.936	-215.77
Taiwan	885.22	.954	.048	.060	44703.244	1060.91	.940	.054	.098	44945.038	-241.794
Turkey	1184.29	.918	.062	.082	48970.868	1219.71	.915	.063	.081	49008.583	-37.715
UK	723.89	.962	.039	.043	50750.003	859.22	.950	.045	.071	50934.704	-184.701
Ukraine	757.60	.963	.038	.052	58663.324	827.58	.958	.041	.059	58756.783	-93.459
USA	939.97	.946	.045	.050	59488.852	1061.68	.936	.050	.075	59647.489	-158.637
Multi-group Free[a]	19120.78 (df = 5880)	.949	.047	.055	1122136.871	21663.74 (df = 5580)	.940	.051	.071	1125407.70	-3270.830
Multi-group Fixed[b]	21439.57 (df = 6412)	.943	.048	.075	1117952.811	23726.14 (df = 6412)	.934	.051	.083	1122638.23	-4685.42

Note. a = loadings and regressions were freely estimated across countries; b = loadings and regressions were constraint to be identical across countries.

Regressions showed that social capital offline was significantly predicted by the interactive and normative values dimensions (social goals), and that social capital online was significantly predicted by the dimensions of excitement and promotion (personal goals). Also, reflection on conversations was significantly predicted by suprapersonal values. The three modalities of social capital showed significant and positive predictions of the three types of political participation, except for the regression between social capital online and voting intentions. This last relationship was negative or non-significant for most of the countries. Examining the indirect effects (see Table 28), it was clear that the three modalities of social capital were mediating the relationship between human values and political participation. These results supported **Hypotheses 1**, **2** and **3**.

An alternative model was also examined to observe whether the proposed hierarchy fits the data better than a model with a different hierarchy. A cross-sectional model cannot offer conclusions of causality, but the test of alternative models can suggest the most likely hierarchy for the model. Then a model with political participation being nourished by values and influencing social capital was assessed (see Figure 10 and Table 27). This model was examined because it might also be that that individuals who are politically active can increase their social capital. For model comparison of non-nested models, the BIC (Bayes Information Criterion) is recommended (Schwartz, 1978). The lower the BIC, the better the fit of the model to the data. Results showed that the alternative model had worse fit than the proposed model for all countries (see ΔBIC at Table 27).

Table 28.

Summary of indirect effects

Paths		Indirect effect
		β [95% CI]
Interactive → Soc Cap Offline →	POff	.04 [.036, .044]
	POn	.04 [.036, .044]
	Vote	.07 [.063, .082]
Normative → Soc Cap Offline →	POff	.01 [.010, .016]
	POn	.01 [.010, .016]
	Vote	.02 [.017, .029]
Excitement → Soc Cap Online →	POff	.03 [.019, .032]
	POn	.03 [.019, .032]
	Vote	-.01 [-.011, -.006]
Promotion → Soc Cap Online →	POff	.14 [.129, .146]
	POn	.14 [.128, .145]
	Vote	-.04 [-.053, -.034]
Suprapersonal → Ref Conver →	POff	.04 [.038, .046]
	POn	.03 [.027, .034]
	Vote	.06 [.055, .071]

Note. Soc Cap Offline = Social capital offline; Soc Cap Online = Social capital online; Ref Conver = Reflection on conversations, POff = Political participation offline, POn = Political participation online.

The multi-group path analysis estimating coefficients without constraints showed better results than the model which constrained parameters to be identical across countries, which indicates that countries vary on the strength of regressions. To explore which relations show greater variation in strength, I assessed a multi-level path analysis in which the same model was estimated in the within level, and cross-level interactions were estimated in the between level. We explored Human Developmental Index as a country-level moderator. See Figure 11 for a visual representation of the model. A Bayesian estimation was used because of the small number of level 2 units (i.e., countries) in the data. The intraclass correlation (ICC) for each variable is provided on Figure 11. The ICC indicates the between-countries variability of the variable. Cross-level interactions were tested for all paths, but for an easier visualisation of the model, only interactions statistically different from zero are displayed. Results showed that eight out of fourteen paths showed variation in the regressions coefficients that accounted for differences on HDI (all cross-level interactions were tested at the same time). The positive relationships between interactive values and social capital offline, promotion values and social capital online, and suprapersonal values and reflection on conversations were stronger for countries with higher HDI. On the other hand, the positive relationships between excitement values and social capital online, social capital offline and political participation offline, social capital offline and political participation online, reflection on conversations and political participation offline, and reflection on conversations and political participation online were stronger for countries with low HDI. Graphs with cross-level interactions are available in Figures 12 and 13. Individualism vs. collectivism was also a significant moderator in the same direction as HDI (for simplicity, as HDI is highly correlated with Hofstede's individualism vs. collectivism dimension, only HDI was added to Figures 11, 12, and 13). Individualism vs. Collectivism moderated the link between suprapersonal values and reflection on conversations (Interaction, B = .072, 95% C.I. = .020, .125), excitement and social capital online (Interaction, B = -.061, 95% C.I. = -.117, -.005), social capital offline and political participation online (Interaction, B = -.035, 95% C.I. = -.066, -.005), social capital online and voting (Interaction, B = -.064, 95% C.I. = -.119, -.012), and political elaboration and political participation online (Interaction, B = -.034, 95% C.I. = -.060, -.008).

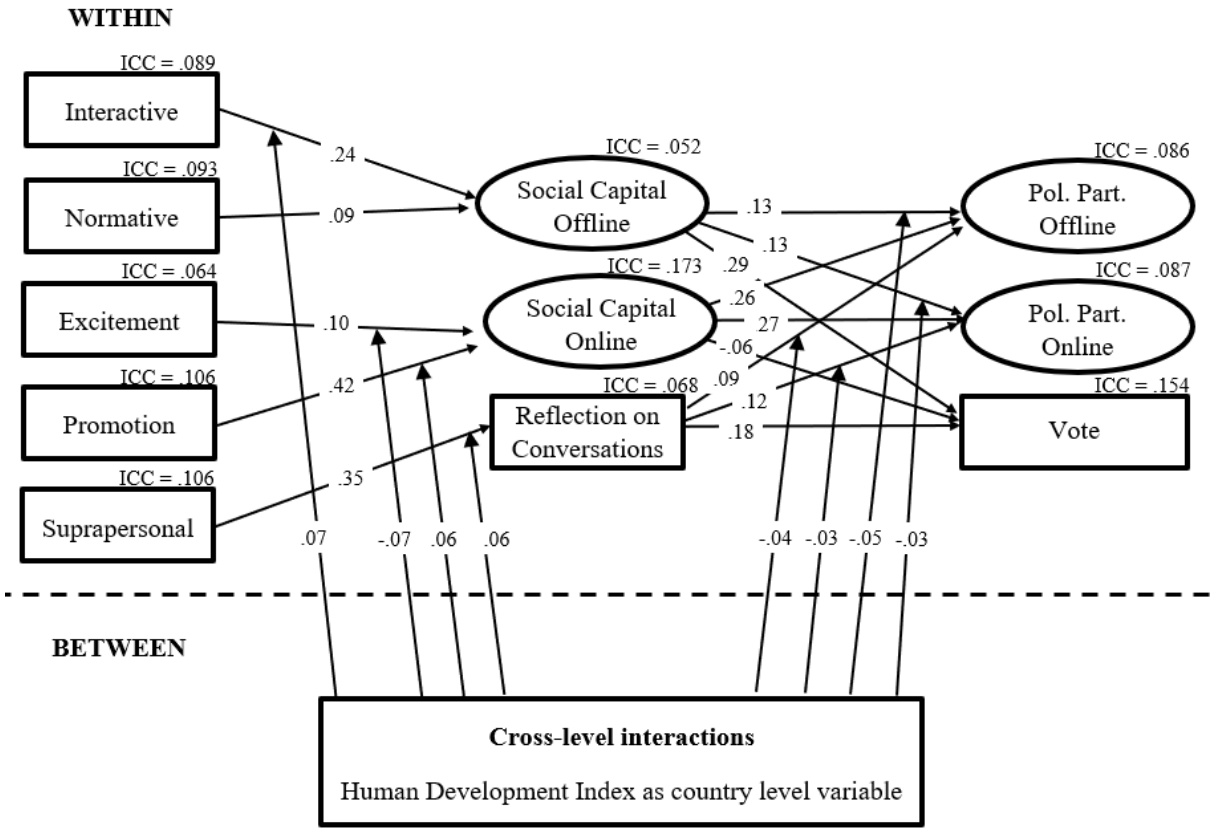

Figure 11. Multi-level SEM analysis

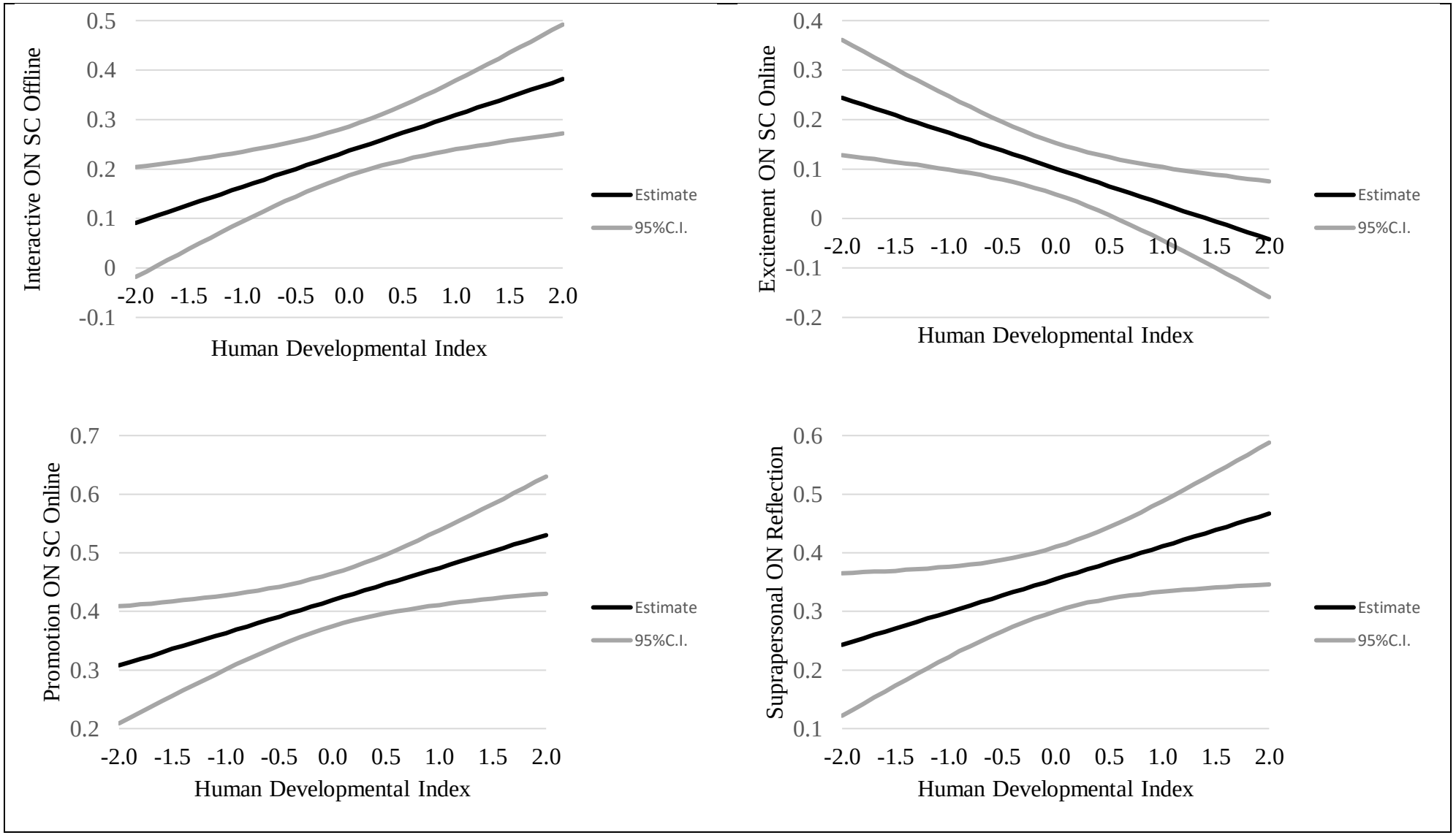

Figure 12. Cross-level interactions on the relationship between values and social capital

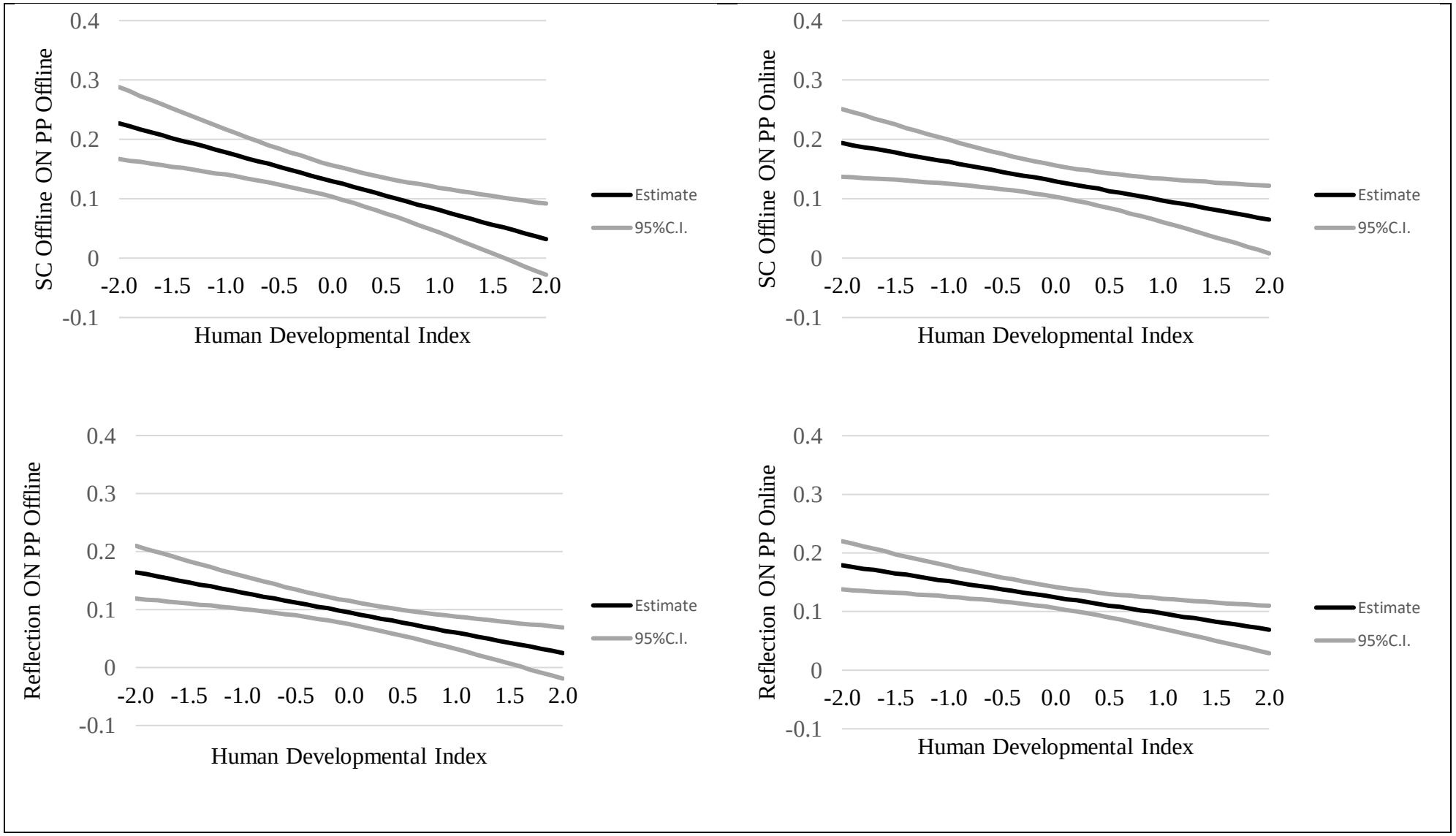

Figure 13. Cross-level interactions on the relationship between social capital and political participation

Discussion

The current research showed evidence of a path model where community engagement (social capital) was nourished by values and informs political participation. We extended previous literature (Gil de Zúñiga et al., 2016) by showing that different modalities of social capital are mobilised by different psychological drivers. Nevertheless, the three modalities of social capital flowed in the same direction, consistently informing political participation and confirming the role of social capital in fostering community involvement and political action (Albarracin & Valeva, 2011; Bevelander & Pendakur, 2009; Gil de Zúñiga et al., 2012; Klesner, 2007; Putnam, 1995; Teorell, 2003).

The relations showed by the first mid-range variable (social capital offline) were consistent with previous findings from the literature. Social capital offline was significantly associated with social goals (Schwartz, 2007) and also with political participation offline, online, and voting (Gil de Zúñiga et al., 2016). Examining mediating mechanisms for these relations, we found significant positive but indirect effects of social capital offline for the majority of the countries. These relationships support the idea that people guided by social goals tend to be more involved in community (Schwartz, 2007), and such engagement might lead them to participate in favour of improvements or benefits for these groups (Albarracin & Valeva, 2011; Gil de Zúñiga et al., 2016). Schwartz (1992) argues that people who have high scores on social goals (e.g., interactive/benevolence and normative/conformity) are more likely to give priority to collectivism and to subordinate the self in favor of socially imposed expectations, and this leads to the endorsement of interpersonal relationships (Schwartz, 2007) and commitment in favor of collective benefits (Dean et al., 2016). These results contrast with previous research that found that people oriented by social goals tend to avoid social disruption and risks, characteristics that are present in political manifestations such as protests (Schwartz, 2007; Vecchione et al., 2015). However, Schwartz (2007) and Vecchione et al. (2015) did not report mediating mechanisms, focusing instead on direct associations.

The second mid-range variable (social capital online) also showed results in accordance with the literature. First, personal goals informed social capital online, which is in line with high scores on personal goals for social media users (Chen, Hsieh, Mahmud, & Nichols, 2014), and also with research that reported positive and significant relations between personal goals and internet use (Bagchi et al., 2015; Besley, 2008). Second, social capital online explained political participation online and offline, once again in accordance with previous research (Gil de Zúñiga et al., 2012; Gil de Zúñiga et al., 2016). We contributed to

the understanding of these relations by examining indirect effects. Our findings presented significant positive indirect effects of social capital online mediating the relationship between personal goals and the two more exciting and risky forms of political engagement (political participation online and offline). These results support the idea that people high in personal values are more open to the unknown (e.g., the volatile virtual environment of the internet) and more willing to deal with risky activities if they result in personal reward (Bagchi et al., 2015; Schiffman, Sherman, & Long, 2003). This helps to explain these people's propensity to engage in social capital online, and also their disposition to participate politically, particularly in the spirit of personal autonomy and freedom of expression (Vecchione et al., 2015).

In contrast to these findings, social capital online showed negative relationships with voting. Similarly, Gil de Zúñiga et al. (2016) found negative relationships between social capital online and voting behaviour, and Caprara et al. (2012) found that non-voters rather than centre-right and centre-left voters had higher scores in stimulation values (personal focus). Overall, these results might indicate that people high in personal values can get stimulated by online platforms and political manifestations because these are resources of excitement (Schwartz, 2007), which is not necessarily the case for voting behaviour, which is typically perceived as conventional. Perhaps people high in personal values might get more inspired to vote if they feel attached to a vibrant politician aligned with their values or ideas, but this perspective is not part of the scope of the current research.

The last mid-range variable considered in the path model was reflection on conversations. As hypothesised, this variable was nourished by suprapersonal values and further associated with political participation. Our findings showed significant indirect effects of reflection on conversations in mediating the relationship between suprapersonal values and the three forms of political participation. These associations are supported by previous research that showed significant positive indirect effects of reflective processes (e.g., reflecting upon news) on the relationship between post-materialistic values and political participation (Satirovic & McLeod, 2001). We argue that reflection is a cognitive and self-critical component of social capital that is preceded by suprapersonal values and related to seeing political participation as a civic duty. Indeed, people high in suprapersonal values tend to be more self-critical (Gouveia, 2013), to care more about the welfare of others, and to act selflessly (Vecchione et al., 2015).

In summary, the indirect effects reported in the present research reinforce the idea that values can be activated by social relations in order to guide behaviour. We presented a comprehensive path model showing that social involvement turns values into a more palpable condition, enabling this construct to fulfill its function of guiding behaviours. The proposed model worked well for 19 countries, and a model constraining the hypothesised regressions to be equal across countries yielded acceptable fit. The fit of the proposed model was also found to be better than an alternative model changing the direction of the path hierarchy. However, as the model free of constraints showed better model fit than the constrained model (paths from the proposed model), we cannot affirm that regressions were invariant across countries.

An examination of country-level moderation showed that there are differences in the strength of the regressions accounted for country differences on HDI and Individualism and collectivism. A plausible explanation would be that people from poorer and more collectivistic countries would have higher correlations between social goals and social capital offline because of the emphasis they give to ingroup relations (Gouveia, 2013; Schwartz, 1992). However, the opposite was found for the link between interactive values and social capital offline. Also, a stronger link between suprapersonal values and reflection on conversations can be expected for richer and individualistic countries, since such context is thought to emphasize universalistic ideas and to score higher on self-transcendence values, which was supported by our findings (Gouveia, 2013; Schwartz, 1992). The higher regressions between promotion values and social capital offline in richer and individualistic countries might be explained by a greater focus on egocentric values in this context in comparison with people from poor and collectivistic countries (Triandis et al., 1988), but the opposite finding for excitement, which is also a subfunction focused on egocentric principles, demands caution when interpreting these results.

For the second part of the SEM, all the significant cross-level interactions were showing higher regressions for collectivistic and poorer countries. These results contrast the literature that shows higher scores of social capital in individualistic countries when compared to collectivistic countries (Allik & Realo, 2004). We highlight that these cross-level interactions were not the main focus of the current study, and they were performed in an exploratory manner since multiple group regressions indicated that there were differences between countries on the model. However, although some variation on the regressions can be found when considering different groups, it cannot be ignored that the path model shows good fit for all the countries individually, showing that the hierarchy proposed fits the data

well, and better than an alternative model changing the hierarchical order of social capital and political participation.

Limitations

An important limitation of the present study is that our data collection was entirely conducted online, and involved correlations only, so no causal inferences can be drawn from them. Even though research has been reported stating that there are no differences between paper-pencil and online data collection (Weigold, Weigold, & Russell, 2013), respondents' familiarity with online platforms might influence the results. In addition, future research needs to improve the measure of different modalities of social capital. In the current study, following Gil de Zúñiga et al. (2016), the measure of social capital online was composed mostly by behavioural items, while social capital offline was measured by more cognitive items. Furthermore, reflection on conversation was composed by two items that embraced some political content. This might require reformulation in future studies in order to achieve greater confidence in the results. We understand that these limitations need to be considered in future designs. However, the findings presented in this study seem to be robust and consistent across different countries, making the current research a useful contribution to the literature on human values and political participation.

Study 4. Explaining concerns with carbon emissions: Considerations from social dominance orientation and human values across 20 countries

Abstract. Carbon emission is a focus of debate around climate change, especially with the undeniable evidence that its increase is directly associated with global warming (IPCC, 2014). In the current research, we aim at understanding the effects of psychological variables (Social Dominance Orientation – SDO, and Human Values) on carbon emission concerns, and whether country/society-level variables (socioeconomic and environmental indicators) would influence such relationships. With representative samples from 20 countries (Wave 1 = 21,362; Wave 2 = 8,174), and using multi-level regressions, results showed the negative effects of SDO and the positive effects of the values dimensions of existence, suprapersonal, and interactive on carbon emission concerns. Cross-level interactions suggest that being concerned with carbon emission activates values sensitive to threat (e.g., survival) in countries that are more vulnerable to the consequences of climate change. In less vulnerable countries, values related to environmental sustainability (e.g., maturity) are more activated.

Keywords: Social Dominance Orientation, human values, environmentalism, carbon emission, cross-cultural research.

Introduction

Environmental concerns, such as those involving climate change, carbon emissions, different types of pollution, and water consumption, are recurrent and predominant concerns all over the world, as these pose a threatening scenario not only to humans, but to many other species (IPCC, 2014). With this in mind, understanding people's dispositions and motivations behind their environmental attitudes and behaviours is crucial. The field of environmental psychology has been very active in improving the scientific understanding of both societal-level (Milfont et al., 2017; Milfont & Markowitz, 2016) and individual-level (Jackson, Bitacola, Janes, & Esses, 2013; Stanley, Wilson, Sibley, & Milfont, 2017) correlations of environmental attitudes and behaviour. In the present study, we contribute with this literature by performing a multi-level analysis to assess the relationship between Social Dominance Orientation (SDO), human values, and concerns with carbon emission, and to verify whether these relationships are influenced by country characteristics (e.g., HDI, GINI, EPI, and collectivism vs. individualism). The focus on carbon emission concerns is a useful element in

this study, as this is one of the main topics where increased awareness is paramount to prevent future calamity (Solomon, Plattner, Knutti, & Friedlingstein, 2009). Reduction of carbon emissions is hugely debated. This is generally because from a scientist's perspective it is a sure path to mitigate climate change (IPCC, 2014), but from a politician's perspective, this science is subject to doubt (Dunlap, McCright, & Yarosh, 2016).

In recent years, SDO, which was developed as an intergroup variable to explain prejudice, has increasingly become known for being negatively related to pro-environmental behaviours. What has been found in this literature is that the need for dominance over other groups of humans may also encompass a drive for dominance of humans over nature and other species (Stanley, Wilson, Sibley, & Milfont, 2017). For instance, Milfont et al. (2017) reported that high levels of SDO are related to a low profile of environmental engagement (e.g., lower indices of pro-environmental behaviours, less willingness to donate for environmental causes, and scepticism about human activity causing climate change). As SDO signals a competitive drive to dominate other groups, this variable has been found to have more impact in cultural contexts with high levels of social inequality and lower societal development (Milfont et al., 2017).

As for human values, these have been long studied in different fields of psychology due to the value-attitude-behaviour hierarchy (Milfont, Duckitt, & Wagner, 2010). They have also been considered in environmental studies as a core foundation for the environmental movement (Dietz, Kalof, & Stern, 2002). In the literature, it has been well established that self-transcendence values are usually connected to pro-environmental behaviours, whereas self-enhancement and conservation values are related to a low profile of environmental engagement (Coelho, Gouveia & Milfont, 2006; Dietz et al., 2002; Karp, 1996; Milfont & Gouveia, 2006). For the current research, we employ Gouveia's (2013) Functional Theory of Human Values, wherein the values dimensions of existence, normative, suprapersonal, interactive and promotion map onto Schwartz's (1992) values dimensions of conservation, self-transcendence, and self-enhancement.[8]

In this direction, we seek to comprehend which psychological variables predict motivations to pro-environmentalism, and to examine to what extent these relations vary when we consider country differences. For that, we use two waves of representative data from 20 countries to test the effects of SDO and human values on concerns regarding carbon

[8] Existence and normative are similar to the conservation high-order dimension, suprapersonal and interactive are similar to self-transcendence, and promotion is similar to self-enhancement (see Gouveia et al., 2014b).

emissions and their impact on climate change. We performed cross-sectional and cross-lagged multi-level analyses. For the second one, the individual-level variables from Wave 1-predicted carbon emission concerns in Wave 2. The importance of psychological aspects to the understanding of people's attitudes towards environmentalism has been previously highlighted by isolated studies considering either SDO or human values (e.g., Dietz et al., 2002; Milfont et al., 2017), but not the two of them together. We expand the literature by showing the competing effects of SDO and human values, which have been reported in the literature as highly correlated constructs (Cohrs, Moschner, Maes, & Kielmann, 2005).

Concerns about carbon emission as an outcome

According to the IPCC report (IPCC, 2014), to the best of current scientific knowledge, human activities produce carbon emissions that impact on climate change. Therefore, it is of vital concern to know the extent to which people believe this. Measuring the extent of individual beliefs regarding the cause of climate change is needed, since this influences willingness to engage in behavioural change (O'Connor, Bord, & Fisher, 1999). Change at the individual level needs to be complemented by changes in government policies. However, to the best of our knowledge, studies focusing on psychological mechanisms related to concerns regarding carbon emissions have not yet been carried out.

Previous studies have indicated that recognising the causes of climate change is a powerful predictor of behavioural intentions regardless of one's beliefs on whether this environmental phenomenon is happening (O'Connor, Bord, & Fisher, 1999). These authors argue that understanding the origin of the problem is important because this can help to define the problem properly. This can lead people to have an appropriate attribution of blame, and assist in comprehending which behaviours would be more appropriate to deal with the problem. In the present study, we capture people's awareness of human influences on climate change [*"Human activity (e.g., carbon emissions) is causing global climate change"*] and the importance of actions being taken by the government to reduce carbon emission *("It is of great importance that governments of the world act together to reduce global carbon emissions"*). These two items together represent people's concerns about carbon emission, since they highlight the existence and cause of the problem, and the need for institutional action to deal with it.

Social dominance orientation (SDO) and human values as predictors of environmental outcome

SDO and human values are well known for their contribution to explaining variance in attitudes and behaviour. Most of the studies reported in the literature consider SDO and human values either separately, disregarding the possibility of content overlap, or follow a model where values are mediated by ideological beliefs (e.g., SDO) to predict an outcome (e.g., prejudice; Feather & McKee, 2008, 2012). However, it is of the utmost importance to be aware that the similarity of content between these constructs (Cohrs et al., 2005) might have impact on findings. For instance, von Collani and Grumm (2009) showed that SDO and some human values (i.e., self-transcendence and conservation) seem to overlap in content to form higher order clusters. In the current research, we add both constructs in the same analysis in order to check whether one explains variance over and above the other, or whether the effects from one of them are nullified by the other due to multicollinearity. Additionally, the previously established mediational model (Duckitt & Sibley, 2010; Feather & McKee, 2008, 2012) is examined, since SDO is reported to be nourished by values (e.g., promotion values).

SDO.

Overall, people with high levels of SDO have a positive perception of dominant groups, show a preference for hierarchy, accept social inequality, and see the world as a competitive place, where those who dominate are more likely to achieve their goals (Pratto, Sidanius, & Levin, 2006). Beyond being a powerful predictor of intergroup relations, such as the development of negative feelings and attitudes towards outgroups in general (e.g., immigrants and other minorities) (Duckitt & Sibley, 2010; Pratto et al., 2006), in the environmentalism sphere, high levels of SDO are usually negatively associated with environmentally relevant variables (Milfont et al., 2017). For instance, people high in SDO tend to support environmental inequality, accepting no need for harmony in human-nature interactions (Jackson et al., 2013). They oppose environmentally friendly actions (Milfont et al., 2013), believe in the superiority of humans over other species (Dhont, Hodson, Costello, & MacInnis, 2014), and deny that human activity produces climate change (Jylhä & Akrami, 2015; Milfont et al., 2013). In a recent 25-nation study, Milfont et al. (2017) reported that "the higher people were on SDO, the less likely they were to engage in environmental citizenship actions, pro-environmental behaviours and to donate to an environmental organization" (p. 1). Thus, our first hypothesis is as follows:

H1. SDO is negatively related with carbon emission concerns.

Human values.

Human values, usually described as motivations that guide people's behaviours (Gouveia, 2003; Rokeach, 1973), and as trans-situational goals that serve as guiding principles in life for an individual or group (Schwartz, 1992), are well known for predicting and mediating different types of attitudes and behaviours. They might also be an important construct that leads to or explains motivations to act in a pro-environmental way. One of the main authors in the field of values was Rokeach (1973), but it was with Schwartz's (1992) dimensional approach that this construct became better known worldwide. Ten motivational types placed in four major values clusters are reported in Schwartz's model: self-transcendence (universalism and benevolence), conservation (conformity, tradition, and security), self-enhancement (achievement and power) and openness to change (hedonism, stimulation, and self-direction). More recently, the Functional Theory of Human Values has been proposed by Gouveia (2013), and tested with different samples (Gouveia, Milfont, & Guerra, 2014a; Gouveia, Milfont, & Guerra, 2014b; Gouveia, Milfont, Vione, & Santos, 2015; Gouveia, Vione, Milfont, & Fischer, 2015; Hanel, Litzellachner, & Maio, 2018).

The Functional Theory has a parsimonious and theory-derived structure, and focuses on two widely accepted value functions: as guides for human action, and as expressions of human needs. The combination of these two functions yields a three-by-two framework (types of orientation: social, central and personal; and types of motivators: materialistic and humanitarian) to generate six subfunctions of values: existence, promotion, normative, suprapersonal, excitement, and interactive (Gouveia, 2013). Even though Schwartz (1992) and Gouveia et al. (2014a) proposed distinct theories, they show similarities, making it possible to compare their dimensions of values. For instance, Gouveia et al. (2014b) fitted Schwartz's data on his functional structure, and Hanel et al. (2018) compared both models, showing that they similarly predict pro-social behaviours, mental health, and environmentalism (similarities between the two models can be found in Gouveia et al., 2014b). The structure of Gouveia's model of values can be summarised in Figure 14 and will be used as the research framework for values in this study.

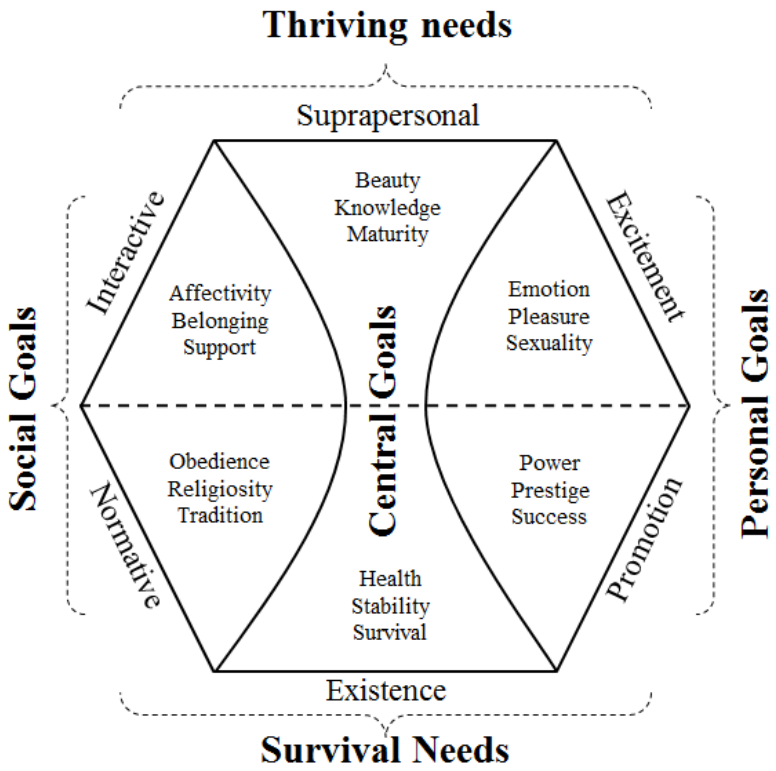

Figure 14. The structure of human values according to the Functional Theory

The relationship between values and environmentalism has been empirically tested in many studies over the decades. Back in the 1990s, this relationship was already of interest to environmental psychologists, where it was suggested that values should be considered as a "core concept in the study of environmentalism" (Dietz et al., 2002, p. 353). For instance, Karp (1996) used Schwartz's (1992) model of values to find that the dimensions of self-transcendence and openness to change had a positive influence on pro-environmental behaviours, while self-enhancement and conservation were negatively related to such behaviours. Similarly, Schultz and Zelezny (1999) reported that the dimension of universalism, included in the higher order factor of self-transcendence, was the strongest predictor of pro-environmental behaviours, while the values dimension of power and tradition (conservation) had the opposite effect. Corroborating results were also found by Coelho et al. (2006) and Milfont and Gouveia (2006), where the pattern of relationships between values and environmentalism were replicated. Overall, values connected to self-transcendence are more related to environmental concerns and pro-environmental behaviours, whereas values that represent self-interest and traditionalism are usually related to low levels of concern, and to less pro-environmental action (Dietz et al., 2002).

It is important to highlight that previous bodies of research have mainly used the four higher-order values dimensions of Schwartz's that gather adjacent values (Schultz & Zelezny, 1999; Milfont & Gouveia, 2006). However, by gathering such values, important particularities of each dimension are lost. This might be the case with "security," which is grouped with more societal dimensions (e.g., tradition and conformity) in Schwartz's (1992) model. We argue that making a distinction here is utterly necessary because security/existence values represent basic needs, while tradition and conformity are focused on social regulation (Gouveia et al., 2015). These values are adjacent because they are both pragmatically oriented and represent sensitivity to threat against the status quo (Gouveia, 2013). However, we argue that existence values will be more sensitive towards environmental threats because these values emphasise the importance of survival (Gouveia et al., 2014a), whereas normative values should be related to climate scepticism (Poortinga, Spence, Whitmarsh, Capstick, & Pidgeon, 2011).

We argue further that normative and existence values should predict environmentalism in different directions. Normative values should show negative relations with environmentalism because these values represent more close-minded and sceptical people (Cohrs et al., 2005). Existence values should be positively related to environmentalism, since changes to the environment as a consequence of climate change pose a threat to people's lives. We highlight that Gouveia's (2013) existence dimension is more related to people's concerns with survival (e.g., health, personal stability) than Schwartz's security dimension (e.g., reciprocation of favours, social order, healthy) because security has normative components mixed with basic needs (Gouveia et al., 2014b; Schwartz, 1992). Also, based on the literature of SDO, we expect that high importance given to power and status can have an effect on environmental attitudes, since people who score higher on these values might believe humans are superior and should dominate nature (see Schultz & Zelezny, 1999).

For the purposes of the current study, the most essential dimensions from Gouveia's model to be focused on are normative, existence, suprapersonal and promotion. Overall, (1) normative values represent the appreciation and importance given to norms, traditions, and social rules; (2) existence values highlight humans' most basic needs, such as being healthy, safe, and stable; (3) suprapersonal values emphasise a more abstract need for idealistic goals, being characterised by humanitarian and universalistic aspects, such as the importance given to maturity, knowledge, and beauty; and (4) promotion values emphasise power and prestige (Gouveia, 2013). Therefore, we hypothesise that:

H2: The normative dimension of values is negatively related to carbon emission concerns.

H3: The suprapersonal dimension of values is positively related to concerns about carbon emissions.

H4: The existence dimension of values is positively related to concerns about carbon emissions.

H5: The promotion dimension of values is negatively related to concerns about carbon emissions.

Country-level moderators

Following previous research (Milfont et al., 2017), we decided to include country-level predictors (e.g., HDI and GINI) for a better understanding of how the relationship between psychological constructs and environmentalism varies according to socio-cultural aspects. These authors showed that the relationship between SDO and environmentalism was more evident in societies with lower societal development and environmental standards, and high levels of income inequality. In the present study, we use the same cultural moderators as Milfont et al. (2017), aimed at replicating their findings using a different environmental attitude (carbon emission concerns).

Regarding values, the main idea behind our novel hypotheses is that environmental outcomes activate values in different ways depending on the components that each outcome activates for each context. This idea is inspired by Maio, Hahn, Frost, and Cheung (2009); they showed that values are activated when people are reminded of a situation where the value of interest is typically activated. Other studies have shown that typicality is likely to be influenced by context (Hanel et al., 2018). Applying this knowledge for the present research, we argue that carbon emissions might represent more threatening elements for more vulnerable countries (IPCC, 2014; Mertz, Halsnæs, Olesen, & Rasmussen, 2009). For poor countries with high inequality and low levels of environmental standards, climate change can be more threatening due to the lack of resources and infrastructure to protect people against environmental calamity. In this case, values related with survival and perception of threat (existence values) would be easier activated when people are evaluating concerns about carbon emission (Mertz et al., 2009). On the other hand, for countries where resources and infrastructure are present (e.g., high HDI), people might feel less threatened by climate change. This does not mean that they ignore global warming. On the contrary, developed

countries are also the ones that do better on environmental performance (HDI is highly correlated with EPI; Milfont et al., 2017). Nevertheless, instead of connecting carbon emissions as a threat, values related with sustainability (suprapersonal) might be the more activated ones when people from these countries evaluate concerns about carbon emissions.

Alternatively, the literature also reports that values might be easily activated in individualistic or less embedded countries because in these countries "people are socialised and encouraged to cultivate their unique preferences and ideas and to pursue their own personal goals" (Davidov, Meuleman, Schwartz, Schmidt, 2014). In contrast to this idea, we argue that values can serve as better predictors in embedded countries if the object being measured activates components that are typical in such contexts. In this case, we expect that even when using a measure of individualism-collectivism, the relationship between existence values and concerns about carbon emission will be stronger for more collectivistic and embedded contexts.

Based on the aforementioned rationale, cultural moderation is expected for values that represent threat or survival (existence values) and values that represent importance for sustainability (suprapersonal values).

H6. High levels of HDI, EPI, and Individualism, and low levels of GINI will increase the positive effect of suprapersonal values on carbon emission concerns.

H7. Low levels of HDI, EPI, and Individualism, and high levels of GINI will increase the positive effect of existence values on carbon emission concerns.

The role of SDO as mediator of values

Finally, motivation around SDO derives from a view of the world as a competitive place, where dominant individuals or groups are more likely to have better chances to achieve their goals, expressed by values of power and superiority (Craig & Richeson, 2013; Duckitt & Sibley, 2010). Therefore, it is expected that SDO will be nourished by promotion values – which represent status and power – and suprapersonal values – which represent tolerance, and is antagonist to what SDO represents. For instance, in studies assessing prejudice, results have shown the mediational role of SDO-connecting values (promotion/power and suprapersonal/self-transcendence) to prejudice (Feather & McKee, 2008, 2012). Therefore, we also test the following hypothesis:

H8. SDO mediates the effect of promotion and suprapersonal values on carbon emission concerns.

Method

Participants.

Data for this study come from a two-wave cross-cultural project with representative samples from 20 countries (Gil de Zúñiga, Diehl, Huber, & Liu, 2017). Participants were recruited online by a global media polling company based in the United States (Nielsen). Wave 1 was composed by 21,362 participants, and data collected from September 14-24, 2015. Wave 2 was composed by 8,740 participants, with data being collected six months later (details per country are provided in the supplementary materials). The percentage of participants that answered both waves was 40.9%. Chile was the only country in which only one wave was administered, but we maintained this country in the cross-sectional study to increase the power of cross-level interactions. Participants answered a large battery of measures, but we will describe only those relevant for the present study. The second wave did not include all the measures that were available in the first wave for cost reasons. For the present study, all the measures were included in both waves, except human values. The data used is the same as provided in Studies 1, 2, and 3, except that in this opportunity we also use longitudinal data. For the cross-sectional analysis, a pairwise missing deletion was preferred because there was less than 2% of missing cases per item of human values, SDO, and environmental concerns. For the longitudinal analysis, participants who did not complete the second wave of data collection were excluded. Table 29 shows detailed information about the drop-out rate per country. We examined whether the participants that participated in both waves were different from the participants that answered only the first wave of data collections in terms of age, gender, political ideology, social status, and religion importance. A pooled within correlation matrix using a dummy variable with information about survey completion (1 = participated in wave 1 only, 2 = participated in both waves) showed that the strongest correlation was with age (r = .204, p < .001), suggesting that older participants completed both waves more frequently than younger participants. The correlations with gender (r = -.014, p > .001), political ideology (r = .010, p > .001), social status (r = .031, p > .001), and religion importance (r = -.007, p > .001) were very small, suggesting that these characteristics were not influential. Surveys were administered in the dominant language for

a given country. Translations were developed through either the committee approach or by back-translation. The average duration for participation was 35 minutes. There was a relatively high response rate (77%) considering the length of the survey.

Table 29.

Sample characteristics from Waves 1 and 2

	Wave 1			Wave 2			Drop-out rate
Nation	N	Age (SD)	♀ (%)	N	Age (SD)	♀ (%)	per country
Argentina	1145	40.8 (14.3)	51.7	359	44.0 (14.5)	46.7	68.6
Brazil	1086	35.9 (12.0)	49.8	353	39.2 (12.4)	53.7	67.5
Chile	964	35.1 (13.1)	51.3	0	-	-	100.0
China	1005	38.7 (12.0)	44.4	387	41.0 (12.1)	39.7	61.5
Estonia	1168	47.8 (17.2)	48.8	733	50.5 (16.4)	48.6	37.2
Germany	1093	45.1 (15.1)	53.9	643	48.3 (14.1)	53.3	41.2
Indonesia	1080	32.8 (9.8)	39.5	305	37.7 (9.5)	44.3	71.8
Italy	1041	41.7 (12.2)	55.3	579	43.6 (13.4)	57.6	44.4
Japan	975	46.7 (12.9)	42.2	574	47.5 (12.7)	39.5	41.1
Korea	943	38.9 (12.7)	46.7	572	41.0 (12.2)	47.7	39.3
NZ	1157	49.5 (17.3)	56.4	605	53.5 (15.7)	54.5	47.7
Philippines	1064	34.2 (11.0)	61.2	153	36.6 (10.3)	56.6	85.6
Poland	1060	42.0 (14.5)	54.0	628	44.1 (14.2)	51.8	40.8
Russia	1145	38.2 (12.8)	50.9	551	41.5 (11.7)	49.4	51.9
Spain	1019	41.0 (12.6)	52.6	302	46.7 (12.8)	52.5	70.4
Taiwan	1008	36.3 (10.9)	50.8	426	39.0 (10.6)	45.3	57.7
Turkey	961	33.9 (11.0)	44.0	331	37.9 (10.8)	47.9	65.6
UK	1064	50.6 (15.6)	54.1	649	53.8 (13.9)	51.1	39.0
Ukraine	1223	33.9 (9.40)	44.0	101	32.3 (12.0)	68.0	91.7
USA	1161	49.8 (16.4)	59.5	489	55.7 (14.0)	56.2	57.9

Instruments.

1) *Social Dominance Orientation* (SDO). A short version (4 items) of the Social Dominance Orientation Scale developed by Pratto et al. (2013) was used. In a Likert-type scale varying from 1 (Strongly Oppose) to 7 (Strongly Support), participants should indicate "How much do you support or oppose the following ideas about groups in general?" The selected items were 1) "In setting priorities, we must consider all groups"; 2) "We should not push for group equality"; 3) "Group equality should be our ideal"; and 4) "Superior groups should dominate inferior groups." Evidence of invariance is showed in the supplementary materials. Descriptive statistics, alpha reliability, evidence of factor structure and invariance (across countries and across time) are available in the appendix.

2) *Basic Values Survey* (BVS; Gouveia, 2003). This 18-item measure was answered in a Likert-type scale varying from 1 (completely unimportant) to 7 (of the utmost importance), where participants must indicate the level of importance they give to each one of the specific values. Evidence of invariance is showed in Study 1 of the present thesis (Vilar, under review). Analysis of factor structure and invariance are provided in Study 1 of the present thesis. For the current study, all values items were used, except for religiosity, which showed poor invariance in analysis with different methods (e.g., alignment method and approximate Bayesian invariance). Descriptive statistics and alpha reliability are available in Study 1 (Table 5).

3) *Carbon Emission Concerns*. As dependent variables, we used two items related to concerns about carbon emission ("Human activity (e.g., carbon emissions) is causing global climate change," and "It is of great importance that governments of the world act together to reduce global carbon emissions"). These items were answered in a Likert-type scale varying from 1 (completely disagree) to 7 (completely agree). Correlations between these two items in Wave 1 varied from .51 (Argentina) to .84 (Taiwan), and the overall correlation across all the 20 countries was .72. For the second wave, correlations varied from .61 (Russia) to .86 (New Zealand), and the overall score was .76. To provide evidence of temporal stability, we checked a paired sample *t* test for all the countries. Using a p-value of .01, only two countries (out of 19) showed significant differences between waves. The countries were Argentina [$t = 2.78$, $p = .006$] and Indonesia [$t = 3.21$, $p = .001$]. Analysis of invariance were not assessed because this measure was composed by two items only. Descriptive statistics and alpha reliability are provided at the appendix.

Survey Translation

The measures were translated by bilingual collaborators (e.g., scholars) from each of the countries where data were collected. The committee approach (Brislin, 1980) or back-translation method (Behling & Law, 2000) were employed.

Nation Variables

Nation variables were HDI, GINI, EPI, and collectivism vs. individualism. HDI is a measure of economic wealth that varies between 0 and 1, where high scores indicate higher human development. We used scores from 2015, retrieved from the United Nations Human Development Report. Also taken from the United Nations reports, GINI is a measure of income inequality, where high values indicate greater income inequality. EPI was retrieved from the website of the Center for International Earth Science Information Network at Columbia University. This is a measure of sustainability in which high scores mean greater environmental health and ecosystem vitality. Finally, collectivism vs. individualism is a measure of cultural values, where high scores emphasise priority given to personal goals over the goals of the in-group. Scores for this last measure varies from 0 to 100 and they were obtained from Hofstede's website (https://www.hofstede-insights.com/country-comparison/).

Data analysis

Multi-level-linear regressions were performed (with Mplus 7.31) due to the hierarchical structure of our data (Hox, 2010). All the regressions were estimated using a Bayesian estimator because of the small number of level 2 units (i.e. countries) in our sample (Stegmueller, 2013). First, we computed the intraclass correlation coefficient (ICC) to check whether the concerns about carbon emission showed variability across cultures. We then included the individual-level predictors, allowing their intercepts and slopes to vary randomly. We followed the same method for the cross-sectional and cross-lagged approaches. For the cross-lagged analyses, only the outcome was measured at Wave 2. Having the outcome in both waves allows us to control the individual-level regressions by the stability of the dependent variable (autocorrelation). Finally, each of the society-level predictors and cross-level interactions were added one at a time. For these analyses, we group-mean centred individual-level variables, and we Z-standardised country-level variables. Since there was a high dropout rate on the sample for the second wave, the cross-lagged findings should be interpreted as a robustness check of the results reported on the cross-sectional analysis. The software Mplus (version 8.4) was used to analyse the data. For analyses assessing confirmatory factor analysis and invariance, the criteria to examine model fit is the same as reported in Study 1.

Results

Reliability coefficients, factor analysis and invariance testing of the values scale can be found in Study 1. For SDO, information of reliability, factor analysis and invariance can be seen in Tables A43, A44, and A45 in the appendix, respectively. We also provide invariance of time for the participants that completed waves 1 and 2 (Table A46 in the appendix) and an examination of SDO using a multilevel CFA (Table A47). For the multilevel CFA, results showed that the factor observed in the individual level is not replicated in the between groups level. As data for human values was not collected in the second wave, temporal invariance is provided for SDO only.

Multi-level Analyses: Cross-sectional.

The individual-level results of the Bayesian multi-level regressions model (cross-sectional and cross-lagged) are displayed in Table 30, after item 4 from SDO and the religiosity item (from values) were removed.[9] Cross-level interactions for the cross-sectional data[10] are shown in Table 31. Before checking the influence of individual-level and country-level variables on concerns about carbon emissions, we examined in a multiple regression (assessing the variance inflation factor – VIF) whether there was multicollinearity between SDO and values when assessed simultaneously. Results suggested low impact of multicollinearity (VIF < 2.70). We then estimated the intra-class correlation coefficient to see whether a multi-level approach could be applicable to the data. Results suggested that people's concerns about carbon emissions were different across nationalities in the cross-sectional (ICC = .066, Post. S.D. = .024, 95% C.I. = .038, .129), and cross-lagged data (ICC = .072, Post. S.D. = .027, 95% C.I. = .040, .144). This variance justifies further evaluation of individual and country-level predictors, as sufficient variance was found at both levels (Hox, 2010).

Individual-level variables were then estimated with random intercepts and random slopes. Results showed that older people, females, and liberals showed greater concerns about carbon emission. Considering the psychological variables, results showed that SDO predicted concerns about carbon emission negatively, while suprapersonal and existence values showed positive regressions on concerns about carbon emissions. These results were statistically different from zero for both cross-sectional and cross-lagged models (see Table 30), and they

[9] These items were removed because they were not invariant across the 20 countries.
[10] Cross-level interactions for the cross-lagged data were not statistically different from zero.

support Hypotheses 1, 3 and 4. Hypothesis 2 (normative on carbon emissions) was not supported, and Hypothesis 5 (promotion on carbon emissions) was supported by the cross-lagged data. Although promotion was not directly associated with concerns about carbon emissions in the cross-sectional data, they were indirectly related through the mediation of SDO. The hypothesised indirect effect of SDO on the relationship between suprapersonal values and carbon emissions concerns was also statistically different from zero, but this was a partial mediation. These mediational findings support Hypothesis 8.

Table 30.

Cross-sectional and cross-lagged Bayesian multi-level analysis predicting concerns related to carbon emissions

	Cross-sectional				Cross-lagged			
	Fixed effect		Random effect		Fixed effect		Random effect	
	B	95% C.I.	B	95% C.I.	B	95% C.I.	B	95% C.I.
Intercept	5.601	5.432, 5.769	.133	.073, .276	5.571	5.400, 5.742	.126	.068, .270
DV in Wave 1	-	-	-	-	.527	.443, .608	.028	.014, .064
Age	.005	.001, .009	.000	.000, .000	.005	.001, .009	.000	.000, .000
Gender (0 male)	.097	.038, .156	.011	.004, .030	.086	.031, .142	.005	.001, .021
Political orientation	-.034	-.061, -.006	.003	.002, .008	-.023	-.038, -.007	.001	.000, .002
SDO	**-.268**	**-.302, -.233**	.004	.002, .010	**-.045**	**-.078, -.014**	.002	.001, .007
Interactive	.095	.057, .134	.003	.001, .011	.029	-.016, .078	.004	.001, .014
Normative	.006	-.034, .045	.005	.002, .013	-.002	-.040, .037	.003	.001, .009
Suprapersonal	**.095**	**.063, .126**	.002	.001, .006	**.047**	**.009, .086**	.002	.000, .006
Existence	**.271**	**.223, .320**	.008	.003, .020	**.050**	**.005, .094**	.003	.001, .011
Excitement	-.019	-.047, .008	.002	.001, .005	.001	-.032, .034	.002	.000, .005
Promotion	-.008	-.036, .019	.002	.001, .005	-.039	-.070, -.007	.001	.000, .005
Residual variance	1.185	1.162, 1.208			.794	.770, .819		
ICC	.101	.058, .189			.137	.079, .254		

Note. In bold are the hypothesised regressions that were significant (credibility interval did not include zero) in both cross-sectional and cross-lagged approaches.

Table 31.

Cross-sectional cross-level interactions

	Human Development Index		GINI		Environmental Performance Index		Collectivism versus Individualism	
	B	95% C.I.	B	95% C.I.	B	95% C.I.	B	95% C.I.
Country-level on DV	-.136	-.300, .026	.138	-.011, .287	-.148	-.294, -.003	-.133	-.285, .018
Cross-level interactions								
Age	-.003	-.007, .001	.002	-.002, .006	-.003	-.007, .001	-.003	-.007, .000
Gender	.022	-.037, .082	-.042	-.100, .017	.036	-.023, .094	.022	-.040, .083
Political orientation	**-.028**	**-.052, -.004**	.007	-.021, .036	-.024	-.049, .001	**-.037**	**-.057, -.016**
SDO	-.035	-.071, .002	.008	-.033, .049	-.019	-.058, .021	-.032	-.070, .005
Interactive	-.024	-.061, .014	-.001	-.038, .036	-.032	-.067, .004	-.022	-.058, .014
Suprapersonal	.018	-.015, .050	.003	-.030, .035	**.044**	**.014, .073**	**.033**	**.003, .062**
Existence	-.024	-.069, .021	.006	-.039, .052	**-.055**	**-.093, -.016**	**-.056**	**-.094, -.018**
ICC	.092	.052, .179	.079	.045, .155	.076	.043, .150	.080	.045, .157

Note. Interactions with the credibility interval falling below or above zero are in bold. Country-level on DV is the country-level main effect.

We then examined whether these relations were influenced by societal characteristics. We used four country-level moderators: HDI, GINI, EPI and collectivism vs. individualism. We did not find culture-level moderation on the relationship between SDO and the dependent variable, but for human values we found that the positive relationship between suprapersonal values and concerns about carbon emissions was stronger for countries with an individualistic focus and with higher levels of EPI. On the other hand, the positive relationship between existence values and concerns about carbon emissions was weaker for countries with high scores of individualism and EPI. This latter pattern was also presented to an extent when HDI was used as the country moderator, but these results were non-significant. These findings partially confirm Hypotheses 6 and 7. Figure 15 displays the significant interactions. Cross-level interactions were also examined for the cross-lagged model, but none of them were statistically different from zero.

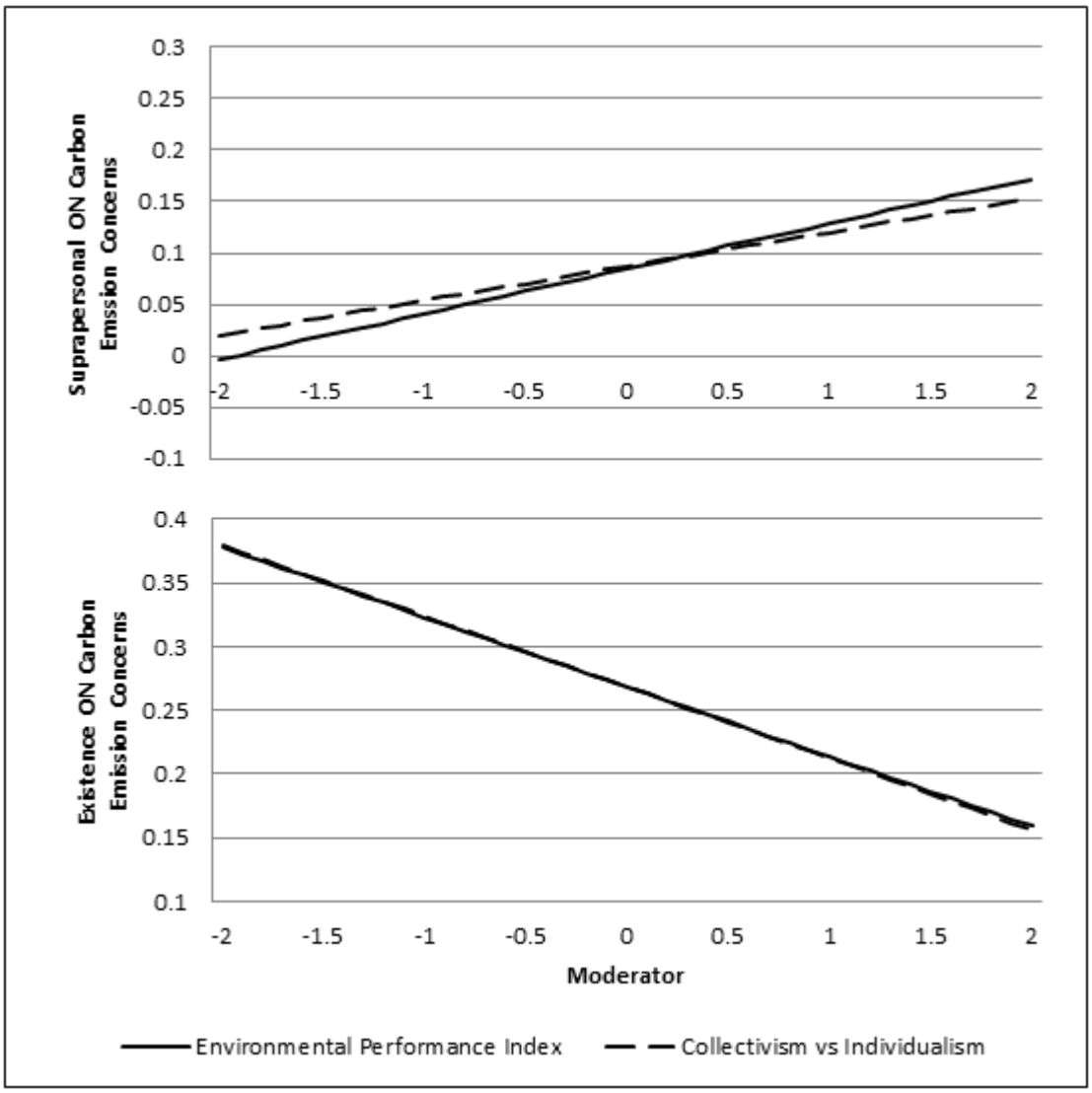

Figure 15. Cross-level interaction

Note. Figure 15 shows differences in the relationship between values and concerns about carbon emission (Y-Axis) for different levels of the moderator (X-Axis)

Discussion

The current research aimed at verifying the role of psychological variables (human values and SDO) on the prediction of concerns with carbon emissions. For that, we performed multi-level analyses for both cross-sectional and cross-lagged data. A Bayesian estimator in both analyses was adopted because of the small number of Level 2 groups (Stegmueller, 2013). As SDO and human values are highly correlated (Cohrs et al., 2005), these variables were inserted into the same analysis to assess whether one explains variance over and above the other, or whether they overlap in content. We also tested a mediational model where SDO mediates the relationship between values and carbon emission. In order to further address the role of societal aspects in such relationships, the moderating effects of socioeconomic (HDI, GINI), environmental (EPI), and cultural indicators (individualism vs. collectivism) were considered. Importantly, this study was not limited to a specific culture or social context, expanding the literature by showing results of representative samples from the Americas, Asia, Oceania, and Europe.

Before performing multi-level regressions, we provided information about the invariance of the scales. For SDO, approximate invariance was not achieved for its four items. We found that Item 4 ("Superior groups should dominate inferior groups") was presenting low loadings and r-square for most of the countries, which was impacting on the model fit. The exclusion of this item improved the fit for each country, and approximate invariance of loadings and intercept was subsequently found. Problems with this item had already been an issue in previous research with samples from Taiwan, China (Pratto et al., 2013) and Brazil (Milfont et al., 2017). Our findings indicate that future research should investigate the structure of the short-measure of SDO carefully, especially regarding its fourth item. Regarding the human values, approximate invariance was found in all of the dimensions in the model from Gouveia et al. (2014a), but for normative values, invariance was achieved only after the exclusion of the item religiosity (Vilar, under review). Cross-cultural variation regarding religiosity should be one of the reasons why it is hard to fit invariance with this item (Gebauer et al., 2014).

In line with the previously described hypotheses, SDO was demonstrated to be a consistent predictor of carbon emission concerns in both cross-sectional and cross-lagged analyses. This pattern confirms the idea that high levels of SDO represent people who tend to believe that nature is to be dominated by mankind (Dhon, Hodson, Costello, & MacInnis, 2014). Similar findings are documented by studies investigating environmental citizenship and pro-environmental behaviour (Milfont at al., 2017), concerns for the natural environment

(Jackson et al., 2013), and climate change (Jylhä & Akrami, 2015; Milfont et al., 2013). Altogether, this literature strengthens the notion that support for social inequality not only justifies the dominance of one group over the other, but also over more general things that men interact with or manipulate. The importance of this variable is also seen in the fact that it was so strong that even correlated constructs like suprapersonal and normative values (Cohrs et al., 2005) were included in the same analysis, which indicates that SDO and values explain unique variance on carbon emission concerns.

As for human values, the values subfunctions of existence and suprapersonal were positively correlated with concerns about carbon emission also in both cross-sectional and cross-lagged analyses. These patterns are justified by the emphasis that such subfunction gives to concerns with basic safety and to the welfare of others, respectively (Gouveia et al., 2014a). Regarding existence values, as the effects of climate change are considerate a threat to humans' lives (Barrett, Charles, & Temte, 2015), it is theoretically expected that people who have existence as a core guiding principle will show high levels of concern with a threatening environmental reality that might cause harm to their survival and stability (Gouveia, 2013). Little focus has been given to these kinds of specific values in past research, as Schwartz's (1992) conservation higher-order factor gathers security (closer motivational type with basic needs from the Schwartz model) with more societal motivational types of values (e.g., tradition, conformity), but our study highlights the importance of the specificities of the existence values. We argue that the severity of the effects of climate change (Hansen et al., 2012), the coverage of the media, and the easy access to information in recent years might have contributed to making these existence values more salient to predict environmentalism (IPCC, 2014; Sampei & Aoyagi-Usui, 2009). This is theoretically sound because existence values are pragmatically oriented and focused on the satisfaction of the most basic psychological needs (e.g., health, survival) (Gouveia et al., 2015).

On the other hand, the relationship between self-transcendent/suprapersonal values and pro-environmental behaviours is well documented in the literature (Evans et al., 2012; Milfont & Gouveia, 2006; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). Overall, scholars have used sub-dimensions of self-transcendence that represent altruistic (a component closely related to interactive values) and biospheric values (a component closely related with suprapersonal values), and their predictions have contributed to the understanding of the motivators of pro-environmental behaviour (Bouman, Steg, & Kiers, 2018). In a parallel, the same has happened with suprapersonal values and pro-environmental attitudes, with studies showing that these values are often related to environmentalism (e.g., recycling) (Hanel et al.,

2018; Queiroga, Gouveia, Coutinho, Pessoa, & Martins, 2006). Also, using data from the World Value Survey, Welzel (2013) found that emancipative values (e.g., post-materialism) predict environmentalism in both the individual and country level. It is, therefore, coherent for the idealistic characteristics of these values to be related to these kinds of concerns. Likewise, it is interesting to perceive how both central values (existence and suprapersonal) are connected to carbon emission concerns, with each covering a specific sphere of this issue: one with a more palpable and materialistic foundation, related to the fear of harm and threat to the survival of mankind; and the other with an idealistic view, focusing on abstract thoughts and the necessity of using knowledge and maturity in the daily life – which inevitably leads to a non-egocentric perception of the world, and to a broader view of worldwide matters (Gouveia et al., 2014a).

Even though we did not specifically hypothesise relations for interactive values, the significant link with carbon emission can be supported by previous research using an altruistic sub-dimension of the Schwartz model (Bouman et al., 2018). Benevolence (a motivational type from which altruism is derived) is similar to the content of interactive values (Gouveia et al., 2014b). However, as the altruistic sub-dimension of benevolence is too specifically related to pro-social behaviour, and the interactive subfunction of Gouveia et al. (2014a) reflects more abstract interpersonal relations, we decided to be prudent on creating hypotheses for interactive values based on this literature. Regarding normative values, we expected negative relationships with carbon emissions, because this value subfunction has been shown to predict fewer concerns and less scepticism toward environmentalism (Poortinga et al., 2011). However, results were non-significant.

For promotion values, the link with carbon emission concerns was found only for the cross-lagged model. However, after examining a mediational model we found that SDO mediates the relationship between promotion values and carbon emission. The role of SDO as mediator is well-studied on prejudice (Duckitt & Sibley, 2010; Feather & McKee, 2008, 2012) but it has not been tested for environmental outcomes. This mediational role is important because values are theorised as positive constructs (Gouveia, 2013), and their connection with undesirable behaviours might occur due to indirect effects. For instance, studies found that the negative connection between promotion values and attitudes toward immigrants happens indirectly through SDO (Feather & McKee, 2008, 2012; Araujo et al., under review). In the present study, the same was found. Values of promotion represent power and prestige, which are not bad traits per se, but they are known to nourish beliefs of status legitimation. We also found that SDO partially mediated the effects of suprapersonal

values on carbon emission concerns. This is theoretically sound because suprapersonal values are antagonistic to SDO, and a solid predictor of environmental outcomes. The partial mediation highlights the importance of these values as predictors of environmental outcomes. They are not only antagonistic to SDO, but also have unique predictions not accounted for by SDO.

After checking the individual-level variables, we examined whether cultural specificities would moderate the relationships found. In contrast to previous research (Milfont et al., 2017), we did not find country-level moderation for the link between SDO and carbon emissions concerns. However, it is important to highlight that even though both bodies of research investigated environmentalism, our study was more focused on general items on carbon emissions and the attribution of responsibility to control them, while the study by Milfont et al. (2017) was more focused on connection with nature or daily behaviours to protect the environment. It might be that the latter activates social dominance orientation differently in different countries because habits are more culturally specific (Wilhite, Nakagami, Masuda, & Yamaga, 1996).

Regarding human values, we found significant interactions with the EPI and collectivism vs. individualism cultural variables, and they were in the expected direction. In this case, the significant relationship between existence values and carbon emission concerns was stronger for less sustainable and collectivistic countries, while the link between suprapersonal values and carbon emission concerns was stronger for individualistic and more environmentally sustainable countries. This goes in line with the idea that carbon emissions should activate different components in different contexts. For poorer, unequal, not environmentally sustainable, and collectivistic countries, the more pragmatic values would be the ones that are more easily activated to predict concerns about carbon emissions, because they are more sensitive to survival threats (Mertz et al., 2009). On the other hand, in societies where the basic needs are satisfied, concerns regarding higher order thoughts are more evident (Schwartz, 1992). However, although HDI, EPI, and individualism are highly correlated, the lack of significant results when HDI was the moderator demands caution on the interpretation of the results.

Conclusion

Our research contributes to the literature on environmentalism by providing evidence of the link between SDO and carbon emissions, and also relevant values subfunctions

(existence and suprapersonal) and this environmental outcome. Our findings were especially robust because they were consistent using cross-sectional and cross-lagged regressions. The reported influence of culture for the human values relations also adds to the literature by showing that the more vulnerable countries seem to activate their values related to survival in order to evaluate carbon emission, while countries that have their basic needs met seem to activate their idealistic values while thinking about this environmental issue. However, these results need to be evaluated with prudence, since results were significant only for EPI and individualism, and not significant for HDI and GINI. Future research using more Level 2 units (countries) should be conducted to bring more clarity regarding culture variation. Finally, a more robust measure of carbon emission concerns would bring more clarity about the relationships reported, especially regarding the impact of existence values, which was not captured in previous research.

Chapter 4. General Discussion

The main aim of this thesis was to examine how values are structured and what their function is in predicting attitudes and behaviour in a variety of countries. In terms of structure, I evaluated the dimensionality and invariance of Gouveia's (2003, 2013) Functional Theory of Human Values (Study 1), and whether the importance that was given to the outlined dimensions varied in a harmonic way as a function of age – values that are highly congruent varied in the same direction for different life stages mirroring the structure of values as proposed by Gouveia (2003, 2013) (Study 2). Regarding the function of values, I examined their correlations with social capital and political participation (Study 3), and environmental concerns (Study 4). The four papers that compose the present thesis were the first peer-reviewed studies examining the Functional Theory using a multi-nation approach. Besides introducing multi-group reports of the Functional Theory, the present thesis brought insights to the field of values more generally by showing how a new conceptualisation can advance the literature. The contributions of each study are outlined next.

Major findings and implications

Study 1.

The structure of values was tested using multidimensional scaling and confirmatory factor analysis. Using multidimensional scaling, results were satisfactory for all the countries, showing that six subfunctions of values could be identified, and that the values subfunctions were organised in a way that replicated the expected levels of congruence (as described in Figure 3 of the general introduction). On the other hand, results from confirmatory factor analysis were unsatisfactory. The six-factor model produced a non-positive definite correlation matrix for all the countries, which indicates that the model was not identified. It might be because of a lack of homogeneity within the items from each latent factor, which can inflate the correlation between latent factors. If correlations between latent factors are 1 or higher, the model is not identified (Wothke, 1993).

I then presented the examination of a human values scale using a Bayesian estimation. This approach brings novelty to the research on human values because it is less liberal than the MDS, but less strict than the CFA using a maximum likelihood estimation. Results showed that when small cross-loadings and residual correlations are allowed to vary, the six-

factor structure proposed by Gouveia (2013) fits the data. These findings do not eliminate the limitation that it is not to fit a strict CFA (e.g., the use of structural equation modelling is not justified), but it shows an important venue to better understand complex measures such as values and personality that usually fail to fit a CFA when estimating zero cross-loadings and residual correlations (McCrae et al., 1996). Morin, Arens, and Marsh (2016) state that "small cross-loadings should be seen as reflecting the influence of the factor on the construct-relevant part of the indicators rather than the indicators having an impact on the nature of the factor itself" (p. 135). According to Muthén and Asparouhov (2012), "current analyses using maximum-likelihood (ML) and likelihood-ratio chi-square testing apply unnecessarily strict models to represent hypotheses derived from substantive theory". These authors argue further that a more liberal CFA (i.e., BSEM) "is intended to produce an analysis that better reflects substantive theories" (see page 313 of Muthén & Asparouhov, 2012). Morin, Arens, and Marsh (2016) and Asparouhov and Muthen (2015) repeat that "small cross-loadings do not taint the constructs by adding "noise" but rather allow them to be estimated using all of the relevant information present at the indicator level" (Asparouhov & Muthen, 2015; pp. 1563). Therefore, I am confident that the results using the Bayesian estimation will contribute with the literature on human values.

I also decided to reduce the complexity of the model by splitting the analysis into reduced models. This is one of the strategies that value researchers have used to provide the psychometric properties of value clusters (e.g., Cieciuch et al., 2014). Therefore, I focused on differentiating the subfunctions from each type of goal (social, central, and personal). This approach is called the magnifying glass strategy, and it was adopted to reduce the complexity of the six-factor model by focusing on adjacent subfunctions with congruent goals (Cieciuch et al., 2014). If congruent subfunctions are found to be independent, this could be an indicator that the six subfunctions proposed by Gouveia (2003, 2013) were meaningful (although the scale with too few items is problematic). The magnifying glass strategy has been often used in the literature on values (Beramendi & Zubieta, 2017; Cieciuch & Schwartz, 2012; Cieciuch, Schwartz, & Vecchione, 2013; Cieciuch et al., 2014; McQuilkin, Gardarsdottir, Thorsteinsson, & Schwartz, 2016). For each pair of goals, it could be seen that two factors of values could be outlined, showing better results than when a single factor including adjacent subfunctions was estimated. In this case, considering models with congruent subfunctions, six latent factors were identified. However, some items seemed problematic, and future research is needed to refine the selection of items designed for each subfunction.

Overall, results from Study 1 using a strict CFA showed that two subfunctions for each pair of goals were identified, but religiosity, maturity and success showed poor fit. Based on these results, the Basic Values Survey would benefit from a refinement of these items, either with new descriptions to focus better on the subfunction they are supposed to load, or to replace them with new items. The more liberal CFA with Bayes estimation showed support for Gouveia's configuration of values, but more research is needed since this is the first time this technique is applied to a value scale. Nevertheless, together with the results of the MDS, the CFA with Bayes estimation suggests that the structure of values as proposed by Gouveia (2013) makes sense, but not to be understood as a latent factor as it is theorized using a maximum likelihood approach. Invariance for each factor was supported when using the approximate Bayesian invariance. When using the alignment method there was also invariance for most of the value subfunctions, except for the items of religiosity and emotion. As the item emotion was metric invariant using the approximate Bayesian invariance and the multiple group factor analysis (when using the more liberal cut-off criteria proposed by Rutkowski and Svetina (2014)), I decided to exclude only the item of religiosity for the remaining studies.

Finally, a multilevel CFA was also employed to test whether the structure found in the individual level could also be identified in the country level (isomorphism). The implication of having an isomorphic scale is that an aggregate of country means can be used as a country level variable (Fontaine, 2008). However, results showed that a multilevel CFA does not fit the structure as proposed by Gouveia (2013). Alternative structures changing the configuration in the between level were also unsuccessful to fit the data. Therefore, the present thesis does not provide support for the use of Gouveia's scale as a country level variable.

Study 2.

The second study aimed at examining the patterns of value change during the life span, and differences between gender groups for different life stages using cross-cultural data. This study provided evidence on three major issues: (1) the development of values across the lifespan, (2) the universality of age and gender differences in values across cultures, and (3) that the patterns of values change for the six subfunctions of values mirrored the structure proposed by Gouveia (2003, 2013). The latter has the biggest connection with the first study because it emphasises how the structure behaves for different age and gender

groups. If values with similar goals had shown different patterns of value change during the life span, this could suggest problems for the conceptualisation that justifies their existence. This would be a problem because the theory of congruence would be meaningless for different life stages. When Gouveia (2003, 2013) conceptualised his structure of values, the congruent subfunctions are supposed to share similar content (e.g., interactive and normative values are society-oriented), to predict similar external outcomes and to vary in a similar way across the lifespan and across cultures because they share similar meaning.

Following Gouveia's theory (Gouveia, 2003, 2013), it was expected that values with similar goals would show similar patterns of value change during the life span. For instance, evidence of a lower value importance for older adults regarding excitement values was also present for promotion values (personal goals) because they are highly congruent subfunctions. The same harmony was found in higher values importance as age increased for the subfunctions that composed social (interactive and normative) and central goals (suprapersonal and existence). Similar results were reported by Bardi et al. (2009) using Schwartz's model of values. Differences between males and females were also harmonious, since highly congruent subfunctions showed similar gender differences (Prince-Gibson & Schwartz, 1998; Schwartz & Rubel-Lifschitz, 2009). Females scored higher than males in social and central goals, and males scored higher than females in personal goals. These findings supported the robustness of the structure of values for different life stages. The differences in values priorities in function of age and gender were discussed using social roles theory and evolutionary psychology (Buss, 1998).

Study 3.

The third study was different from Studies 1 and 2. In Study 3 and Study 4, the focus was on understanding how Gouveia's model of values was related to external outcomes. For this study, a structural equation model was built to show a comprehensive view of how values mobilise people to connect and to participate politically. However, as values did not fit a CFA with the Robust-ML estimation, this variable was included in the model as a manifest variable. Also, reflection of conversations and voting intentions were added as manifest variables because these clusters are composed only by two items each. The factors of social capital online and offline, and the factors of political participation online and offline were estimated as latent variables.

It is known in the literature that the link between values and behaviour is weak because of the theoretical distance between the two (Bardi & Schwartz, 2003). For instance, values are completely abstract, and behaviour is a more palpable phenomenon. Because of this distance, researchers have argued in favour of the need to build models in which mid-range variables mediate the link between values and behaviour (Homer & Kahle, 1988; Milfont, Duckitt, & Wagner, 2010). In the present study, I used social capital, which is a more attitudinal variable representing the importance of social networks (Rothstein & Dietlind, 2008; Stolle & Hooghe, 2004). The link between social capital and political participation is well documented (Albarracin & Valeva, 2011; Bevelander & Pendakur, 2009; Fukuyama, 1995, 2001; Gil de Zúñiga et al., 2012; Gil de Zúñiga et al., 2016), and the link between values and political participation is also well explored (Augemberg, 2008; Caprara et al., 2006; Caprara et al., 2017; Schwartz et al., 2010; Sotirovic & McLeod, 2001; Vecchione et al., 2015). However, this was the first attempt to show a comprehensive model, including the three phenomena.

The findings from this study showed that different forms of social capital are nourished by different values following theoretical hypotheses, and that social capital is strongly connected to political participation. The mediation was significant for almost all the paths, suggesting that the hierarchical model was a comprehensive view about how values can drive people to behave politically. This study has implications for research around values and political action because it shows that values with social goals are connected to political participation through social capital. This is important because people oriented by social goals tend to avoid social disruption and risks, characteristics that are present in political manifestations, such as protests (Schwartz, 2007; Vecchione et al., 2015). Nevertheless, it was found that their social goals still impact on their political participation through the build-up of social connections. The proposed model showed a better fit than the alternative model changing the hierarchy of variables. This does not provided support of causality, but suggests the most likely hierarchy for the model.

In addition to these analyses, Study 3 also estimated the structural equation modelling in a multilevel approach. This was conducted because comparisons between a country specific (regressions were not constraint to be similar across countries) and a universal model (regressions were constraint to be similar across countries) were significantly different. This finding suggested that there was significant variation on the strength of the estimated regressions across countries. Using a multilevel approach, it was possible to estimate cross-

level interactions in which country-level characteristics moderate the regression coefficients that were proposed in the model. Results showed that HDI and individualism vs. collectivism explained variance on several paths, indicating that country characteristics are impacting on the regressions. However, only part of the interactions could be explained by values theory. For instance, the higher relationship between suprapersonal values and reflection on conversations on richer and individualistic countries could be explained by the fact that such context is thought to emphasize universalistic ideas and to score higher on self-transcendence values (Gouveia, 2013; Schwartz, 1992).

Study 4.

The last study uses multi-level regressions to investigate the impact of human values and SDO on environmental concerns. This study employed cross-sectional and cross-lagged data to show that SDO and existence and suprapersonal values were consistently related to carbon emission concerns. Using a multi-level approach to analyse the data, it was possible to observe that values assumed different importance at predicting environmental concerns in different contexts. For more vulnerable contexts (poorer countries with low levels of environmental performance), existence values predicted environmental concerns more strongly. For richer countries and with higher levels of environmental performance, suprapersonal values predicted environmental concerns more strongly. Cross-level interaction was not observed for SDO.

This research adds to the literature by showing the impact of existence values on environmental concerns. In previous research using Schwartz's model (Milfont & Gouveia, 2006; Schultz & Zelezny, 1999), this relationship had not been reported. One of the reasons might be the fact that part of the research using Schwartz's model adopts higher order factors (e.g., conservation) instead of more specific motivational goals (e.g., conservation = tradition, conformity, and security). In this case, security values, which is the closest Schwartz's motivational type to Gouveia's existence subfunction, are usually combined with conformity and tradition. Another important note is that Gouveia's (2013) existence subfunction is more related to people's concerns with survival (e.g., health, personal stability) than Schwartz's security subfunction (e.g., reciprocation of favours, social order, health) because security has normative components mixed with basic needs (Gouveia et al., 2014b; Schwartz, 1992). These aspects might have impacted previous research, but another point to be noted is that climate change has received more attention only recently (Capstick, Whitmarsh, Poortinga,

Pidgeon, & Upham, 2014; Sampei & Aoyagi-Usui, 2009; Schmidt, Ivanova, & Schaffer, 2013). Perhaps values are being activated now because people are more aware of the consequences of climate change.

Contribution of a cross-cultural approach

The usage of multi-nation data was a big strength of the present thesis. I reported results from countries with substantial cultural differences, and this contributes to the discussion about whether values are universal in structure and whether they are activated by cultural characteristics when predicting external outcomes. Regarding the universality of the structure, multidimensional scaling provided strong support for the underlying six-factor structure proposed by Gouveia (2003, 2013) across all cultural contexts. Less strong results, but with similar characteristics, were found when performing confirmatory factor analysis. For instance, loadings, modification indexes and model fit were very similar across countries, and invariance (metric and scalar, using the approximate Bayesian invariance) was found for almost all the values items used in the present thesis, except religiosity. Also, the patterns of value change during the life span were not influenced by cultural moderators for the majority of the relations, suggesting that they are a result of life stage rather than cultural narratives. These findings were similar to documented research (Dobewall et al., 2017; Fung et al., 2016; Robinson, 2012).

For the influence of culture on the prediction of external outcomes, we described interesting results in Study 4. It could be seen that values sensitive to threat were activated in cultures that are more vulnerable to environmental threat (poor and with low levels of environmental performance) and that values related to justice and maturity were activated in richer and more environmentally sustainable countries. These results contribute to the discussion about what are the reasons why some values show greater correlations in certain contexts. In the present thesis, it was argued that the intensity of the relationship between values and external outcomes might depend on contextual characteristics related to the external outcome. For instance, in the carbon emission concerns study, a sense of threat related to climate change might have activated existence values to predict carbon emission concerns in countries that are more vulnerable to environmental threats. This idea is inspired by Maio, Hahn, Frost, and Cheung (2009); they showed that values are activated when people are reminded of a situation where the value of interest is typically activated. If typicality activates values, the contextual characteristics associated to the outcome might be a key to understand variation in the strength of the relationship across cultures. This interpretation is

supported by a study about attitudes toward immigrants. It was found that values are better activated to predict attitudes toward immigrants in contexts that are a target for immigration (Araujo et al., 2019). Nevertheless, this interpretation needs to be further validated.

Advantages and Limitations of the Functionalist Theory

In recent refinement of Schwartz's theory of values (Schwartz et al., 2012), there has been a trend of attempts to identify as many dimensions as possible, and this seems to be based on the search for a better fit and stronger correlations between values and external outcomes. Schwartz et al. identified 19 possible motivational types (Schwartz et al., 2012). Schwartz defends his recent refinement of the structure of values based on an idea that values are organised in a circular continuum and any delimitation of motivational types is arbitrary. In this case, why not try to have very detailed structure? The answer might be on parsimony and replicability. If arbitrariness is the explanation for the frequent change on the delimitation of latent factors, the structure can always change, and this limits the science around values, since replication is always going to be an issue because researchers can use a different configuration of values. It is worth mentioning that the many motivational types proposed by Schwartz are supposed to represented the same higher order factors as before (Cieciuch et al., 2014; Schwartz et al., 2012), but this malleability might interfere with replicability, and it ignores parsimony.

In the present thesis, I introduced new insights and empirical evidence to support a theory that sees the structure of values in a different way, which seems to be more concerned with justifying the delimitation of latent factors rather than making it loose and making boundaries between value subfunctions arbitrary: the Functional Theory of Human Values. The result is a stricter configuration of values that has clear criteria and hypotheses for the development of latent factors. The criteria are that values have two main functions and that the combination of these functions originates different subfunctions of values. The theorisation is simple and efficient because research has shown that it can fit a more complex configuration of values (Gouveia et al., 2014b). In the present thesis, I did not aim at comparing different models of values, but on presenting evidence that the six subfunctions proposed by the Functional Theory work for several contexts. However, the lack of fit of Gouveia's model when estimated through a strict CFA suggests that there is quite some distance to go before Gouveia's theory can be thought to have advanced the literature on values beyond Schwartz. Perhaps testing both theories using a CFA with a Bayesian estimator might bring some light on which model better represents the structure of values.

In the present thesis, results of MDS supported the six subfunctions and the hypothesis of congruence, which embraces the adjacency of values. Similarities between values subfunctions (multidimensional scaling) and tests of patterns of values change during the life span (showing harmonic patterns of change for values with similar goals) were in line with what was expected, and this was consistent across several countries. These results show positive evidence for the dimensionality of values, as proposed by Gouveia (2003, 2013). Nevertheless, it is important to mention that this measure of values might have limitations that can influence negatively on the model fit when testing this structure with a rigorous approach. When the structure was tested with CFA, limitations were found, but the subfunctions were still observed when less complex models were tested. The present thesis highlights the items that might be refined in future research.

Another contribution of the Functional Theory is related to the central goals. When Gouveia (2003, 2013) proposed his six-factor structure, four subfunctions were characterised by a type of orientation and a type of motivator/need. For instance, interactive values have a social orientation and represent thriving needs, normative values have a social orientation and represent survival needs, excitement values have a personal orientation and represent thriving needs, and promotion values have a personal orientation and represent survival needs. However, some values are neither personal nor social, and some authors refer to them as "mixed values" (Schwartz, 1992; Schwartz & Bilsky, 1987), but without a reason as to why they are categorised in such way. According to Gouveia (2003, 2013) the explanation for these values is in the representation of needs. Survival and thriving needs interact with social and personal goals to form the interactive, normative, excitement, and promotion subfunctions, but they also produce another type of orientation – which Gouveia refers as "central goals" – focused on needs. Gouveia's conceptualisation of needs is inspired by Maslow's hierarchy of needs (Maslow, 1973), and Inglehart's dichotomy of materialistic and post-materialistic values (Inglehart, 1977).

A clear definition for the mixed or central goals is important because it can impact on the way that results are interpreted. For instance, a lack of conceptualisation of "mixed values" might have impacted on the items designed by Schwartz to measure his motivational type of security. Security is similar to Gouveia's existence subfunction, but somewhat different in focus. For Gouveia (2003, 2013), basic needs should represent existence values without a clear focus on social or personal orientation. However, Schwartz's security motivational type of value has social components that push these values to have a social

focus. Study 4 highlighted how a different conceptualisation of existence values might contribute to the literature about environmentalism. The focus on basic needs might be the reason why existence values were activated to predict carbon emission concerns. This is important to be further investigated because the effects reported with cross-sectional and cross-lagged data using existence values were not observed in previous research using Schwartz's security motivational type.

Limitations and Future Research

First, one key limitation is the number of items used by Gouveia to represent his Functional Theory. As he developed only three items per factor, it is difficult to check whether a different configuration of items per subfunction (e.g., removing items) would present a better fit. As aforementioned, some items did not fit well in the subfunctions they were supposed to fit when using the strict CFA with zero cross-loadings and residual correlations, but the low number of items limited the testing of alternatives. Future studies are necessary to test the structure of values as proposed by Gouveia (2003, 2013) with an improved set of items. Correlations within values items are usually strong, even when they are supposed to belong to different subfunctions. In this case, when an item is not specific enough, it might be that the subfunction is also not homogeneous enough, which can contribute to poor model fit overall. For instance, a high correlation between subfunctions can make the correlation matrix not positive definite indicating that the model was not identified (Wothke, 1993).

In the present thesis, a non-positive correlation matrix was observed when testing Gouveia's model in each of the countries (when using the strict CFA as a method of factor reduction). This means that the items that compose each subfunction are not homogenous enough, since cross-loadings were identified to be one of the main reasons for the model misspecification. In this case, Gouveia's full model of values fails to show that latent factors of values can be identified under the strict CFA assumptions. This is a considerable limitation of the theory and it questions the feasibility of Gouveia's model. This limitation also raises concerns about what values are methodologically if a latent model cannot be fit. How should we interpret value correlations with external outcomes if value dimensions cannot provide enough evidence that they represent unique content? This is an important question since most part of the value literature shows correlational studies using values as manifest variables and not latent. This certainly limits the findings because it questions the accuracy of the results and robustness of the interpretations.

Value theories try to contour the lack of evidence of latent structure by saying that correlations are expected because values are a circular continuum and the selection of dimensions are arbitrary (Schwartz, 2014) or that different dimensions can share the same goals and needs (Gouveia et al. 2014a). However, although value theories expect correlation between value clusters, there is a selection of specific items for each cluster and specific hypothesis for their correlation with external outcomes. Therefore, although a latent model does not fit the data, the interpretation commonly used is as if a latent model was provided. Critics may wonder if such interpretations are justified or not. The present thesis contributes to this debate by applying recent developments in the measurement theory: estimation of latent models using Bayesian estimation and approximate to zero cross-loadings and residual correlations. In this case, this recent literature shows that the conventional CFA with zero cross-loadings and residual correlations is unnecessarily strict and might be unsuitable to examine the structure of complex theories. Muthén and Asparouhov (2011) show that this is the case for models of personality and the present thesis shows that this also seems to be the case for value theories. However, as the method is recent and this is the first time it is used for a value theory, future research should use this method to examine other complex theories as well.

In this case, the present thesis contributes with the discussion about the utility of a model that does not satisfy strict CFA, but shows acceptable psychometric qualities when using a more liberal approach. It is known that value scales are based on a heterogenous pool of items that are purposefully designed to cover a vast range of content (Knoppen & Saris, 2009). In this case, should researchers design items that are homogenous in detriment of covering the content the dimensions they are supposed to cover just to fit strict CFA and to show high reliability? This is an answer that we do not provide in this thesis, but the results provided here can contribute to this discussion, since the correlational results presented are not random but are well explained by the theory. For instance, Graham et al. (2011) argued that “it is better to have dissimilar items that are moderately correlated but that each capture a different facet... than it is to have similar items that are highly correlated and capture only a small amount of the [dimensions] scope" (p. 370). However, it is important that future studies make an extensive examination of more homogeneous items in order to test whether there is a loss in explanation of external outcomes when the fit is emphasized over the content.

Another important limitation of the thesis was the testing of cross-cultural differences on the effects of age and gender in values importance, it might be that having 1000

participants per country is not robust enough. Future research should be composed of more participants per country so that linear and non-linear effects are better understood, especially when comparing different cultures.

In Study 3, there was a limitation with the measure of social capital. Social capital offline is more attitudinal and social capital online is more behavioural. Although this is the same way that several studies have used these factors (Gil de Zúñiga & Valenzuela, 2012; Gil de Zúñiga et al., 2016), future research would benefit from a more standardised measurement. This criticism can be also directed to the third factor of social capital (reflection on conversations). A more standardised set of items will bring increased understanding of the configuration of social capital and its impact on political participation. For Study 4, a better measure of carbon emission concerns would also contribute to the robustness of the findings. In the findings of this study, there is bold speculation about the possible impact that perception of threat from climate change might have influenced the prediction of existence values. This is an interesting finding, but it needs to be further investigated. More specifically, a clear measure of the perception of threat should be considered. For instance, it could examine whether the perception of threat from climate change moderates the link between existence values and environmental attitudes or behaviours.

Conclusion

The present thesis provides the first peer-reviewed cross-cultural testing of the Functional Theory and the first cross-cultural comparisons in terms of correlations with external outcomes. The four papers developed will contribute to the visibility of the Functional Theory, and it should contribute to the field of values since a more parsimonious and theoretically grounded set of subfunctions were examined. The present thesis also contributes to the relationship between values and external outcomes in a broad way. I presented a structural equation model including values, social capital and political participation. This model is especially interesting because it can show how values with social goals can predict political participation. In previous literature, social goals were usually negatively or non-significantly related to political participation. However, based on the results from the present thesis, social goals do influence political participation positively through social capital. As mentioned earlier, this thesis also contributed to the theory surrounding the conceptualisation of central goals. Study 4 showed correlations for existence values that have not been reported before, which might be because of the way values are conceptualised. Finally, I contribute with findings examining the patterns of values change,

which are scarce in the literature, and with cross-cultural testing considering non-European countries, since Europe is the focus of the majority of studies with values.

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Supplementary materials Study 1

Table A1

Raw stress per item and per country

	Int1	Int2	Int3	Nor1	Nor2	Nor3	Sup1	Sup2	Sup3	Exi1	Exi2	Exi3	Exc1	Exc2	Exc3	Pro1	Pro2	Pro3
Argentina	.034	.032	.057	.024	.026	.173	.040	.077	.097	.027	.084	.041	.152	.105	.045	.034	.082	.104
Brazil	.070	.023	.022	.027	.038	.079	.035	.050	.031	.024	.025	.023	.073	.067	.017	.022	.031	.067
Chile	.046	.016	.040	.055	.063	.238	.060	.049	.041	.040	.035	.040	.072	.040	.023	.031	.095	.112
China	.062	.062	.070	.025	.056	.357	.103	.144	.084	.036	.071	.078	.124	.040	.061	.041	.037	.030
Estonia	.096	.126	.160	.048	.092	.296	.097	.090	.055	.055	.081	.032	.092	.062	.075	.032	.027	.044
Germany	.077	.066	.105	.050	.123	.233	.102	.045	.057	.072	.105	.092	.086	.047	.075	.065	.139	.109
Indonesia	.031	.039	.029	.009	.029	.019	.058	.021	.035	.015	.022	.018	.076	.057	.014	.014	.060	.019
Italy	.043	.041	.087	.021	.023	.233	.098	.056	.038	.032	.062	.034	.082	.057	.050	.020	.119	.175
Japan	.081	.108	.104	.050	.068	.363	.069	.143	.063	.063	.057	.064	.089	.068	.184	.068	.085	.059
Korea	.053	.044	.108	.052	.061	.184	.061	.078	.077	.055	.071	.064	.145	.050	.117	.049	.180	.059
NZ	.030	.032	.096	.027	.067	.192	.048	.053	.053	.067	.111	.052	.067	.043	.034	.005	.085	.101
Philippines	.034	.056	.050	.027	.071	.227	.072	.135	.071	.058	.071	.053	.044	.060	.091	.034	.043	.045
Poland	.028	.038	.037	.017	.030	.183	.042	.055	.026	.042	.046	.021	.035	.024	.045	.027	.059	.079
Russia	.087	.037	.054	.029	.020	.241	.040	.093	.036	.038	.063	.035	.057	.079	.100	.016	.114	.077
Spain	.073	.057	.079	.031	.103	.232	.050	.078	.049	.042	.065	.069	.108	.083	.072	.040	.145	.155
Taiwan	.026	.058	.042	.032	.029	.260	.025	.065	.020	.048	.104	.048	.104	.081	.068	.012	.114	.078
Turkey	.051	.035	.036	.017	.076	.107	.071	.047	.038	.020	.085	.027	.147	.072	.064	.007	.054	.054
UK	.059	.073	.085	.033	.052	.226	.064	.055	.044	.058	.092	.091	.071	.021	.067	.024	.130	.087
Ukraine	.023	.042	.033	.048	.024	.262	.026	.051	.030	.045	.045	.028	.038	.113	.081	.024	.075	.081
USA	.036	.056	.082	.015	.078	.074	.036	.034	.035	.032	.068	.028	.058	.030	.034	.018	.076	.061
Pooled-within	.018	.028	.050	.020	.045	.305	.045	.039	.032	.042	.063	.042	.052	.066	.029	.032	.103	.101

Note. Int1 = Belonging, Int2 = Social Support, Int3 = Affectivity, Nor1 = Obedience, Nor2 = Tradition, Nor3 = Religiosity, Sup1 = Beauty, Sup2 = Maturity, Sup3 = Knowledge, Exi1 = Personal Stability, Exi2 = Survival, Exi3 = Health, Exc1 = Sexuality, Exc2 = Emotion, Exc3 = Pleasure, Pro1 = Success, Pro2 = Power, Pro3 = Prestige.

Table A2.

Examining alternative structure of values with three, two, and one factor, and a Robust-ML estimator

	Robust ML estimator											
	3 Factors				2 Factors				1 Factor			
	X2 (132)	CFI	RMSEA	SRMR	X2 (134)	CFI	RMSEA	SRMR	X2 (135)	CFI	RMSEA	SRMR
Argentina	844.38[a]	.710	.096	.083	917.25	.681	.100	.087	921.17	.680	.100	.087
Brazil	838.53	.801	.099	.076	861.87	.795	.100	.079	860.44	.795	.099	.079
Chile	726.34[a]	.729	.097	.085	761.89	.714	.099	.088	763.31	.713	.099	.087
China	795.11[a]	.822	.098	.084	867.75	.803	.102	.086	871.01	.802	.102	.086
Estonia	1052.89	.705	.111	.101	1369.85	.605	.128	.109	1353.54	.610	.126	.109
Germany	895.24[a]	.649	.105	.098	921.30	.638	.105	.099	942.49	.629	.106	.099
Indonesia	919.45	.816	.106	.086	935.18	.813	.106	.090	938.20	.813	.106	.090
Italy	919.46	.724	.109	.098	1064.49[a]	.674	.118	.103	1061.17	.675	.117	.103
Japan	984.02	.688	.118	.114	1006.20	.680	.119	.117	1006.46	.681	.118	.116
Korea	749.98	.753	.098	.081	789.75	.737	.100	.084	787.34	.739	.100	.084
NZ	963.55	.658	.104	.090	1113.53	.597	.112	.097	1126.31	.593	.112	.097
Philippines	1050.63[a]	.764	.116	.091	1095.51[a]	.753	.117	.092	1096.37	.753	.117	.092
Poland	845.15	.712	.102	.110	1067.75	.623	.116	.111	1068.37	.623	.115	.111
Russia	924.34	.708	.102	.089	957.80	.696	.104	.092	947.83	.700	.103	.092
Spain	1046.34	.686	.116	.110	1056.95	.683	.116	.113	1058.11	.683	.116	.113
Taiwan	851.31	.777	.102	.080	880.273	.769	.103	.082	892.04	.766	.104	.082
Turkey	879.27[a]	.764	.108	.092	916.17[a]	.753	.110	.089	923.67	.751	.110	.089
UK	954.33	.706	.109	.094	1114.34	.650	.118	.101	1124.92	.646	.118	.102
Ukraine	905.36	.712	.099	.091	933.56	.702	.100	.094	931.88	.703	.099	.094
USA	922.82[a]	.711	.102	.095	1102.14	.646	.112	.099	1106.24	.645	.099	.112

a = countries which the correlation matrix was non positive definite.

Table A3.

Examining alternative structure of values with three, two, and one factor, and a Bayesian estimator (approximate zero cross-loadings and exact zero residual correlations)

	Bayes Estimator Prior = .001 for cross-loadings											
	3 Factors Social, Central and Personal goals				2 Factors Thriving and Survival needs				1 Factor General factor			
	PPP	CFI	RMSEA	95% C.I.	PPP	CFI	RMSEA	95% C.I.	PPP	CFI	RMSEA	95% C.I.
Argentina	.000	.740	.103	771.02, 876.65	.000	.681	.113	969.20, 1053.20	.000	.679	.113	976.15, 1062.42
Brazil	.000	.808	.116	947.24, 1048.31	.000	.749	.120	1024.76, 1115.30	.000	.794	.120	1027.47, 1115.02
Chile	.000	.751	.108	690.82, 792.181	.000	.718	.114	798.05, 884.95	.000	.712	.115	815.09, 902.83
China	.000	.849	.106	720.66, 839.54	.000	.804	.120	972.51, 1059.12	.000	.802	.120	981.75, 1069.25
Estonia	.000	.751	.117	956.61, 1053.87	.000	.612	.143	1524.24, 1610.91	.000	.612	.143	1530.63, 1612.03
Germany	.000	.660	.117	962.97, 1062.73	.000	.640	.123	1025.04, 1121.26	.000	.622	.126	1080.82, 1170.49
Indonesia	.000	.872	.110	776.46, 898.40	.000	.807	.133	1218.39, 1307.95	.000	.806	.134	1228.66, 1314.63
Italy	.000	.775	.119	855.09, 966.98	.000	.666	.141	1307.63, 1400.11	.000	.666	.142	1305.66, 1399.15
Japan	.000	.697	.144	1248.14, 1375.98	.000	.676	.150	1363.84, 1446.48	.000	.674	.150	1372.64, 1457.04
Korea	.000	.755	.116	838.35, 926.97	.000	.731	.121	925.20, 1011.90	.000	.731	.121	927.92, 1014.92
NZ	.000	.702	.111	886.76, 992.59	.000	.606	.126	1204.96, 1288.76	.000	.599	.127	1222.91, 1308.51
Philippines	.000	.794	.131	1141.54, 1279.62	.000	.756	.142	1388.92, 1479.11	.000	.756	.143	1390.71, 1476.76
Poland	.000	.752	.114	836.83, 937.11	.000	.618	.140	1321.84, 1408.02	.000	.617	.139	1328.39, 1413.50
Russia	.000	.741	.116	959.67, 1069.06	.000	.691	.125	1162.76, 1254.47	.000	.691	.126	1167.35, 1261.52
Spain	.000	.694	.133	1199.12, 1295.11	.000	.684	.136	1240.86, 1329.95	.000	.682	.136	1250.67, 1337.27
Taiwan	.000	.799	.121	936.17, 1050.82	.000	.763	.129	1129.69, 1218.51	.000	.758	.131	1158.42, 1243.14
Turkey	.000	.805	.117	823.30, 926.54	.000	.745	.131	1095.64, 1183.58	.000	.745	.133	1098.54, 1185.57
UK	.000	.738	.119	933.01, 1048.443	.000	.654	.136	1263.86, 1351.31	.000	.646	.137	1289.61, 1378.73
Ukraine	.000	.755	.112	926.76, 1045.89	.000	.696	.123	1183.14, 1273.42	.000	.695	.124	1184.26, 1275.97
USA	.000	.749	.108	824.65, 933.02	.000	.647	.126	1187.48, 1271.49	.000	.642	.127	1206.90, 1290.50

Table A4.

Confirmatory Factor Analysis with Bayesian estimation

	Model 3 Bayes Estimator Prior = .001 for cross-loadings and *d* = 200 for residuals			
	PPP	CFI	RMSEA	95% C.I.
Argentina	.025	.980	.054	.119, 121.582
Brazil	.028	.988	.055	-1.892, 126.433
Chile	.009	.976	.066	13.997, 128.733
China	.150	.994	.034	-26.345, 81.683
Estonia	.004	.980	.061	20.759, 144.990
Germany	.009	.972	.064	16.664, 145.062
Indonesia	.020	.990	.046	3.434, 123.442
Italy	.008	.981	.063	11.949, 139.603
Japan	.051	.987	.051	-7.656, 111.469
Korea	.061	.988	.045	-14.659, 108.847
NZ	.009	.977	.061	12.216, 137.104
Philippines	.045	.992	.043	-10.145, 106.265
Poland	.012	.982	.057	8.075, 120.032
Russia	.019	.982	.059	3.636, 137.716
Spain	.035	.986	.056	-3.528, 119.065
Taiwan	.017	.988	.050	5.743, 122.692
Turkey	.005	.982	.065	20.318, 151.502
UK	.004	.981	.060	18.615, 133.137
Ukraine	.004	.981	.062	15.671, 143.476
USA	.001	.976	.067	22.699, 147.112

Table A5.

CFA with Robust-ML estimation and second order factors

	Robust ML estimator High Order Factors											
	3 second order factors and 6 first order factors				2 second order factors and 6 first order factors				1 second order factor and 6 first order factors			
	X2 (126)	CFI	RMSEA	SRMR	X2 (128)	CFI	RMSEA	SRMR	X2 (129)	CFI	RMSEA	SRMR
Argentina	836.81[a]	.711	.098	.080	861.98[a]	.702	.099	.084	859.94[a]	.703	.099	.084
Brazil	810.26[a]	.807	.100	.076	811.11[a]	.807	.099	.077	811.02[a]	.808	.098	.077
Chile	690.05[a]	.743	.097	.082	711.64[a]	.734	.098	.086	707.73[a]	.736	.097	.085
China	756.25[a]	.831	.098	.088	801.06	.819	.100	.089	798.89	.820	.100	.089
Estonia	1037.95[a]	.708	.113	.100	1201.85[a]	.656	.122	.104	1170.10[a]	.667	.119	.105
Germany	819.43[a]	.681	.102	.094	817.54[a]	.683	.101	.095	818.30[a]	.683	.101	.096
Indonesia	925.35[a]	.814	.110	.141	881.37[a]	.824	.105	.087	880.83[a]	.825	.105	.087
Italy	844.78[a]	.748	.107	.093	938.02[a]	.716	.113	.099	950.35	.712	.113	.099
Japan	943.29[a]	.701	.118	.112	954.74[a]	.697	.118	.114	952.69[a]	.698	.117	.113
Korea	694.29[a]	.772	.096	.079	725.71[a]	.761	.098	.080	726.82[a]	.761	.098	.081
NZ	948.87[a]	.662	.106	.095	1041.34[a]	.625	.110	.092	1030.83[a]	.629	.109	.092
Philippines	1023.15[a]	.769	.117	.089	1033.69[a]	.767	.117	.089	1041.98[a]	.765	.117	.090
Poland	826.82[a]	.717	.103	.116	983.52[a]	.655	.113	.131	980.26[a]	.657	.130	.130
Russia	880.53[a]	.722	.102	.086	884.68[a]	.721	.102	.087	879.34[a]	.723	.101	.088
Spain	1089.59[a]	.670	.122	.156	1157.17[a]	.647	.125	.163	1166.02[a]	.644	.125	.160
Taiwan	797.50[a]	.792	.101	.077	823.60[a]	.785	.102	.079	823.41	.785	.102	.079
Turkey	796.20[a]	.788	.105	.082	814.416[a]	.783	.106	.085	820.33[a]	.782	.106	.085
UK	864.40[a]	.736	.106	.091	949.25	.707	.110	.096	942.76	.709	.110	.096
Ukraine	891.46[a]	.715	.101	.090	879.68[a]	.720	.099	.091	882.42[a]	.720	.099	.092
USA	886.36[a]	.722	.103	.090	977.01[a]	.689	.108	.093	973.61[a]	.691	.107	.093

a = analyses which the correlation matrix was non positive definite.

Table A6.

CFA of Social Goals

	Model 1				Model 2				Model 3			
	χ^2	CFI	SRMR	RMSEA	χ^2	CFI	SRMR	RMSEA	χ^2	CFI	SRMR	RMSEA
Argentina	57.328	.890	.050	.103	16.218	.958	.028	.072	54.420	.899	.051	.093
Brazil	81.065	.891	.056	.129	17.636	.972	.031	.079	75.154	.901	.055	.116
Chile	38.210	.921	.046	.089	1.249	.977	.025	.057	38.922	.922	.047	.083
China	5.281	.944	.048	.100	3.557	.955	.046	.113	76.168	.911	.047	.119
Estonia	5.244[a]	.909	.047	.097	18.461	.953	.031	.080	5.117	.911	.048	.090
Germany	77.173	.842	.060	.128	1.818	.978	.029	.057	78.320	.842	.064	.121
Indonesia	46.374[a]	.964	.031	.095	26.324	.969	.026	.103	49.899	.962	.032	.093
Italy	97.264	.861	.060	.150	45.766	.907	.050	.145	95.810	.864	.062	.139
Japan	59.748[a]	.895	.052	.118	3.071	1.000	.014	.000	57.001	.902	.052	.107
Korea	47.243	.925	.041	.100	12.700	.973	.028	.067	46.396	.928	.041	.092
NZ	28.146	.951	.035	.066	8.347	.983	.020	.043	3.353	.948	.038	.064
Philippines	46.791[a]	.944	.036	.097	21.846	.962	.031	.093	52.286	.938	.037	.096
Poland	67.019	.899	.049	.119	4.858	.998	.016	.020	59.637	.913	.052	.104
Russia	115.928[a]	.814	.072	.154	7.418	.990	.024	.039	114.905	.818	.071	.143
Spain	333.560[a]	.392	.098	.282	59.686	.852	.069	.165	166.087	.707	.098	.185
Taiwan	67.899	.920	.047	.120	19.909	.965	.031	.087	84.813	.899	.052	.127
Turkey	62.061[a]	.913	.050	.119	49.775	.903	.051	.154	59.937	.918	.050	.108
UK	44.631	.921	.045	.093	6.901	.991	.018	.037	62.119	.885	.051	.106
Ukraine	7.323	.888	.052	.114	11.241	.981	.025	.055	65.607	.898	.053	.103
USA	46.788	.922	.041	.092	1.548	.979	.021	.053	49.033	.920	.044	.088

a = analyses which the correlation matrix was non positive definite.

Table A7.

CFA of Central Goals

	Model 1				Model 2				Model 3			
	χ^2	CFI	SRMR	RMSEA	χ^2	CFI	SRMR	RMSEA	χ^2	CFI	SRMR	RMSEA
Argentina	24.081	.965	.033	.059	3.910	1.000	.017	.000	27.121	.961	.035	.059
Brazil	68.778[a]	.937	.041	.118	22.034	.971	.024	.091	74.760	.931	.043	.116
Chile	57.126[a]	.895	.050	.113	22.696	.939	.034	.099	56.001	.899	.050	.105
China	65.233	.939	.039	.117	32.637	.961	.031	.117	76.327	.928	.042	.119
Estonia	5.823	.941	.044	.097	23.039	.958	.039	.092	69.902	.917	.050	.109
Germany	38.091	.905	.050	.084	14.000	.948	.032	.071	4.321	.901	.052	.081
Indonesia	39.583	.970	.031	.086	15.193	.986	.020	.073	41.088	.970	.032	.082
Italy	29.859	.968	.033	.074	2.487	1.000	.014	.000	37.559	.958	.036	.080
Japan	76.354	.889	.068	.136	26.334	.945	.044	.110	86.752	.874	.072	.137
Korea	47.822	.923	.048	.101	12.852	.972	.031	.067	58.445	.904	.056	.106
NZ	56.980	.874	.052	.102	8.201	.982	.025	.042	59.505	.870	.054	.098
Philippines	49.219	.951	.047	.100	19.981	.970	.027	.088	51.050	.950	.047	.095
Poland	66.794	.880	.776	.119	13.187	.968	.028	.066	66.746	.883	.059	.111
Russia	42.102	.944	.043	.086	17.767	.964	.028	.078	48.295	.935	.043	.087
Spain	38.263	.960	.039	.086	11.258	.984	.021	.060	44.017	.954	.042	.087
Taiwan	84.160	.909	.041	.135	25.853	.962	.030	.102	93.991	.899	.048	.135
Turkey	114.844[a]	.870	.064	.167	86.968[a]	.854	.062	.208	123.027	.861	.068	.162
UK	4.267	.952	.045	.088	6.907	.994	.022	.037	67.125	.913	.058	.111
Ukraine	37.262	.953	.037	.078	5.918	.995	.018	.028	39.537	.951	.039	.075
USA	58.382	.917	.049	.105	13.480	.977	.026	.064	64.541	.908	.054	.104

a = analyses which the correlation matrix was non positive definite.

Table A8.

CFA of Personal Goals

	Model 1				Model 2				Model 3			
	χ^2	CFI	SRMR	RMSEA	χ^2	CFI	SRMR	RMSEA	χ^2	CFI	SRMR	RMSEA
Argentina	54.551	.887	.049	.100	18.932	.955	.031	.080	57.698	.882	.048	.096
Brazil	68.831	.868	.058	.118	54.945	.862	.055	.153	66.107	.876	.058	.108
Chile	116.435	.759	.073	.168	19.542	.955	.025	.090	103.161	.790	.065	.148
China	87.120[a]	.878	.053	.137	27.158	.949	.035	.105	84.655	.883	.054	.127
Estonia	79.686	.897	.044	.126	78.952	.857	.047	.182	79.698	.898	.044	.118
Germany	69.090	.858	.058	.120	33.249	.904	.043	.118	76.949	.842	.061	.119
Indonesia	107.024	.835	.076	.153	34.163	.933	.045	.119	105.287	.839	.074	.142
Italy	85.911[a]	.866	.057	.140	45.658	.900	.049	.145	88.549	.863	.059	.133
Japan	89.960	.803	.080	.149	12.526	.971	.032	.068	91.512	.802	.075	.141
Korea	39.017	.927	.044	.089	5.409	.995	.021	.027	41.543	.924	.043	.086
NZ	85.677	.867	.053	.129	74.140	.853	.046	.173	84.275	.871	.054	.120
Philippines	114.049[a]	.815	.071	.160	7.980	.990	.020	.044	111.504	.821	.069	.148
Poland	57.825	.897	.058	.109	21.131	.956	.033	.091	57.495	.900	.056	.102
Russia	58.325	.890	.047	.105	3.975	.925	.036	.109	58.274	.892	.047	.098
Spain	146.890	.684	.103	.184	42.601	.879	.052	.137	17.218	.633	.092	.187
Taiwan	4.500[a]	.931	.042	.088	23.128	.945	.035	.096	4.138	.934	.042	.081
Turkey	56.441	.888	.046	.112	52.454	.850	.045	.159	6.166	.881	.048	.109
UK	87.518[a]	.856	.051	.137	64.129	.847	.046	.169	87.172	.859	.051	.129
Ukraine	115.947[a]	.786	.069	.150	56.626[a]	.862	.051	.148	115.798	.788	.069	.141
USA	49.068	.922	.040	.095	36.437	.924	.040	.119	48.866	.925	.040	.088

a = analyses which the correlation matrix was non positive definite.

Table A9.

Correlation Matrix between the 18 items from the BVS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Belonging	1																
2. Social Sup.	.429**	1															
3. Affectivity	.361**	.528**	1														
4. Obedience	.511**	.480**	.422**	1													
5. Tradition	.528**	.371**	.327**	.515**	1												
6. Religiosity	.371**	.184**	.211**	.264**	.302**	1											
7. Beauty	.462**	.368**	.318**	.355**	.453**	.223**	1										
8. Maturity	.399**	.538**	.490**	.482**	.396**	.147**	.425**	1									
9. Knowledge	.370**	.494**	.365**	.343**	.347**	.236**	.464**	.431**	1								
10. Per. Stability	.492**	.464**	.385**	.587**	.461**	.203**	.377**	.481**	.342**	1							
11. Survival	.341**	.529**	.472**	.499**	.354**	0.007	.315**	.620**	.319**	.484**	1						
12. Health	.372**	.531**	.534**	.469**	.358**	.197**	.329**	.532**	.392**	.432**	.528**	1					
13. Sexuality	.276**	.307**	.383**	.247**	.275**	.110**	.303**	.358**	.328**	.296**	.269**	.280**	1				
14. Emotion	.275**	.285**	.247**	.173**	.216**	.196**	.345**	.284**	.508**	.170**	.140**	.248**	.273**	1			
15. Pleasure	.161**	.289**	.250**	.174**	.146**	.100**	.221**	.274**	.287**	.212**	.188**	.325**	.326**	.350**	1		
16. Success	.382**	.582**	.448**	.493**	.366**	.182**	.386**	.588**	.491**	.480**	.462**	.505**	.346**	.367**	.323**	1	
17.Power	.230**	.176**	.149**	.105**	.203**	.336**	.252**	.159**	.360**	.176**	-.005	.130**	.287**	.481**	.294**	.309**	1
18. Prestige	.268**	.215**	.152**	.137**	.227**	.301**	.266**	.180**	.311**	.225**	.017*	.188**	.295**	.320**	.389**	.295**	.545**

** = p< .005, * = p < .05

Supplementary materials Study 2

Table A10.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Argentina

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.57	0.87	.59							
2. Normative	5.69	1.01	.64	.58**						
3. Suprapersonal	5.47	0.87	.57	.54**	.48**					
4. Existence	5.90	0.81	.65	.63**	.57**	.54**				
5. Excitement	4.97	1.02	.53	.36**	.23**	.47**	.34**			
6. Promotion	4.45	1.08	.60	.31**	.24**	.36**	.31**	.50**		
7. Age	40.76	14.30	-	.21**	.21**	.12**	.13**	-.01	-.06	
8. Sex $_{(M=1, F=2)}$	0.52	0.50	-	.06*	.05	.13**	.07**	-.05	-.06	-.10**

* $p < .05$, ** $p < .01$.

Table A11.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Brazil

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.44	1.08	.71							
2. Normative	5.58	1.19	.62	.69**						
3. Suprapersonal	5.56	1.07	.74	.74**	.67**					
4. Existence	5.88	1.06	.79	.72**	.72**	.75**				
5. Excitement	4.94	1.11	.59	.52**	.37**	.56**	.45**			
6. Promotion	4.83	1.12	.63	.51**	.39**	.52**	.44**	.60**		
7. Age	35.87	12.04	-	.18**	.22**	.10**	.17**	-.01	.01	
8. Sex (M=1, F=2)	0.50	0.50	-	-.03	.02	.00	.04	-.13**	-.09**	-.07*

* $p < .05$, ** $p < .01$.

Table A12.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Chile

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.42	0.97	.63							
2. Normative	5.51	1.11	.65	.59**						
3. Suprapersonal	5.41	0.99	.65	.60**	.52**					
4. Existence	5.72	0.93	.67	.67**	.62**	.64**				
5. Excitement	5.05	1.07	.64	.50**	.36**	.55**	.51**			
6. Promotion	4.61	1.06	.54	.39**	.25**	.44**	.38**	.58**		
7. Age	35.05	13.10	-	.23**	.28**	.16**	.24**	.02	-.04	
8. Sex (M=1, F=2)	0.51	0.50	-	.06	.10**	.06*	.10**	-.06	-.10**	-.02

* $p < .05$, ** $p < .01$.

Table A13.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in China

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.22	0.94	.78							
2. Normative	5.44	1.01	.80	.66**						
3. Suprapersonal	5.06	0.91	.77	.71**	.59**					
4. Existence	5.43	0.94	.77	.75**	.74**	.68**				
5. Excitement	4.64	0.95	.60	.47**	.32**	.62**	.40**			
6. Promotion	4.82	0.98	.73	.59**	.40**	.65**	.49**	.68**		
7. Age	38.66	11.98	-	-.02	.16**	-.05	.08**	-.11**	-.08**	
8. Sex (M=1, F=2)	0.44	0.50	-	.04	.03	.04	.04	-.02	.01	-.15**

* $p < .05$, ** $p < .01$.

Table A14.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Estonia

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.40	0.86	.56							
2. Normative	5.51	0.92	.63	.56**						
3. Suprapersonal	5.05	0.87	.64	.53**	.50**					
4. Existence	5.92	0.80	.68	.65**	.59**	.50**				
5. Excitement	4.47	1.04	.60	.45**	.14**	.45**	.34**			
6. Promotion	4.05	1.02	.70	.36**	.12**	.35**	.25**	.60**		
7. Age	47.80	17.16	-	-.02	.26**	.09**	.04	-.33**	-.28**	
8. Sex (M=1, F=2)	0.49	0.50	-	.13**	.08**	.11**	.19**	-.02	-.01	-.14**

* $p < .05$, ** $p < .01$.

Table A15.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Germany

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.38	0.91	.61							
2. Normative	4.95	1.03	.60	.48**						
3. Suprapersonal	5.09	0.89	.60	.52**	.37**					
4. Existence	5.65	0.83	.59	.64**	.53**	.49**				
5. Excitement	4.80	0.98	.59	.41**	.27**	.51**	.41**			
6. Promotion	3.98	1.07	.64	.23**	.37**	.31**	.24**	.49**		
7. Age	45.10	15.07	-	.12**	.12**	.10**	.05	-.05	-.11**	
8. Sex (M=1, F=2)	0.54	0.50	-	.17**	.07*	.11**	.22**	-.02	.00	-.21**

* $p < .05$, ** $p < .01$.

Table A16.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Indonesia

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.50	0.92	.78							
2. Normative	5.58	1.03	.78	.76**						
3. Suprapersonal	5.30	0.94	.75	.77**	.75**					
4. Existence	5.73	0.99	.85	.82**	.79**	.77**				
5. Excitement	4.93	0.98	.68	.57**	.47**	.64**	.50**			
6. Promotion	4.83	1.00	.65	.48**	.40**	.57**	.40**	.68**		
7. Age	32.75	9.88	-	.15**	.12**	.09**	.17**	.02	-.02	
8. Sex (M=1, F=2)	0.39	0.49	-	-.03	-.03	-.01	.02	-.06*	-.03	-.13**

* $p < .05$, ** $p < .01$.

Table A17.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Italy

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.40	0.96	.68							
2. Normative	5.32	1.11	.71	.63**						
3. Suprapersonal	5.32	0.97	.72	.61**	.51**					
4. Existence	5.71	0.94	.72	.70**	.60**	.63**				
5. Excitement	4.67	1.10	.63	.36**	.20**	.47**	.34**			
6. Promotion	4.54	1.08	.62	.41**	.27**	.45**	.34**	.63**		
7. Age	41.72	13.15	-	.11**	.20**	.08*	.06*	-.14**	-.10**	
8. Sex (M=1, F=2)	0.55	0.50	-	.15**	.09**	.09**	.13**	-.11**	-.05	-.04

* $p < .05$, ** $p < .01$.

Table A18.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Japan

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	4.33	0.99	.72							
2. Normative	4.29	0.99	.73	.66**						
3. Suprapersonal	4.16	0.92	.68	.68**	.57**					
4. Existence	4.85	1.03	.76	.66**	.65**	.55**				
5. Excitement	4.13	0.95	.61	.61**	.44**	.71**	.47**			
6. Promotion	3.76	0.96	.66	.47**	.34**	.60**	.25**	.63**		
7. Age	46.69	12.88	-	.07*	.11**	-.03	.05	-.09**	-.04	
8. Sex (M=1, F=2)	0.42	0.49	-	.08**	.01	-.02	.06*	-.12**	-.10**	-.10**

* $p < .05$, ** $p < .01$.

Table A19.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Korea

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	4.93	0.85	.69							
2. Normative	4.97	0.91	.66	.58**						
3. Suprapersonal	4.92	0.84	.68	.62**	.45**					
4. Existence	5.41	0.88	.76	.60**	.55**	.57**				
5. Excitement	4.70	0.90	.62	.53**	.35**	.65**	.43**			
6. Promotion	4.70	0.88	.67	.61**	.41**	.62**	.44**	.58**		
7. Age	38.87	12.71	-	.10**	.24**	.02	.09**	-.04	.06	
8. Sex (M=1, F=2)	0.47	0.50	-	.04	-.03	.02	.04	-.08*	-.02	-.19**

* $p < .05$, ** $p < .01$.

Table A20.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in New Zealand

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.21	0.87	.58							
2. Normative	5.02	0.98	.61	.45**						
3. Suprapersonal	4.90	0.86	.59	.54**	.35**					
4. Existence	5.73	0.76	.60	.57**	.48**	.47**				
5. Excitement	4.38	1.03	.58	.36**	.19**	.44**	.31**			
6. Promotion	4.09	0.97	.64	.30**	.22**	.43**	.24**	.56**		
7. Age	49.54	17.32	-	.05	.20**	-.01	.09**	-.20**	-.21**	
8. Sex (M=1, F=2)	0.56	0.50	-	.06	-.03	.02	.07*	-.09**	-.06*	-.19**

* $p < .05$, ** $p < .01$.

Table A21. *Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Philippines*

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.68	0.94	.76							
2. Normative	5.76	1.01	.68	.70**						
3. Suprapersonal	5.49	0.91	.68	.73**	.68**					
4. Existence	6.01	0.96	.84	.80**	.73**	.69**				
5. Excitement	5.15	0.99	.63	.62**	.44**	.63**	.51**			
6. Promotion	4.93	1.02	.63	.50**	.35**	.55**	.37**	.64**		
7. Age	34.18	10.99	-	.10**	.11**	.07*	.17**	-.02	-.02	
8. Sex (M=1, F=2)	0.61	0.49	-	.06	.04	-.01	.09**	-.06	-.05	-.05

* $p < .05$, ** $p < .01$.

Table A22.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Poland

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.28	0.96	.69							
2. Normative	5.22	1.06	.73	.64**						
3. Suprapersonal	4.93	0.90	.62	.57**	.55**					
4. Existence	5.46	0.94	.70	.71**	.65**	.57**				
5. Excitement	4.49	1.01	.63	.40**	.25**	.51**	.36**			
6. Promotion	4.22	1.00	.61	.28**	.23**	.44**	.28**	.63**		
7. Age	41.96	14.51	-	.15**	.23**	.10**	.11**	-.08**	-.06*	
8. Sex (M=1, F=2)	0.54	0.50	-	.11**	.02	.78*	.13**	-.11**	-.10**	-.08**

* $p < .05$, ** $p < .01$.

Table A23.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Russia

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.37	0.90	.63							
2. Normative	5.26	1.06	.68	.63**						
3. Suprapersonal	5.28	0.92	.65	.66**	.49**					
4. Existence	5.70	0.94	.71	.69**	.58**	.62**				
5. Excitement	4.73	1.00	.53	.47**	.25**	.49**	.39**			
6. Promotion	4.60	1.04	.64	.47**	.31**	.50**	.39**	.60**		
7. Age	38.15	12.79	-	.11**	.19**	.10**	.14**	-.11**	-.13**	
8. Sex (M=1, F=2)	0.51	0.50	-	.09**	.02	.11**	.15**	.01	.00	-.09**

* $p < .05$, ** $p < .01$.

Table A24.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Spain

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.33	0.97	.64							
2. Normative	5.25	1.10	.63	.63**						
3. Suprapersonal	5.24	0.97	.70	.62**	.53**					
4. Existence	5.74	0.97	.76	.73**	.61**	.62**				
5. Excitement	4.97	0.96	.62	.54**	.38**	.56**	.50**			
6. Promotion	4.37	1.01	.55	.37**	.34**	.38**	.29**	.54**		
7. Age	40.94	12.63	-	.24**	.29**	.16**	.23**	.02	-.05	
8. Sex (M=1, F=2)	0.53	0.50	-	.10**	.04	.07*	.15**	-.02	-.06	-.09**

* $p < .05$, ** $p < .01$.

Table A25.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Taiwan

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.04	0.96	.78							
2. Normative	5.11	1.02	.75	.63**						
3. Suprapersonal	4.96	0.99	.79	.74**	.57**					
4. Existence	5.34	0.95	.76	.72**	.69**	.68**				
5. Excitement	4.53	0.97	.60	.50**	.32**	.63**	.41**			
6. Promotion	4.57	0.97	.68	.59**	.42**	.65**	.48**	.66**		
7. Age	36.29	10.89	-	-.01	.19**	-.02	.06	-.08**	-.03	
8. Sex (M=1, F=2)	0.51	0.50	-	.15**	.05	.09**	.12**	-.09**	-.02	-.11**

* $p < .05$, ** $p < .01$.

Table A26.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Turkey

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.62	1.09	.79							
2. Normative	5.39	1.12	.57	.71**						
3. Suprapersonal	5.42	1.02	.69	.78**	.76**					
4. Existence	5.67	1.08	.74	.78**	.73**	.78**				
5. Excitement	4.62	1.14	.56	.33**	.32**	.37**	.27**			
6. Promotion	4.96	1.11	.66	.53**	.46**	.56**	.46**	.52**		
7. Age	33.92	10.97	-	.11**	.10**	.06	.12**	-.07*	-.02	
8. Sex (M=1, F=2)	0.44	0.50	-	.14**	.08**	.07*	.08*	-.08*	.04	.01

* $p < .05$, ** $p < .01$.

Table A27.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in United Kingdom

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.17	0.96	.64							
2. Normative	5.11	1.16	.72	.49**						
3. Suprapersonal	4.96	0.97	.67	.60**	.39**					
4. Existence	5.65	0.90	.71	.60**	.53**	.52**				
5. Excitement	4.48	1.10	.61	.43**	.20**	.49**	.29**			
6. Promotion	4.13	1.10	.67	.34**	.26**	.44**	.24**	.58**		
7. Age	50.61	15.60	-	.16**	.28**	.05	.18**	-.16**	-.17**	
8. Sex (M=1, F=2)	0.54	0.50	-	.10**	.03	.06	.14**	-.08**	-.06*	-.09**

* $p < .05$, ** $p < .01$.

Table A28.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in Ukraine

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.40	0.95	.69							
2. Normative	5.41	1.07	.66	.62**						
3. Suprapersonal	5.40	0.93	.66	.63**	.60**					
4. Existence	5.82	0.94	.73	.67**	.62**	.63**				
5. Excitement	4.50	1.02	.48	.36**	.19**	.40**	.28**			
6. Promotion	4.77	1.03	.59	.46**	.32**	.49**	.37**	.58**		
7. Age	33.90	9.40	-	.11**	.19**	.08**	.10**	-.07**	-.10**	
8. Sex (M=1, F=2)	0.44	0.50	-	.11**	.06*	.09**	.14**	-.01	-.04	-.06*

* $p < .05$, ** $p < .01$.

Table A29.

Descriptive statistics and correlations for values, age and Sex (M=1, F=2) in United States

	M	SD	α	1	2	3	4	5	6	7
1. Interactive	5.32	0.95	.63							
2. Normative	5.09	1.08	.62	.53**						
3. Suprapersonal	5.04	0.95	.63	.56**	.39**					
4. Existence	5.78	0.85	.69	.64**	.52**	.52**				
5. Excitement	4.36	1.16	.63	.37**	.20**	.51**	.29**			
6. Promotion	4.20	1.07	.65	.38**	.30**	.51**	.27**	.61**		
7. Age	49.76	16.43	-	.08**	.20**	.00	.14**	-.20**	-.21**	
8. Sex (M=1, F=2)	0.59	0.49	-	.07*	.04	.03	.11**	-.05	.00	-.16**

* $p < .05$, ** $p < .01$.

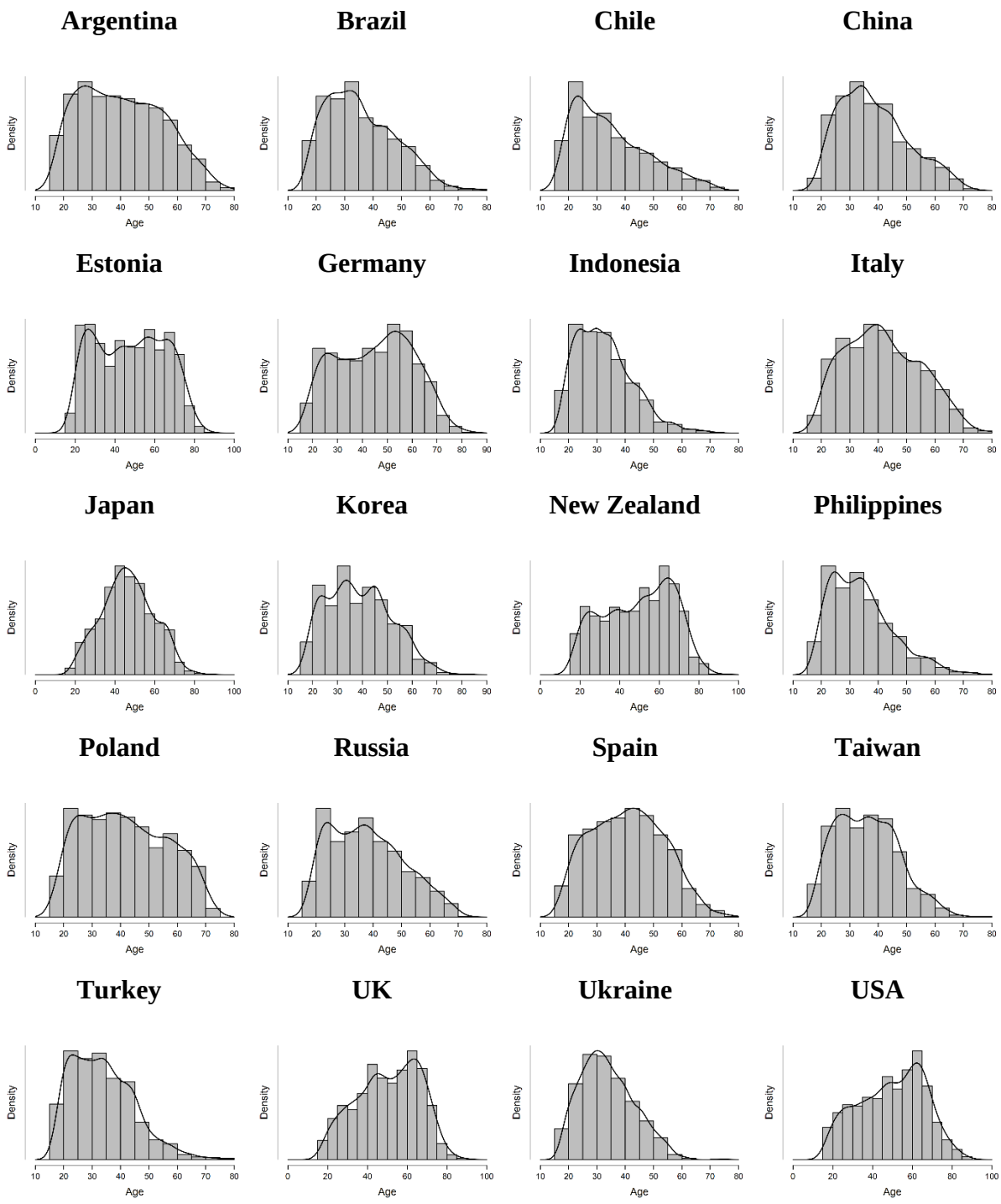

Figure A1. Distribution of age per country

Table A30.

Multi-level regression with residualised outcomes for interactive, normative, and suprapersonal values

	Interactive (ICC = .089)		Normative (ICC = .093)		Suprapersonal (ICC = .106)	
	B	95% C.I	B	95% C.I	B	95% C.I
Fixed Parameters						
Intercept	-.033	-.083, .017	.052	-.028, .132	-.026	-.075, .023
Level 1						
Sex $_{(M=1, F=2)}$	.083*	.045, .122	-.057*	-.096, -.018	.048*	.015, .080
Age	.026*	.009, .043	.098*	.073, .124	-.006	-.023, .011
Age x Sex	-.012	-.033, .008	-.013	-.043, .017	.022*	.002, .042
Age^2	-.002	-.011, .007	-.015*	-.026, -.003		
Age^2 x Sex	-.010	-.023, .002	.001	-.014, .016		
Random parameters						
Level 1						
Intercept	.011	.005, .023	.029*	.015, .060	.010*	.005, .022
Level 2						
Sex	.004*	.001, .012	.003*	.001, .010	.003	.001, .009
Age	.001	.000, .002	.002*	.001, .006	.001	.000, .022
Age x Sex	.001	.000, .003	.002*	.001, .007	.001	.000, .003
Age^2	.000	.000, .001	.000	.000, .001		
Age^2 x Sex	.000	.000, .001	.001	.000, .001		

Note. *parameters which the 95% C.I. did not include zero in the confidence interval and are therefore statistically different from zero.

Table A31.

Multi-level regression with residualised outcomes for existence, excitement, and promotion values

	Existence (ICC = .074)		Excitement (ICC = .064)		Promotion (ICC = .106)	
	B	95% C.I	B	95% C.I	B	95% C.I
Fixed Parameters						
Intercept	-.041	-.090, .007	.093*	.002, .184	.038	-.060, .136
Level 1						
Sex $_{(M=1, F=2)}$	.100*	.065, .175	-.171*	-.210, -.132	-.077*	-.121, -.032
Age	.013	-.006, .031	-.038*	-.056, -.020	-.069*	-.092, -.046
Age x Sex	.002	-.019, .023	-.051*	-.074, -.029	-.018	-.004, .039
Age^2	-.003	-.013, .007				
Age^2 x Sex	.000	-.013, .013				
Random parameters						
Level 1						
Intercept	.010*	.005, .021	.038*	.021, .079	.044*	.024, .091
Level 2						
Sex	.003*	.001, .009	.005*	.001, .013	.006*	.002, .017
Age	.001	.000, .003	.001	.000, .002	.002*	.001, .004
Age x Sex	.000	.000, .003	.001	.000, .003	.001	.000, .003
Age^2	.000	.000, .001				
Age^2 x Sex	.000	.000, .001				

Note. *parameters which the 95% C.I. did not include zero in the confidence interval and are therefore statistically different from zero.

Approximate Bayesian Invariance

To conduct Bayesian approximate invariance, I followed the same steps as Cieciuch, Davidov, Schmidt, Algesheimer, and Schwartz (2014). I tested the invariance of each value dimension one at a time (interactive, normative, suprapersonal, existence, excitement, and promotion). First, a prior of .01, which represents the amount of variance the Bayesian approximate invariance allows the items to vary across groups (loading and intercept), was used for each of the dimensions. In case this level of invariance was not achieved, this value was increased up to .05. The invariance is considered acceptable when the PPP (posterior predictive p-value) is higher than zero and includes zero in its credibility interval (Muthén & Asparouhov, 2013; Van de Schoot et al., 2013). To examine invariance for age, we divided the sample into 5 groups of age. Table S23 shows descriptive statistics for the 5 groups and Table S24 shows the results for approximate Bayesian invariance.

Table A32.

Descriptive statistics per groups of age

Age interval	N	% Women
18-27	4775	56.4
28-37	5173	52.8
38-47	4493	48.1
48-57	3232	49.3
> 58	3253	43.7

Table A33.

Approximate Bayesian invariance per age, gender, and country

	Prior = .01		
	Age	Sex	Country
	PPP [95% C.I.]	PPP [95% C.I.]	PPP [95% C.I.]
Interactive	.503 [-25.745, 25.343]	.507 [-18.467, 16.030]	.099 [-20.122, 91.699]
Normative	.376 [-23.143, 31.874]	.499 [-16.989, 17.202]	.000 [428.252, 598,239]
Prior = .01[a]			.217 [-25.070, 59.670]
Suprapersonal	.510 [-26.555, 25.663]	.503 [-16.576, 16.460]	.285 [-39.699, 69.326]
Existence	.523 [-25.828, 25.732]	.483 [-16.215, 16.560]	100 [-22.366, 94.246]
Excitement	.405 [-24.944, 30.645]	.462 [-17.025, 17.888]	.000 [197.535, 349.565]
Prior = .03			.088 [-17.451, 102.775]
Promotion	.515 [-28.905, 25.247]	.483 [-17.113, 16.785]	.004 [28.545, 154.179]
Prior = .02			.167 [-27.808, 82.633]

a = Normative achieved invariance only after we removed the item of religiosity.

Table A34.

Multi-level analysis predicting Existence, Excitement, and Promotion values: Country level effects using Hofstede's Cultural Values as moderator

	Interactive		Normative		Suprapersonal		Existence		Excitement		Promotion	
	B	95% C.I.	B	95% C.I.	B	95% C.I.	B	95% C.I.	B	95% C.I.	B	95% C.I.
Moderator on Outcome												
POW	.141	-.011, .294	.231*	.074, .387	.164*	.019, .308	.081	-.053, .214	.054	-.064, .173	.200*	.085, .314
MAS	-.167*	-.304, -.030	-.199*	-.355, -.044	-.167*	-.302, -.034	-.145	-.257, -.034	-.060	-.172, .053	-.130	-.262, .000
UNC	-.032	-.192, .131	-.019	-.207, .168	.007	-.155, .168	-.040	-.175, .094	-.020	-.137, .099	-.019	-.168, .130
LONG	-.157*	-.298, -.014	.123	-.300, .053	-.137	-.284, .007	-.137*	-.255, -.020	-.117*	-.222, -.012	-.049	-.197, .098
INDUL	.001	-.164, .168	-.046	-.237, .143	.016	-.149, .179	.023	-.116, .160	.057	-.062, .177	-.022	-.174, .129
Cross-level Interaction												
POW x Age	.013	-.016, .042	.007	-.019, .032	.011	-.013, .033	.024*	.001, .046	.029	.000, .058	.022	-.005, .048
POW x Sex	-.047	-.101, .008	-.021	-.061, .020	-.015	-.064, .033	-.017	-.065, .031	.010	-.037, .056	.023	-.020, .065
MAS x Age	-.013	-.042, .014	-.025*	-.047, -.003	-.023*	-.043, -.004	-.018	-.041, .005	-.010	-.042, .020	.000	-.029, .028
MAS x Sex	.014	-.042, .071	-.017	-.056, .024	-.031	-.075, .014	-.013	-.060, .034	-.028	-.070, .015	-.021	-.062, .022
UNC x Age	.028*	.002, .054	.013	-.012, .037	.020	-.001, .041	.003	-.022, .028	.025	-.004, .055	.020	-.007, .046
UNC x Sex	.021	-.035, .077	.010	-.031, .051	.032	-.014, .077	.014	-.033, .062	-.006	-.053, .039	-.007	-.050, .037
LON x Age	-.024	-.050, .002	-.003	-.028, .023	-.012	-.036, .010	-.018	-.041, .005	-.021	-.052, .009	.003	-.026, .032
LON x Sex	.019	-.037, .075	-.004	-.045, .037	.009	-.039, .057	.014	-.034, .062	.021	-.025, .065	.032	-.009, .072
ING x Age	.011	-.018, .039	.002	-.024, .028	-.004	-.027, .020	.009	-.015, .034	.012	-.020, .044	.002	-.028, .031
ING x Sex	-.016	-.074, .042	-.002	-.044, .040	-.021	-.069, .027	-.023	-.071, .025	-.028	-.072, .017	-.031	-.072, .011

Note. POW = Power distance, MAS = Masculinity vs. Femininity, UNC = Uncertainty avoidance, LON = Long-term orientation, ING = Indulgence. Each moderator was examined at a time.

Supplementary materials Study 3

Table A35.

Descriptive statistics and alpha reliability social capital and political participation

	Soc Cap Off			Soc Cap On			Reflection			Pol Part Off			Pol Part On			Voting		
	M	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α
Argentina	3.89	1.35	.90	3.33	1.69	.95	4.24	1.60	.87	1.83	1.20	.87	1.73	1.11	.82	6.37	1.33	.91
Brazil	3.85	1.45	.93	4.03	1.70	.95	4.05	1.69	.90	2.17	1.52	.93	1.98	1.49	.93	5.74	1.78	.96
Chile	3.71	1.40	.91	3.53	1.68	.95	3.87	1.57	.87	1.94	1.32	.91	1.97	1.34	.91	4.71	2.30	.93
China	4.14	1.28	.95	4.15	1.32	.93	4.13	1.31	.88	2.66	1.47	.95	2.54	1.49	.94	2.63	1.51	.88
Estonia	3.96	1.25	.94	2.47	1.34	.95	3.36	1.46	.92	1.31	0.72	.87	1.26	0.66	.85	6.05	1.68	.96
Germany	4.12	1.31	.91	2.62	1.67	.96	4.29	1.45	.82	1.72	1.17	.90	1.52	1.07	.90	5.43	2.05	.95
Indonesia	4.37	1.30	.93	4.32	1.45	.94	3.88	1.43	.91	2.33	1.54	.95	2.27	1.55	.95	4.91	1.79	.92
Italy	3.69	1.42	.94	3.50	1.72	.96	3.90	1.63	.89	1.98	1.39	.93	1.82	1.35	.94	5.73	1.77	.97
Japan	3.17	1.28	.94	2.21	1.39	.97	4.05	1.26	.93	1.32	0.86	.96	1.25	0.76	.95	4.77	2.29	.98
Korea	3.30	1.46	.95	3.18	1.53	.94	3.33	1.53	.91	1.61	1.14	.95	1.79	1.24	.94	5.16	2.06	.93
NZ	3.79	1.28	.91	2.47	1.46	.95	3.19	1.70	.93	1.46	0.89	.90	1.36	0.82	.84	5.67	1.89	.88
Philippines	4.03	1.18	.91	4.26	1.46	.94	4.12	1.33	.88	2.23	1.39	.93	2.17	1.44	.93	5.10	1.96	.98
Poland	4.02	1.31	.93	3.32	1.58	.95	3.46	1.74	-	2.01	1.30	.93	1.80	1.28	.94	5.28	1.84	.95
Russia	3.84	1.43	.93	3.48	1.66	.96	3.67	1.53	.90	1.68	1.14	.92	1.61	1.14	.93	4.64	2.02	.90
Spain	3.77	1.35	.92	3.27	1.69	.97	4.06	1.56	.90	2.03	1.34	.91	1.87	1.31	.93	5.47	1.90	.96
Taiwan	3.92	1.32	.96	3.83	1.32	.91	3.55	1.40	.91	1.95	1.25	.94	1.82	1.24	.96	4.78	2.03	.97
Turkey	4.15	1.41	.94	4.07	1.62	.93	4.20	1.51	.88	2.59	1.54	.92	2.48	1.59	.92	6.02	1.56	.96
UK	3.43	1.46	.93	2.21	1.55	.97	3.14	1.77	.94	1.58	1.07	.92	1.45	1.03	.91	5.39	2.14	.95
Ukraine	3.32	1.39	.94	3.13	1.58	.95	2.98	1.42	.84	1.73	1.14	.92	1.61	1.12	.92	4.14	2.20	.96
USA	3.73	1.39	.92	2.38	1.53	.96	3.32	1.80	.93	1.72	1.13	.89	1.43	1.00	.91	5.37	2.09	.93

Table A36.

Summary of model fit and invariance for political participation offline and political participation online

Models	Model Fit				Invariance	
	SBχ^2 (df)	CFI	SRMR	RMSEA	ΔCFI	ΔSRMR
Model fit by country						
Argentina	215.44 (26)	.922	.040	.082	-	-
Brazil	220.94 (26)	.941	.028	.085	-	-
Chile	167.58 (26)	.949	.025	.077	-	-
China	131.09 (26)	.978	.020	.065	-	-
Estonia	91.03 (26)	.956	.032	.047	-	-
Germany	118.55 (26)	.957	.032	.059	-	-
Indonesia	142.84 (26)	.974	.015	.066	-	-
Italy	96.40 (26)	.977	.020	.052	-	-
Japan	89.69 (26)	.932	.023	.051	-	-
Korea	84.58 (26)	.974	.018	.050	-	-
NZ	48.67 (26)	.986	.022	.028	-	-
Philippines	220.67 (26)	.937	.034	.087	-	-
Poland	81.41 (26)	.975	.018	.046	-	-
Russia	143.78 (26)	.959	.024	.064	-	-
Spain	116.41 (26)	.968	.027	.059	-	-
Taiwan	143.35 (26)	.955	.021	.069	-	-
Turkey	189.88 (26)	.953	.030	.084	-	-
UK	60.88 (26)	.979	.020	.036	-	-
Ukraine	96.72 (26)	.972	.024	.048	-	-
United States	120.42 (26)	.954	.034	.057	-	-
Equivalence across all countries						
Configural	2400.26 (250)	.960	.026	.060		
Metric	2800.64 (653)	.954	.039	.057	.006	.003
Scalar	4812.88 (786)	.915	.062	.071	.039	.014

Table A37.

Multi-level CFA Social Capital Offline, Social Capital Online, and Reflection

	MLR estimator					
	N factors within	N factors between	χ^2 (df)	CFI	RMSEA	SRMR
Model 1	3	3	1088.960 (82)	.974	.025	.024
Model 2	2	2	653.893 (38)	.968	.029	.028
Model 3	2	2	798.783 (26)	.947	.039	.031
Model 4	2	2	723.546 (16)	.932	.047	.029
Model 5	2	1	803.889 (17)	.924	.049	.029

In both Models 1 and 2 there was a misspecification regarding the between level part of the model. In Model 1, the loading of item 8 and item 11 were higher than 1.000 which caused a non-positive definite first-order derivative product matrix. Therefore, we tested a second model estimating only the two factors of social capital online and offline, since only 1 item of reflection could not represent a latent factor. Also, correlations between the latent factor of reflection on conversations and the other two factors were close to zero, suggesting that reflection on conversations does not mean the same as in the within level. For the second model, items 8 and the two items that compose the reflection on conversations factor (items 10 and 11) were not considered. The model still resulted in a non-positive definite first-order derivative product matrix. The Mplus output revealed that the problem involved item 3, also in the between level. In this case, a third model was tested, removing item 3. The Mplus output showed the same warning message, but this time involving item 6 in the between level. Removing this item did not remove the warning message of non-positive definite first-order derivative product matrix (Model 4), and the Mplus output showed that this time the problem was related to item 9, also in the between level. Removing more items was not possible because the social capital online would be represented by only one item. As a final attempt to examine these three factors in a multi-level approach, a model was estimated with two factors in the within level and a single factor in the between level using the same items used in Model 4. The resulting model still showed the same misspecification but this time involving item 1 in the between level. Therefore, we conclude that using these items as country-level variable is not justifiable. See Table A38 for the loadings of Model 1.

Table A38.

Multilevel CFA: Loadings of the social capital three factors scale

	Social Capital Offline	Social Capital Online	Reflection
WITHIN LEVEL			
Social Capital Offline			
Item 1	.786		
Item 2	.846		
Item 3	.880		
Item 4	.916		
Item 5	.837		
Social Capital Online			
Item 6		.870	
Item 7		.900	
Item 8		.950	
Item 9		.920	
Reflection (F3-1)			
Item 10			.879
Item 11			.930
BETWEEN LEVEL			
Social Capital Offline			
Item 1	.929		
Item 2	.873		
Item 3	.926		
Item 4	.964		
Item 5	.863		
Social Capital Online			
Item 6		.990	
Item 7		.983	
Item 8		1.001	
Item 9		.991	
Reflection (F3-			
Item 10			.748
Item 11			1.265

Table A39.

Correlations between the latent factors of the social capital three factors scale

	1	2	3
1. Social Capital Offline	1	.312***	.359***
2. Social Capital Online	.575***	1	.316***
3. Reflection	.000	-.015	1

Note. Correlations in the within level are above the diagonal and correlations in the between level are below the diagonal. Results are from the model estimated on Table A37, Model 1.

Table A40.

Multi-level CFA Political Participation Offline and Political Participation Online

	MLR estimator					
	N factors within	N factors between	χ^2 (df)	CFI	RMSEA	SRMR
Model 1	2	2	1039.946 (52)	.954	.031	.020
Model 2	2	2	636.152 (39)	.965	.028	.019
Model 3	2	2	312.805 (27)	.978	.023	.020
Model 4	2	2	292.134 (17)	.970	.029	.021
Model 5	2	1	1170.110 (18)	.875	.057	.034

Similar to the analyses with social capital, we examined whether the factors of political participation could be estimated at the within individuals and at the between-groups levels. We estimated only the two factors of political participation offline and political participation online. The two items of voting were not included because they already showed a poor fit when analysis was conducted for each group at a time. As two factors of political participation showed acceptable fit and metric invariance, we performed an analysis of multi-level confirmatory factor analysis using the MLR estimator. This estimator was repeated in the MLCFA because a good fit was observed when single-group CFA was examined. Results showed a good fit for the MLCFA, but the output using Mplus showed a warning of non-positive definite first-order derivative product matrix (Model 1). Examining loadings and residuals, there was no loading higher than 1 or negative residuals. The warning in the output indicated that problem involved item 2. When the model was examined without item 2 (Model 2), the output kept the warning of misspecification, but this time related to item 4 in the between level. Removing item 4 (Model 3) did not remove the warning that reappeared this time related to item 8. Removing item 8 (Model 4) or more items did not solve the problem, which was always related to the estimation of the items in the between level. Also examining a one-factor model (Model 5) in the between level using the same items as Model 4 did not remove the warning. Therefore, using the items of political participation in the between level is not justifiable. See Table A41 for the loadings of Model 1, Table A40.

Table A41.

Multilevel CFA: Loadings of the political participation two factors scale

	Political Participation Offline	Political Participation Online
WITHIN LEVEL		
Political Participation Offline		
Item 1	.775	
Item 2	.838	
Item 3	.865	
Item 4	.873	
Item 5	.880	
Political Participation Online		
Item 6		.809
Item 7		.868
Item 8		.903
Item 9		.873
BETWEEN LEVEL		
Social Capital Offline		
Item 1	.957	
Item 2	.986	
Item 3	.852	
Item 4	.964	
Item 5	.942	
Social Capital Online		
Item 6		.874
Item 7		.968
Item 8		.991
Item 9		.923

Table A42.

Correlations between the latent factors of the political participation two factors scale

	1	2
1. Social Capital Offline	1	.911***
2. Social Capital Online	.993***	1

Note. Correlations in the within level are above the diagonal and correlations in the between level are below the diagonal. Results are from the model estimated on Table A40, Model 1.

Supplementary materials Study 4

Table A43.

Descriptive statistics and coefficient of alpha reliability for social dominance orientation and carbon emission concerns

	Social Dominance Orientation			Carbon Emission Concerns		
	M	*SD*	α	*M*	*SD*	α
Argentina	2.29	1.05	.72	6.12	1.08	.65
Brazil	3.24	.94	.34	5.92	1.28	.85
Chile	2.55	1.12	.70	5.93	1.25	.78
China	3.03	.97	.65	5.76	1.03	.86
Estonia	3.27	.86	.68	5.25	1.16	.81
Germany	3.06	.92	.59	5.69	1.27	.81
Indonesia	3.15	.93	.46	5.81	1.10	.67
Italy	2.74	1.11	.72	6.02	1.13	.80
Japan	3.58	.74	.54	5.22	1.15	.83
Korea	3.21	.78	.48	5.66	1.05	.78
NZ	2.84	1.01	.74	5.33	1.49	.89
Philippines	2.89	1.06	.64	5.98	1.16	.84
Poland	3.36	.82	.39	5.39	1.37	.87
Russia	3.11	.88	.58	5.07	1.30	.76
Spain	2.50	1.12	.76	5.86	1.20	.80
Taiwan	3.06	.95	.65	5.88	1.14	.91
Turkey	2.88	1.04	.53	6.00	1.21	.84
UK	3.07	1.15	.79	5.43	1.34	.88
Ukraine	3.38	.89	.52	5.43	1.35	.79
USA	2.29	1.05	.72	5.15	1.66	.90
Average	2.98	.97	.61	5.65	1.24	.82

Table A44.

Confirmatory factor analysis of the SDO scale using the MLR and Bayes estimators

	Model 1 MLR estimator				**Model 2** Bayes Estimator				**Model 2** Bayes Estimator (d = 200)			
	$S\chi^2$ (2)	CFI	RMSEA	SRMR	PPP	CFI	RMSEA	95% C.I.	PPP	CFI	RMSEA	95% C.I.
Argentina	7.09	.988	.047	.017	.057	.988	.075	-2.740, 25.479	.187	.991	.084	-7.320, 30.902
Brazil	No-Co				.000	.631	.186	107.672, 137.072	.176	.976	.085	-8.384, 27.937
Chile	19.76	.950	.096	.030	.001	.961	.120	11.809, 41.841	.152	.986	.098	-7.861, 29.360
China	110.76	.760	.233	.071	.000	.847	.238	111.839, 139.346	.169	.990	.092	-9.457, 29.535
Estonia	20.12	.969	.088	.025	003	.976	.095	7.470, 37.013	.178	.991	.082	-11.174, 27.369
Germany	12.92	.974	.072	.028	.029	.980	.076	-.657, 27.372	.153	.988	.081	-8.375, 28.107
Indonesia	No-Co				.000	.729	.184	107.038, 135.943	.166	.982	.088	-9.337, 27.844
Italy	95.36	.803	.212	.050	.000	.891	.205	85.475, 113.610	.169	.991	.088	-7.426, 30.045
Japan	46.42	.762	.151	.056	.000	.873	.158	42.076, 69.991	.132	.979	.095	-7.484, 28.318
Korea	17.30	.906	.090	.035	.007	.930	.101	4.013, 33.201	.132	.965	.100	-6.828, 30.516
NZ	28.12	.948	.106	.038	.000	.949	.141	39.687, 67.826	.169	.993	.082	-8.656, 30.364
Philippines	191.31	.604	.300	.114	.000	.669	.378	263.898, 292.251	.142	.990	.088	-9.557, 26.884
Poland	28.06	.888	.111	.048	.000	.893	.115	23.208, 53.057	.174	.977	.089	-7.177, 29.859
Russia	50.01	.837	.145	.055	.000	.864	.182	59.249, 88.764	.190	.985	.083	-7.738, 28.336
Spain	33.01	.929	.123	.035	.000	.948	.172	36.191, 66.917	.149	.992	.090	-9.363, 28.276
Taiwan	32.25	.930	.122	.036	.000	.955	.138	28.623, 57.546	.152	.991	.091	-8.510, 28.965
Turkey	70.52	.786	.189	.063	.000	.860	.155	48.651, 76.771	.130	.980	.097	-7.049, 29.196
UK	58.93	.917	.164	.044	.000	.934	.199	76.266, 106.128	.184	.994	.088	-9.040, 29.289
Ukraine	142.72	.452	.240	.055	.000	.807	.161	68.712, 95.347	.182	.983	.073	-9.544, 26.435
USA	59.46	.888	.157	.047	.000	.913	.188	77.008, 105.487	.174	.992	.083	-8.820, 27.224

No-Co = Non convergence

Table A45.

Approximate Bayesian invariance for the SDO scale

									Fit 1 (4 items) (prior = .05)		Fit 2 (without SDO4) (prior = .05)		Fit 3 (without SDO4 and without Brazil) (prior = .05)	
	Loadings				R-square				PPP	95% C.I.	PPP	95% C.I.	PPP	95% C.I.
	SDO1	SDO2	SDO3	SDO4	SDO1	SDO2	SDO3	SDO4						
Argentina	.643	.642	.675	.579	.414	.412	.456	.335	.066	-3.989, 24.811	.509	-11.776, 11.527	.501	-11.690, 11.809
Brazil	.988	-.183	.296	.284	.977	.034	.087	.081	.000	107.071, 139.044	.000	60.526, 88.487		
Chile	.674	.564	.679	.522	.454	.318	.461	.272	.001	11.840, 40.070	.501	-12.037, 11.522	.501	-12.623, 12.144
China	.686	.551	.825	.196	.471	.303	.681	.038	.000	111.188, 147.876	.501	-11.866, 11.715	.494	-12.587, 12.581
Estonia	.676	.580	.842	.305	.456	.336	.709	.093	.001	8.446, 37.866	.503	-11.412, 12.720	.500	-12.177, 11.706
Germany	.699	.112	.831	.475	.489	.012	.691	.225	.019	1.085, 30.100	.460	-12.199, 13.422	.446	-11.499, 13.387
Indonesia	.765	.103	.652	.130	.586	.011	.425	.017	.000	106.791, 136.495	.464	-12.821, 12.092	.467	-11.452, 12.805
Italy	.480	.758	.706	.561	.230	.575	.498	.315	.000	84.696, 133.973	.490	-12.081, 12.880	.483	-11.704, 12.549
Japan	.461	.498	.847	.184	.213	.248	.718	.034	.000	41.650, 70.845	.511	-11.412, 12.827	.501	-12.296, 12.366
Korea	.596	.182	.690	.313	.355	.033	.476	.098	.007	4.496, 32.678	.508	-11.989, 11.905	.495	-11.812, 11.585
NZ	.741	.617	.730	.499	.549	.381	.533	.249	.000	38.070, 67.881	.478	-12.988, 11.699	.505	-11.918, 12.074
Philippines	.700	.411	.784	.240	.491	.169	.615	.058	.000	250.471, 287.676	.482	-11.918, 11.935	.512	-11.782, 12.491
Poland	.973	-.151	.441	.284	.946	.023	.195	.081	.000	23.345, 53.095	.098	-4.958, 20.231	.089	-3.652, 20.421
Russia	.658	.438	.678	.285	.433	.192	.460	.081	.000	56.891, 87.141	.494	-11.504, 11.707	.501	-11.263, 11.804
Spain	.635	.673	.740	.623	.403	.452	.547	.388	.000	36.889, 65.737	.499	-11.204, 11.790	.505	-11.745, 11.869
Taiwan	.632	.689	.880	.170	.399	.475	.774	.029	.000	28.721, 60.413	.503	-12.257, 12.406	.487	-11.726, 12.014
Turkey	.518	.111	.944	.350	.268	.012	.891	.122	.000	46.438, 75.821	.458	-12.056, 12.127	.456	-11.146, 11.963
UK	.703	.703	.870	.514	.494	.495	.757	.265	.000	76.658, 105.756	.510	-11.962, 12.731	.497	-11.674, 12.195
Ukraine	.534	.358	.745	.171	.285	.128	.555	.029	.000	65.508, 94.827	.502	-12.130, 11.867	.520	-11.931, 11.762
USA	.686	.565	.780	.379	.471	.320	.609	.144	.000	81.936, 120.590	.115	-6.279, 27.872	.109	-5.713, 11.762
Approximate Bayesian Invariance									.000	1416.31, 1551.07	.000	35.713, 146.901	.224	-33.212, 73.751

Table A46.

Time Invariance of the SDO scale

	$S\chi^2$ (df)	CFI	RMSEA	ΔCFI
Configural	92.466 (5)	.991	.029	
Metric	98.650 (7)	.991	.025	.000
Scalar	134.293 (9)	.987	.026	.004

Table A47.

Multilevel CFA for SDO using a Bayes estimation

	SDO (d = 200)
WITHIN LEVEL	
Social Dominance	
Item 1	.691
Item 2	.488
Item 3	.829
Item 4	.392
BETWEEN LEVEL	
Social Dominance	
Item 1	.000
Item 2	.000
Item 3	.000
Item 4	.000

Model fit: PPP = .083, 95% C.I. = -7.229, 38.152.