Article

Cross-Cultural Research
2025, Vol. 59(5) 615–650

DOI: 10.1177/10693971251338204
journals.sagepub.com/home/ccr
Sage

What Predicts Intentions and Behavior? A Cultural Exploration of Attitude, Belief, and Norm Effects Across 55 Countries

Ronald Fischer[1] **and Johannes A. Karl**[2]

Abstract

We report a series of meta-meta-analyses examining cultural variability in the Theory of Planned Behavior involving data from 956 studies across 54 countries (N = 151,177 to 245,694). Using multi-level analyses, we identified substantive variability within-country for all effects (variability at level 2 in 5 out of 6 analyses >70%). Cross-cultural variability was sizable, ranging from 5.5% for the attitude-intention association to 57.8% for the norm-behavior association. On average, cross-cultural variability was larger for behavior (28.6%) than for intentions (8.1% of the variability). We were able to predict systematic patterns for individually focused cognitions (attitudes, perceived behavioral control) on behavioral intentions, but no consistent effects emerged predicting variability in behavioral outcomes or for norms. These patterns suggest cultural theories are better at predicting variability in individualistic cognitions, but do less well for explaining variability in behavior or norm effects, even though these effects show greater variability cross-culturally.

[1]Institute D'Or for Research and Education, São Paulo, Brazil
[2]Stanford University, Stanford, CA, USA

Received: 27 November 2024; accepted: 7 April 2025

Corresponding Author:
Ronald Fischer, Cognitive Neuroscience and Neuroinformatics Unit, Institute D'Or for Research and Education, Av. Brigadeiro Luís Antônio, 5001 – Jardim Paulista, São Paulo – SP – CEP 01401-002, Brazil.
Email: ronald.fischer@idor.org

Keywords
theory of planned behavior, meta-meta-analysis, variance estimates, multilevel, cultural differences, subjective norms, collectivism, tightness-looseness

Human behavior is shaped by both our personal attitudes and beliefs, as well as social norms, that is perceptions of what others do and approve of. Yet when exploring behaviors, there is a strong bias in psychology to train the lens on personal attitudes, beliefs and risk factors and to downplay or ignore social effects (Holt-Lunstad et al., 2010; Smith et al., 2013; Zomeren, 2016). This bias in psychological science is likely driven by the individualistic culture of the researchers who have dominated published research (Chater & Loewenstein, 2022; Smith et al., 2013). Personal beliefs and attitudes are more salient and important for individuals working in individualistic societies that prioritize the individual over group concerns, whereas social context effects may be more salient for individuals in more collectivistic or group-oriented societies (Abrams et al., 1998; Cialdini et al., 1999; Fischer & Mansell, 2009; Triandis, 1995).

Cultural variability in psychological phenomena has emerged as a major research target in the last few decades and serious attempts are underway to understand human behavior in its full cultural diversity. But currently there is little insight into the extent to which individual versus social effects vary within and between societies. There is also an ongoing debate about the extent to which societal culture versus more proximal situational contexts or individual differences matter for explaining psychological variability (Fischer, 2021; Fischer & Schwartz, 2011; Saucier et al., 2015).

The current work contributes to this debate by exploring the extent of cultural variability in the predictive power of personal norms and beliefs versus social norms for intentions and behaviors. To do so, we focus on one of the most widely used theories used to predict human behavior (Bosnjak et al., 2020), the theory of planned behavior (Ajzen, 1991). There have been previous attempts to include cultural variables in the theory (Hassan & Shiu, 2017; Morren & Grinstein, 2021; Zhang et al., 2012), but these have often only partially covered existing evidence. Our study systematically pools all available data included in previous meta-analyses up to 2020 into a single overarching meta-meta-analysis, allowing for a comprehensive coverage of the existing evidence, and to explicitly differentiate variability at the study versus societal culture level. Using this data allows us to address two major questions which are currently unaddressed in the literature.

First, how does heterogeneity or variability affect generalizability of effects within and across contemporary societies? This is of substantive interest for both theory development and intervention work. For example, if there is

greater cross-country variability in the relationship of control beliefs with behavior compared to attitudes, this implies that there is important variability operating at a macro-contextual level that is of relevance for the theory and requires further exploration and explanation. Such a finding would have important practical implications because it would suggest that there are potentially important but hidden moderators operating at institutional, economic, or cultural level that may dampen the effectiveness of interventions. One classic example are norms around behavioral variability in the form of tightness versus looseness, which may systematically affect norm effects on behavior (Gelfand et al., 2011). Alternatively, we may find significant variation within societies. For example, social norm effects may show greater variability for behavior, implying specificity of social norms across different situations or behavioral domains within cultures. In such a case, behavioral intentions and behavior may be more explicable by more proximal situational variables, in which case broad macro-level cultural dimensions are less likely to play a role (Zhang et al., 2012).

This question on the relative extent of variability within- versus between-countries invites our second question: how well can we predict cross-country variability using existing theories of culture? A number of dimensional frameworks are available which we can draw on to make predictions about cultural differences (Beugelsdijk et al., 2017; Fischer & Ferreira, 2024; Smith et al., 2013). How well can these widely used dimensions of culture explain variability in the theory of planned behavior? Answering this question can help identify how well current theorizing about cultural effects in psychology work for explaining variability across a broader set of cultures. To guide the reader, we first present the basic parameters of the Theory of Planned Behavior and then present predictions based on current cross-cultural theory.

The Theory of Planned Behavior

The most widely used theory to predict behavior is the Theory of Planned Behavior (TPB; Ajzen, 1985, 1991), which extends the earlier theory of reasoned action (TRA; Fishbein & Ajzen, 1975). The main idea of the model is that behavioral intentions are determined by a person's evaluation of a behavior as positive (attitude), the belief that the person is able to perform the behavior (perceived behavioral control) and perceptions of what important others would do or prefer the person to do (subjective norm). From our perspective, both attitudes and perceived behavioral control as a personal belief are more individualistic variables because these judgments can be made without reference to external agents (Triandis, 1995), whereas subjective norms capture the importance of social context for driving behavior. Subjective norms in the theory are conceptualized as 'perceived social pressure to perform or not to perform the behavior' (Ajzen, 1991).

To date, the TRA and the TPB have been applied widely and have been the subject of several meta-analyses across different domains. Typically, the subjective norm component is a weaker predictor of behavioral intentions compared with attitudes and perceived behavioral control (Armitage & Conner, 2001; McDermott et al., 2015; Paquin & Keating, 2017). The relative weakness of the normative component within the theory have even led some researchers to drop it from analyses (Armitage & Conner, 2001). Yet, these discussions have not generally considered possible cultural differences. Given the importance of attitudes for informing behavioral decisions in more individualistic contexts typically studied in European and North American psychological research, relevant norm effects of theoretical interest may have been overlooked (Fischer & Karl, 2022).

An important task is to explicitly estimate how much variability in these effects can be attributed to cultural versus situational variables that vary substantively within and between cultures. It may well be possible that norm effects are indeed weaker, compared to the other components, but also more variable across situational and cultural factors. For example, a study of the TPB effects during the first stages of the COVID-19 pandemic (Fischer & Karl, 2022) demonstrated that social norm effects varied substantively both within and across cultures and this variability was greater than the variability observed for attitudes and perceived behavioral control. Notably, the authors were able to code mean levels of social norms within each study, which then predicted the relative strength of norm effects within each study. In other words, the importance of social norms acted as a moderator when predicting norm-behavior associations. This pattern clearly highlights the need to pay more attention to the pattern of variability of subjective norm effects within and across countries.

In addition, overall norm effects may vary between countries. For example, subjective norm effects appear somewhat stronger in Asian contexts and in societies scoring higher on collectivism, although these effects were not necessarily consistent across measures and behavioral outcomes (Fischer & Karl, 2022; Morren & Grinstein, 2021; Zhang et al., 2012). Therefore, explaining variability in the theory of planned behavior presents a formidable challenge and the extent to which cultural, economic, or social variables may be relevant remains an open question. In the next section, we provide a brief overview of relevant models and theories.

A General Overview of Possible Societal-Level Moderators

We organize the following section by differentiating between theories that focus on non-psychological variables including ecological and economic variables and theories that emphasize sociocultural (psychological) dynamics.

Economic and Ecological Theories

Several theories have focused on the ecological conditions that may facilitate or constrain behavior. Welzel (2013) outlined a cool water hypothesis predicts that person-focused variables might be important for intentions and behavior. Welzel argued that locations with (1) comparatively low average temperatures, (2) regular yearlong rainfall, and (3) accessible waterways fit for travel foster conditions of social organization that allow individual agency and empowerment. Access to water is fundamental for sustaining life and is a primary resource that individuals and groups compete over. Ecological conditions that limit opportunities for powerful elites to control access to this vital resource promote conditions for loosely connected individuals to form small groups with pluralistic power structures. Once material condition improve, such structures can be easily scaled up to become more effective institutions that protect the rights of individuals. As a result, cool water conditions should strengthen personal attitude and belief effects on intentions and behavior, but not norm effects.

A separate theoretical model derives from biological work on parasite stress effects on human sociality and health (Fincher & Thornhill, 2012; Thornhill & Fincher, 2014, 2020). The principal driver here is the presence (or relative absence) of parasites that increase risks of debilitating disease and premature deaths. In more stressful contexts, normative pressures on individuals are likely to increase as norms represent time-tested solutions to deal with these threats and mitigate risk, whereas in more parasite free contexts individual experimentation is less costly and more likely to relate to behavior. Therefore, higher parasite stress might be associated with strengthened norm effects and weakened attitude and belief effects.

A third perspective focuses on the economic resources that are available to individuals. Building on the postmaterialism framework (Inglehart, 1997; Welzel, 2013), economic resources allow individuals to express themselves and search for opportunities for personal growth. However, in context where resources are scarce, survival mechanisms prevail, and personal expression of attitudes and beliefs may be weakened as behavioral diversity is curtailed by existential pressures. Instead, people might be more likely to follow norms as they indicate safe options. Consequentely, increasing economic prosperity in a society should strengthen personal attitude and belief associations with intentions and behavior. Indirect evidence supporting this rationale has emerged across a number of studies showing that values, attitudes, and reports of behavioral traits are more strongly correlated in more affluent societies (Boer & Fischer, 2013; Fischer & Boer, 2015).

Material resources are just one component and more recent work has stressed the importance of the general living conditions. The Human Development Index (HDI; UNDP, 2022) captures the conditions beyond just

pure material economic resources, including direct and indirect proxies for education and health care access. Being educated and healthy enables individuals to acquire the resources and apply them with confidence in a way that increases perceived control over one´s life and strengthen links with behavior. Hence, personal attitudes and beliefs should be more strongly associated with intentions and behavior in contexts with better living conditions.

A final theoretical model combines ecological and economic factors. According to demand-resource balance models in psychology (Lazarus & Folkman, 1984), high levels of stress without having adequate resources turn stress into a threat, whereas adequate resources turn stress into a challenge. Considering the stress posed by high temperatures for body heat regulation and access to food as well as the economic resources available to individuals to address these challenges, Van de Vliert (2008) proposed a Climato-economic theory of culture. In conditions of high climatic stress but with individuals having adequate economic resources to meet these demands, self-expression and personal growth happen because individuals can overcome these challenges and feel empowered. In contrast, in high climatic stress contexts with limited resources to adequately address these challenges, individuals are driven by survival and are constrained in their personal growth. Therefore, personal attitudes and beliefs should be particularly strong predictors of intentions and behaviors in conditions where high climatic stress is met by high economic conditions compared to all other conditions.

Sociocultural Dimensions

A classic variable that has played a central role in the exploration of cultural difference is individualism-collectivism. Triandis' (1995) groundbreaking work on the construct proposed that one of the defining components is that individualists are motivated by their personal attitudes and beliefs whereas collectivists are thought to be more strongly guided by norms. In more individualistic settings in which individuals feel more self-directed, autonomous and emancipated, personal attitudes and control beliefs are the primary motivator for actions. The focus on and primacy of person-centered beliefs underlies the center of agency. In contrast, in more collectivistic and group-oriented settings, the prevalent social norms are a more powerful motivator of actions. Individuals are motivated to conform and follow established traditions and norms, moving the center of agency towards social norm. There is some evidence that individualism is relevant for relative effects of attitudes versus norms for behavior. A number of survey and experimental studies have provided support for the central claim that norms are more important than attitudes and other self-centered psychological attributes in more collectivistic samples, and vice versa, attitudes and beliefs are more important for behavior in more individualistic contexts (Abrams et al., 1998; Cialdini et al., 1999;

Fischer & Mansell, 2009; Triandis, 1995). Because individualism is a broad dimension, we test various indicators that are associated with individualism (including autonomy and emancipation and the inverse of embeddedness and traditionalism).

A second cultural variable that is closely related to this broad individualism-collectivism dimension, but has a slightly different motivational dynamic is power distance, measuring the extent to which social relations are more hierarchical or egalitarian (Hofstede, 2001; Schwartz, 2006). The general predictions about the importance of personal attitudes and beliefs follows the same logic as individualism: in more egalitarian settings the expectation is that individuals are more empowered and therefore feel motivated to act on their personal attitudes and perceptions of being in control of the situation. The motivational dynamic is the egalitarian nature of relationships, which allows individuals to feel empowered and able to fully participate in any activities. In contrast, in more hierarchical and unequal contexts, individuals are expected to fit in and follow the social norms. Therefore, the predictions for this broad cluster of cultural dimensions are highly similar, although the underlying motivational mechanisms are slightly different (Schwartz, 1994, 2006). Again, a number of different value dimensions that are aligned with power distance and hierarchy versus egalitarianism have been developed over the years and we test the relative predictive power of these diverse dimensions.

A third cultural dimension that has garnered much attention in recent years and is relevant for regulating behavior is tightness-looseness (Gelfand et al., 2011). This dimension captures the extent to which behavior is tightly controlled and norm-guided versus more flexible. In loose cultures, a wide range of behaviors are deemed acceptable and norm violations are generally tolerated. In tighter societies, behavioral expression is highly restricted and norm violations are punished. As a result, norm effects should be stronger on intentions and behaviors in more tightly controlled societies whereas attitudes and beliefs effects should be strengthened in looser societies. Partial support for these effects has been found in a previous study on behavior during the first wave of the COVID-19 pandemic (Gelfand et al., 2021).

Table 1 provides a summary of the predictions.

The Current Study

Summarizing, we report a series of meta-meta-analyses of the relationships between attitudes, perceived behavioral control and social norms with behavioral intentions and behaviors. Our first research question concerns the relative strength of attitude, belief and norm effects on intentions and behaviors across a wider set of behavioral contexts compared to any single meta-analysis. Our second research question focuses on the relative variability in

Table 1. Overview of Predictor Variables and Hypotheses.

Moderator	Theoretical dynamics	Predictions for attitude & perceived behavioral control effects	Predictions for subjective norm effects	Empirical support
Cold water	Autonomy of access to water should empower individuals, increase mobility & trading opportunities (via riverine travel) & reduce opportunities for powerful groups to monopolize & control access to water & other resources	Cool water access should increase attitude and perceived behavioral control effects	Cool water access should diminish social norm effects	Not supported
Parasite stress	Increased parasite stress increases risk of illness & death, which should strengthen traditional social norms as a form of behavioral immune system	Increased parasite stress should diminish attitude and perceived behavioral control effects	Increased parasite stress should strengthen social norm effects	Not supported
National wealth	Economic resources available increase self-expression, agency and autonomy, reduce existential threats which should diminish reliance on social networks to meet daily demands	Strengthened attitude & perceived behavioral control effects	Weakened social norm effects	Not supported
Human development index	Resources (including access to education & health care) increase individual self-expression, agency and autonomy, and reduce the necessity to rely on social networks to meet existential needs	Strengthened attitude & perceived behavioral control effects	Weakened social norm effects	Not supported
Climato-economic challenges	Climatic stressors act as existential threats, which can be buffered via available resources, in demanding climates, resources should buffer existential threats posed by climate and result in converting stressors into challenges that can be met whereas lack of resources should lead to prioritizing social order; in benign climates, wealth should not have a strong effect	Interaction – in harsh climates increased wealth should lead to a strengthening of attitude and perceived behavioral control effects; in benign climates, wealth should have little effect	Interaction – in harsh climates with low wealth norm effects should be strengthened, in benign climates no effect of wealth on norms	Effect on PBC – intention, but more complex
Individualism	Individualism increases self-reliance and independence from social groups	Increased individualism (and decreased collectivism) should strengthen attitude and perceived behavioral control effects	Increased individualism (and decreased collectivism) should diminish social norm effects	Supported for PBC-Intentions (for Schwartz' collectivistic values)

(continued)

Table 1. (continued)

Moderator	Theoretical dynamics	Predictions for attitude & perceived behavioral control effects	Predictions for subjective norm effects	Empirical support
Power distance	Extent to which social relations are egalitarian or hierarchically organized	Increased egalitarianism and decreased power distance are associated with stronger attitude and perceived behavioral control effects	Increased egalitarianism (and decreased power distance/ hierarchy) are associated with weakened social norm effects	Effect of Power values on PBC-behavior correlation, contrary to predictions
Tightness-Looseness	In loose cultures, there is a wide range of acceptable behaviors, behavioral transgressions of weakly delineated and enforced norms are tolerated, whereas in tight cultures, there are restrictions of behavioral expression and lower tolerance for norm deviations.	Increased tightness should diminish attitude and perceived behavioral control effects	Increased tightness should increase social norm effects	Supported for Attitude-Intentions

these effects across samples and cultures – do associations of attitudes, perceived behavioral control and social norms with intentions and behaviors vary more within or between societies? These questions are often not of interest in individual meta-analyses and can only be properly addressed when examining a larger set of studies involving more countries.

We then test a number of ecological, economic and cultural dimensions to account for any variability in effects across societies in this meta-meta-analysis. Differentiating between more individualistically focused attitudes and perceived behavioral control and more social or culturally focused social norms, we predict that attitudes and perceived behavioral control effects on intentions and behavior are comparatively stronger in (a) cold water conditions, (b) with lower parasite prevalence, (c) in more economically developed societies, (d) in more comfortable living conditions, (e) in contexts where climate challenges can be met with sufficient economic resources, (f) in more individualistic societies and (g) in more egalitarian societies. We also expect that social norm effects are strengthened in tighter societies. For the socio-cultural dimensions, we use several indicators, to test the overall stability and replicability of any effects across all data sets derived from this meta-meta-analysis. Finally, in the supplement, we also report several additional country-level predictors for which we did not have specific predictions, and these findings may guide further theory development and testing.

Method

Literature Search

We conducted a literature search to identify previously published meta-analyses of the Theory of Planned Behavior. This search was done in PsycInfo and Web of Science in October 2020, using the keywords 'Theory of Reasoned Action', 'Theory of Planned Behavior' and 'meta-analysis'. A total of 77 meta-analyses were identified in this search. The first author then read all titles and abstracts to determine if they were relevant. A total of 61 meta-analyses were deemed worth exploring further. The authors with the help of a research assistant then screened the methods, results and supplementary material of each meta-analysis to determine if individual level study information is available and information on the country of participants can be extracted (see Figure 1). We contacted the meta-analysis authors for further information if we could not extract relevant information from their published meta-analysis. In cases where we could not extract relevant information from the published reports, unpublished supplements or via the authors, we excluded the particular meta-analysis. The final database consisted of 30 meta-analyses.

We coded information at the individual studies within each of the meta-analyses. If a single study was included in more than one meta-analysis, we only used the most complete information or the larger sample size. We excluded effect sizes and samples that could not be attributed to a population residing in a single country (e.g., reporting aggregate effects including participants from various samples across countries). We included specific ethnic, occupational or gender subsamples, if their country origin was clearly stated. Our final sample consisted of data from 956 studies from 54 countries with samples sizes ranging from 151,177 for the attitude-behavioral intention link to 245,694 for the subjective norm- behavior link. Our sample represents the available data from previous meta-analyses in which country of origin of the participants in each sample could be clearly determined. We report the country composition of our sample in Table 2.

The first author coded all the behaviors into broad behavioral categories. The second author double checked this coding independently and there was one disagreement which was resolved through discussion. In the end, we had 98 studies that focused on intoxicants (alcohol, tobacco, illegal drugs), 279 studies that focused on food choice, 188 studies focusing on physical exercise, 108 studies on other health issues, 67 studies focusing on sexual behavior, 130 studies with environmental variables and 86 studies that had some other behavior as focus.

Each behavior was coded as either positively or negatively valenced, meaning that the behavior was supposed to be facilitated (as in increasing

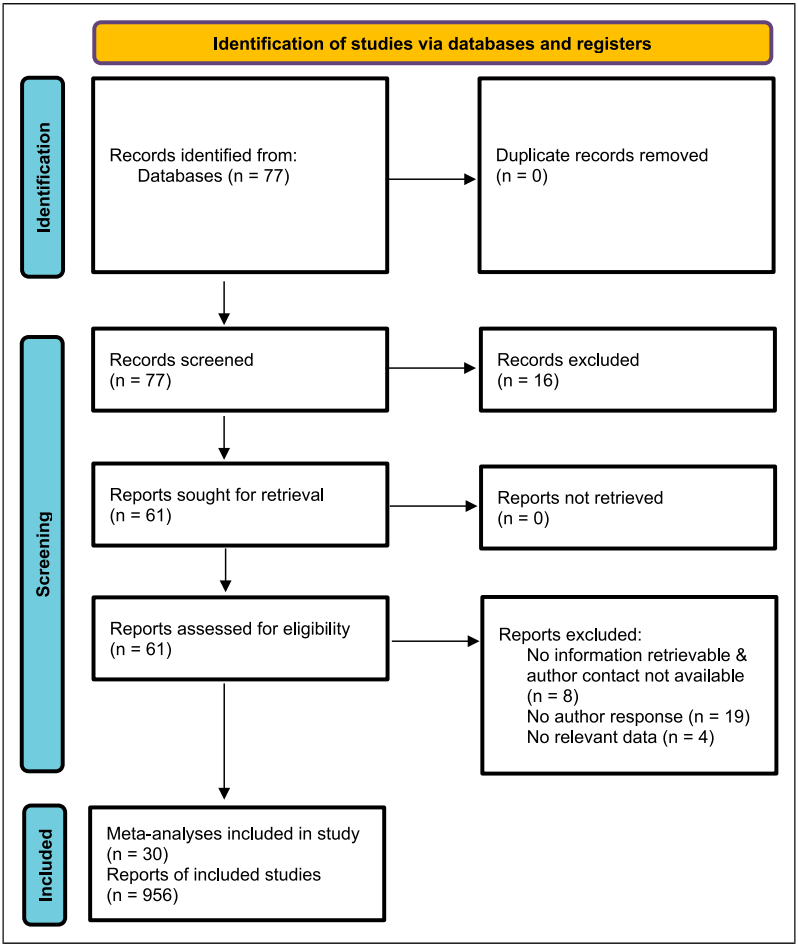

Figure 1. Prisma Chart of Study Inclusions and Exclusions. *From:* Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021; 372:n71. doi: 10.1136/bmj.n71.

healthy behavior, adhering to a healthy diet or recycling to reduce environmental impact) or inhibited (as in reducing smoking or unsafe sexual practices). The first author coded all information and the second author independently checked the accuracy in 10% of the total sample. The agreement was 99%. We also noted the study year of the original publication in order to estimate possible temporal effects (declining or increasing effectiveness of the predictor over time).

Table 2. Number of Samples and Total Sample Size of Each TPB Correlation by Country.

Country	Number of samples	Combined *N* of samples behavior			Combined *N* of samples intention		
		Attitude	Norm	PBC	Attitude	Norm	PBC
Australia	99	9431	12110	17099	16276	19815	18416
Austria	1	215	215	215	215	215	215
Belgium	6	716	429	858	1341	1341	1943
Bulgaria	1	0	0	0	510	510	510
Bahrain	1	0	0	241	0	0	0
Brazil	2	200	200	400	200	200	200
Canada	74	11794	10658	16109	5544	9523	4814
Switzerland	9	703	156	703	3078	3237	2674
China	10	0	0	0	4944	4396	4396
Cyprus	2	500	0	0	793	293	293
Czechia	2	1306	1054	1054	1054	1054	1054
Germany	28	11146	6825	6139	14865	15254	14573
Denmark	9	3038	0	1520	890	771	1009
Spain	6	400	400	400	1253	1353	1153
Estonia	5	783	783	598	783	1051	689
Ethiopia	3	743	743	743	1097	1464	1097
Finland	12	646	446	327	2309	2309	1909
France	8	631	631	631	3980	3980	5252
United Kingdom	201	23984	22698	29181	31991	33862	32971
Greece	15	2777	3883	1820	4054	3953	1477
Hong Kong SAR China	3	136	136	136	641	641	641
Hungary	3	318	235	235	235	470	235
India	4	0	0	0	1310	1310	1310
Ireland	5	623	119	405	995	865	995
Iran	11	2624	2624	4777	5215	4188	4295
Israel	2	3307	0	0	0	0	0
Italy	19	7420	7420	5706	9833	8969	6312
Jordan	1	0	0	0	323	323	0
Japan	4	321	835	835	288	288	629
South Korea	10	1383	1167	1383	2448	1919	2046
Lebanon	2	735	75	0	660	0	0
Mexico	2	475	475	475	1220	1220	475
Malta	2	0	0	100	200	200	200
Malaysia	2	200	0	0	397	397	0
Nigeria	1	1360	0	0	0	0	0

(continued)

Table 2. (continued)

Country	Number of samples	Combined *N* of samples behavior			Combined *N* of samples intention		
		Attitude	Norm	PBC	Attitude	Norm	PBC
Netherlands	87	27434	25369	31927	46507	46097	39648
Norway	42	4649	4036	4292	9477	8369	5693
New Zealand	6	645	755	755	2886	2886	2886
Pakistan	2	216	216	216	216	216	216
Poland	1	103	103	103	103	103	103
Portugal	5	177	177	177	1128	1128	1128
Romania	1	35	35	35	0	0	0
Russia	1	204	204	0	204	204	0
Singapore	2	133	133	133	133	266	133
Sweden	21	1414	0	5642	11151	9688	8480
Thailand	3	191	191	0	672	672	272
Turkey	2	0	0	254	1309	1309	1309
Taiwan	11	614	614	0	3188	2943	3188
Tanzania	6	2180	2180	3756	2801	2801	2801
Uganda	6	372	372	4956	5328	5328	5328
United States	188	24743	20995	27366	34791	37097	27009
Vietnam	2	0	0	612	805	805	805
South Africa	3	152	152	152	544	152	446
Zimbabwe	2	0	0	0	259	259	259

Transparency and Openness

All data and analysis code have been made publicly available at the Open Science Framework and can be accessed at https://osf.io/cpnm2/?/. This study was not preregistered.

Moderator Variables

Economic and Ecological Indicators. Cold water indices were obtained from Chris Welzel (personal communication, April 26, 2021, see also (Welzel, 2014)). This index is a weighted average of the fraction of a country's land territory being located in cold or temperate climate zones with no dry season and the presence of permanently navigable waterways. More information on the derivation and validation of the index are reported by Welzel (2013, 2014).

We used historic parasite prevalence data (Murray & Schaller, 2010). This is based on the prevalence of leishmaniasis, schistosomes, trypanosomes, malaria, typhus, filariae, and dengue in each country. This human-specific and

multi-host parasite indicator has been shown to be more important for social and cultural processes than zoonotic parasite stress (Fincher & Thornhill, 2012; Van de Vliert & Postmes, 2012).

Wealth was measured with the averaged index of Gross Domestic Product per capita, expressed as Purchasing Power Parity for the period from 2000 to 2020 from the CIA World Factbook (Central Intelligence Agency, 2021). We z-transformed this index to provide a more meaningful scale for our analyses. For the Climato-economic analyses, we used a log-transformed wealth index (Van de Vliert, 2013).

The Human development index is a composite index, including an estimate of wealth, life expectancy at birth, the mean of expected years of school and mean average year of schooling. We used averaged United Nations data for the period 2000 to 2020 (UNDP, 2022).

Climatic demands are defined as the sum of the deviations from 22 degrees C (ca. 72F) for the lowest and highest average temperatures in the coldest month and the lowest and highest average temperatures in the hottest month, measured at the location of the capital city in each country (which is a relative conservative approach, Van de Vliert, 2008). Further discussions on the biological evidence for this setpoint are available elsewhere (Fischer, 2021; Van de Vliert, 2013).

Sociocultural Indicators. We used a number of different estimates of individualism-collectivism. First, we used a subjective averaged measure which was calculated as the average of normalized scores for Inglehart's (Inglehart & Baker, 2000) survival versus self-expression dimension, Hofstede's Individualism index (Hofstede, 2001), and Schwartz's autonomy versus embeddedness score for teachers and students (Schwartz, 1994). Previous research has suggested that this is a reliable and valid measure for capturing individualism (Fischer & Boer, 2011; Fischer & Van de Vliert, 2011). To test whether the individual indicators are relevant, we also separately tested the survival dimension (Inglehart & Baker, 2000) as well as the conceptually related emancipation values (Welzel, 2013), Hofstede's individualism dimension as well as separate value dimensions using both Schwartz' culture level dimensions of affective and intellectual autonomy and embeddedness dimensions.

We also included the aggregated individual level equivalents of Hedonism, Stimulation, Self-Direction, Conformity, Security and Tradition values (Fischer, 2012; Fischer & Poortinga, 2012; Schwartz, 1992) averaged across single item measures in the World Values Survey (Welzel, 2010), the Portrait Value Survey scores available in the values in crisis project (Aschauer et al., 2021) and all waves of the European Social Survey (for structural validation of the ESS index, see Bilsky et al., 2011). The average correlations for each of the value dimensions across the different data sets were all positive (k varies from

7 to 38, Hedonism r = .64, Stimulation r = .34, Self-Direction r = .52, Conformity r = .25, Security r = .64, Tradition r = .73.

Second, we used an objective indicator of collectivism (Pelham et al., 2022), which contains six specific subdomains (total fertility rate, living arrangements, stability of marriages, extent of religiosity, reliance on collective transportation and ingroup bias). It is conceptually grounded, correlates moderately with other measures of individualism and is independent of economic wealth (Pelham et al., 2022).

The extent of power inequalities was measured with Hofstede's power distance index (Hofstede, 2001), Schwartz' culture level dimensions of egalitarianism and hierarchy (Schwartz, 2006) and the individual level equivalent dimensions of universalism, benevolence, power and achievement (Fischer, 2012; Schwartz, 1992). The individual level data was again based on the World Value Survey (single items), the Values in Crisis project and the European Social Survey (using the Portrait Value Questionnaire), as described above. The average correlation for each of these value dimensions across the different data sets were again positive (k varying from 7 to 38, Universalism r = .60, Benevolence r = .63, Power r = .72, Achievement r = .71.

Tightness was measured based on survey data collected with student and adult samples. We z-transformed and averaged the currently available tightness-looseness data from diverse samples (Gelfand et al., 2011, 2021). The two scores were highly correlated (r = .87)[1]. Higher scores indicate greater tightness. Figure 2 shows the overall correlation matrix of the aggregated and averaged data at the study level.

Analytical Strategy

We used the *metafor* package (Viechtbauer, 2010) in R (R Core Team, 2021) to run our analyses. All effect sizes were r-to-z-transformed and the weights were based on the sample sizes (Lipsey & Wilson, 2001). Our data was nested within countries (effect sizes within samples within countries) but were also included in different meta-analyses organized by topic. For this reason, we ran a three-level cross-classified mixed-effects meta-analysis using REML (restricted maximum likelihood) estimation. This means we included separate random effects of effect sizes nested in studies nested in countries and effect sizes nested in meta-analyses (e.g., random = list (~1 | Country /Study ID, ~1 | meta-analysis).

We compared the performance of the cross-classified model against a three-level model including only the hierarchical nesting within samples and countries using a Maximum likelihood estimation.

Variance estimates at the different levels were calculated using the *dmetar* package (Harrer et al., 2019). We computed these estimates with only the overall effect size estimates and when controlling for domain effects.

Figure 2. Correlation of moderator variables at the study level. *Note*: Cold-Water = Cold water index, Stress-Paras = parasite stress index, Stress-Clima = climatic demands, GDP = Gross domestic product (per capita), HDI = Human development index, FB-IDV = Fischer & Boer combined individualism index, Obj-IDV = Pelham et al. objective collectivism index, H-IDV = Hofstede individualism-collectivism, I-Sec = Inglehart secular values, W-Emanc = Welzel emancipative values, I-Trad = Inglehart traditional values, W-Surv = Inglehart survival values, S-AffAut = Schwartz Affective Autonomy values, S-IntAut = Schwartz Intellectual Autonomy values, S-Emb = Schwartz Embeddedness values, S-HE = Schwartz Hedonism values, S-ST = Schwartz Stimulation values, S-SD = Schwartz Self-Direction values, S-CO = Schwartz Conformity values, S-TR = Schwartz Tradition values, S-SE = Schwartz Security values, H-PD = Hofstede Power Distance, S-Hier = Schwartz Hierarchy values, S-Egal = Schwartz Egalitarianism values, S-UN = Schwartz Universalism values, S-BE = Schwartz Benevolence values, S-PO = Schwartz Power values, S-AC = Schwartz Achievement values, TL = Gelfand Tightness Looseness.

For the main analyses of the cultural dimensions, we entered each moderator variable *individually* in a three-level mixed effects meta-analysis, in which we also controlled for the valence of the behavior, the year of publication and the domain. Because the year of publication of the original analysis and the behavior domain were not independent of the meta-analysis in which the study was included, we were not able to run a cross-classified model.

Results

Overall Meta-Analysis Results

Our first research question concerned the relative strength of attitudes, perceived behavioral control and subjective norms on both behavioral attention and behaviors (see Table 3). The effects were somewhat stronger for behavioral intentions than for behavior. For behavioral intentions, the strongest effect was observed for attitudes, followed by perceived behavioral control and subjective norms. The 95% confidence intervals for attitudes were not overlapping with those of subjective norms, suggesting that these effects are reliably stronger overall. The confidence intervals for norms and PBC did overlap, implying that these effects were not reliably different. For behaviors, the largest effect was observed for perceived behavioral control, closely followed by attitudes and then norms. All confidence intervals overlapped, suggesting that the effects are not reliably different. This answers our first research question and highlights that the average effects for attitudes, perceived behavioral control and subjective norms on behavior are empirically comparable, but that the effects of attitudes on intentions was empirically stronger than the effect of subjective norms on intentions.

Behavior Domain Effects

Considering possible domain effects, the strongest and most consistent effects were observed for perceived behavioral control associations (see Table 4). In studies focusing on food choice and physical exercise the effects of perceived behavioral control on attitudes and behaviors were significantly stronger compared to studies that investigated intoxicants-related behaviors. Studies

Table 3. Overall Results of the Meta-Analysis (Using a Three-Level Cross-Classified Model).

Variable	ES	95% CI	*Q*	*k*	*LRT*
Behavioral intentions					
Attitudes	.560***	.512, .609	15599.37	593	21.16***
PBC	.493***	.446, .539	19843.87	513	0.34
Subjective norm	.439***	.394, .483	12024.66	586	9.72**
Behavior					
Attitudes	.325***	.271, .378	10204.22	392	32.26***
PBC	.325***	.262, .389	11220.11	449	10.08**
Subjective norm	.287***	.198, .377	5813.82	351	32.44***

Note. ***$p < .001$, **$p < .01$, *$p < .05$, LRT – Likelihood ratio test, examining the relative fit of the cross-classified multilevel to a three-level mixed effects model.

Table 4. Behavior Domain Effects on Correlations Using a Cross-Classified Multilevel Model.

	Intentions			Behavior		
	Attitudes	PBC	Subjective norms	Attitudes	PBC	Subjective norms
Intercept	0.519***	0.309***	0.468***	0.290***	0.172*	0.351***
Food choices	0.035	0.162**	−0.039	0.027	0.112	−0.047
Physical exercise	0.036	0.286***	−0.151***	0.038	0.226**	−0.118*
Health	0.063	0.187**	−0.029	0.032	0.125	−0.029
Environmental behavior	−0.034	0.217***	−0.083±	0.139±	0.185*	−0.007
Safe-sex behavior	0.049	0.098	0.061	−0.094	0.003	−0.102
Other	0.115±	0.206**	0.091±	0.020	0.166±	−0.021
Q(M)	17.93**	26.45***	50.64***	5.41	17.96**	9.89
Q(E)	15281.31***	17673.61***	11445.10***	8678.19***	10068.21***	5293.34***

Note. ± $p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$, all domains compared with intoxicants-focused behavior as comparison category, results from the cross-classified three level model.

investigating food choice behavior, health and other behavior domain effects also reported stronger effects for perceived behavioral control with intentions compared to intoxicants-focused behavior studies. Interestingly, for subjective norm associations with both intentions and behavior were significantly weaker for exercise compared to intoxicants-focused behaviors. Another interesting observation is that behavior domain effects were largely absent for attitude effects on both intentions and behavior, whereas perceptions of control were most susceptible to behavior domain effects.

Relative Variability of Effects

Our second question concerned the relative variability of effects at the level of effect size, the sample or across countries (see Table 5). The first observation is that for most associations the greatest variability was observed at the study level within countries. The variability for all associations except the subjective norm – behavior associations was above 78%. The only outlier here was the subjective norm – behavior association which showed only 38% or 35% variability across studies within countries, without and with adjusting for behavior domain effects, respectively. Variability at the country level was sizable, varying between 5.5% for the attitude-intention association to 57.8% for the norm-behavior association, when not adjusting for behavior domain effects. On average, 8.1% of the variability was observed across countries for intentions and on average 28.6% of the variability for behaviors was due to country, without adjusting for behavior domain effects. This suggests that there is greater variability and less consistency in the prediction of behavior across countries than for predictions of intentions. This pattern held when adjusting for behavior domain effects. Level 3 variance estimates decreased slightly in four cases and increased in 2 cases. However, the overall pattern

Table 5. The Relative Variance Contributions in the Three-Level Model.

	Level 1		Level 2		Level 3		Total I^2 (%)	
	M1	M2	M1	M2	M1	M2	M1	M2
Attitudes-Intentions	4.02	3.94	90.50	89.92	5.47	6.14	95.97	96.06
PBC – Intentions	2.92	3.06	91.12	91.09	5.95	5.85	97.08	96.94
Subjective norms – Intentions	4.96	5.17	82.10	86.23	12.94	8.60	95.04	94.83
Attitude – Behavior	4.11	4.60	85.57	93.65	10.32	1.75	95.89	95.40
PBC - behavior	3.46	3.76	78.79	81.79	17.75	14.45	96.54	96.24
Subjective norms – Behavior	3.89	3.98	38.29	34.78	57.81	61.24	96.10	96.02

Note. M1 = Three-level model, M2 = three-level model with behavioral subdomains as predictors; Level 1 = effect size level within studies; Level 2 = studies nested within countries; Level 3 = cross-country differences.

remained unchanged and for both intentions and behaviors, the variability estimates for subjective norms were larger compared to both attitudes and PBC. This answers our second research question: (a) we found greater cross-country variability for links of the theoretical variables with behaviors and (b) somewhat greater variability for the effects of subjective norms compared to the individualistic predictors within the model.

Societal Level Moderator Effects

We first ran a three-level mixed effects model in which each moderator (or set of moderators for the Climato-economic model) was entered individually. Potentially, we could expect 174 significant effects (3 predictors × 2 outcome variables x 29 moderators). Overall, we identified 7 significant effects with a $p < .01$ after controlling for behavior valence, publication year and behavior domain. We organize the moderation results by attitude, perceived behavioral control and subjective norms.

First, we found a significant effect of Tightness-looseness on the attitude-intention link: b = −.087, 95%CI [-.139, −.034], $p = .001$. The effect of food choice behavior (b = −.102, $p = .023$), environmental behavior (b = −.133, $p = .004$), and health behavior (b = −.100, $p = .040$), all compared to intoxicant-focused behavior as comparison group, were also significant. In tighter societies, the effect of attitudes on intentions was weaker (see Figure 3). This is in line with our predictions.

Second, we found an effect of embeddedness on the perceived behavioral control association with intentions: b = −.188, 95%CI [-.320, −.055], $p = .005$. In this model, the effect of behavior valence (b = .093, $p < .001$), environmental behavior (b = .168, $p = .004$), exercise behavior (b = .196, $p = .001$), and other behaviors (b = .167, $p = .008$), all compared to intoxicants-focused behavior were also significant. Increased embeddedness was associated with weakened perceived behavioral control associations with behavioral intentions, which is in line with our expectations (see Figure 4).

Replicating these effects, the Conformity value effect on perceived behavior control associations with intentions was also significant (b = −.211, 95%CI [−.343, −.078], $p = .002$). In this model, the effects of behavior valence (b = .098, $p < .001$), publication year (b = .006, $p = .021$), environmental behavior (b = .171, $p = .004$), exercise behavior (b = .197, $p = .002$), and other behaviors (b = .166, $p = .006$), all compared to intoxicants- focused behavior were also significant. More embedded values were associated with weakened perceived behavioral control effects, which is in line with our predictions (see Figure 5).

Similarly, the effect of Security values on perceived behavior control associations with intentions was also significant (b = −.173, 95%CI [−.280, −.066], $p = .002$). In this model, the effects of behavior valence (b =

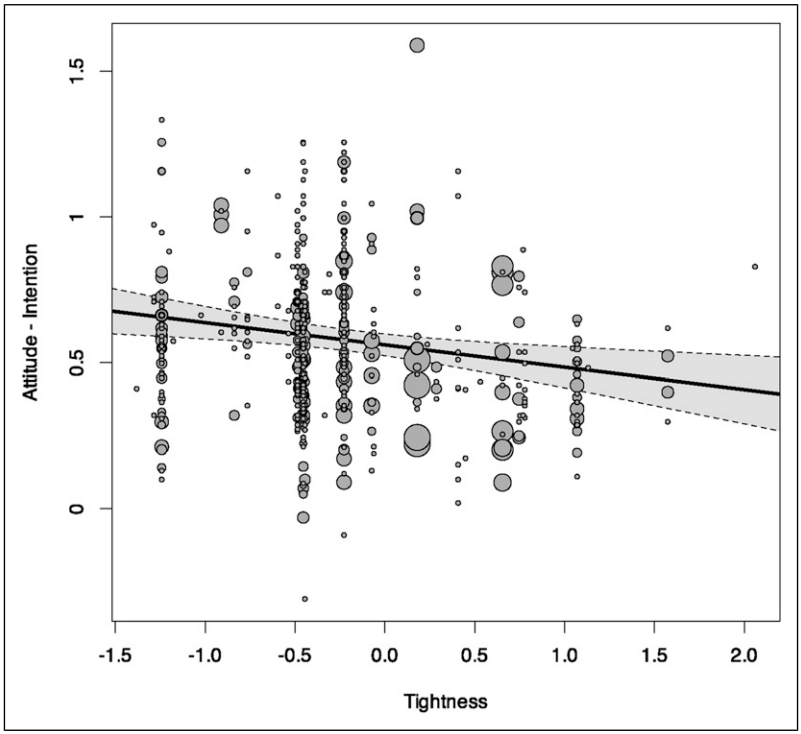

Figure 3. Moderating effect of Tightness on the Attitude-Behavioral Intention Relationship. *Note*: The size of the points is a function of the square root of the model weights (sample size dependent) and their size is proportional to their weight. The point sizes are rescaled for plotting, which implies that the relative sizes do no longer exactly correspond to their relative weights.

.095, $p < .001$), environmental behavior (b = .172, $p = .003$), physical exercise behavior (b = .203, $p = .001$), and other behaviors (b = .161, $p = .008$), all compared to intoxicants-focused behavior were also significant. Again, more collectively oriented values were associated with weakened effects. This is in line with our predictions (see Figure 5).

A further moderation effect on perceived behavioral control with intention associations was due to the climate by wealth interaction: b = .004, 95%CI [.001, .007], $p = .002$. In this model, the effect of year (b = .006, $p = .047$), behavioral valence (b = .094, $p < .001$), climatic stress (b = −.041, $p = .007$), Gross National income (b = −.193, $p = .029$), environmental behavior (b = .188, $p = .002$), exercise (b = .210, $p < .001$), health (b = .128, $p = .042$) and other behaviors (b = .184, $p = .004$) were all significant. To break down this interaction, we split the sample into poor (1 SD below the mean at the country

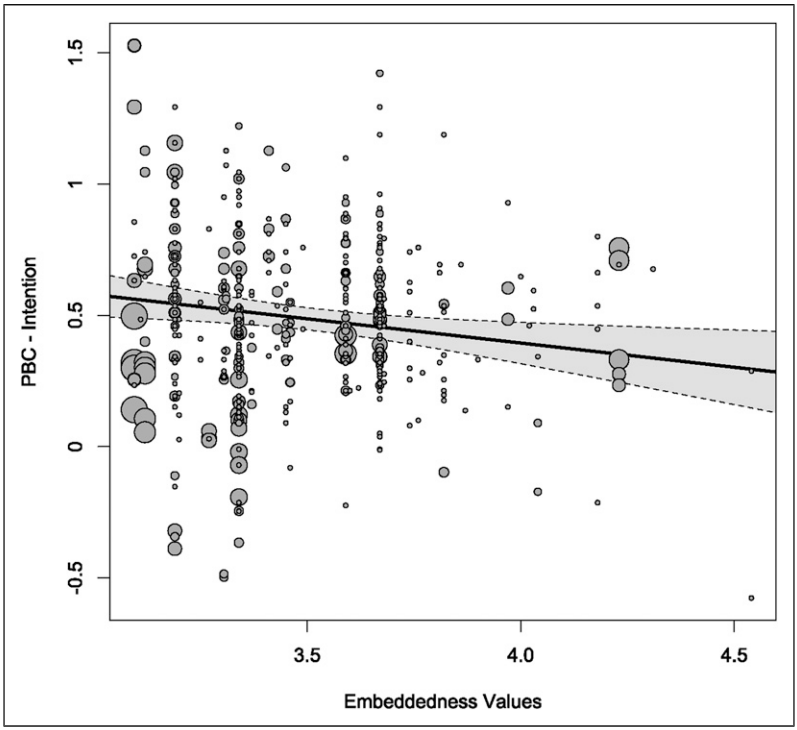

Figure 4. Embeddedness values moderate the association between perceived behavioral control and behavioral intentions. *Note*: Please see Figure 3 for an explanation of the point sizes.

level), average (mean level of Gross national income at the country level) and rich countries (1 SD above the mean). We then reran the analysis testing the climate effect. When including all control variables, the effect of climate stress was negative and significant in poor societies: b = −.018, 95%CI [−.027, −.009], $p < .001$, k = 30, but was not significant at the mean levels of income: b = .001, 95%CI [−.002, .004], $p = .528$, k = 468 or high levels of income: b = .000, 95%CI [−.023, .023], $p = .988$, k = 5. When separately splitting the sample into harsh and benign climates and testing the wealth effect, the effect gross national income was negative but not significant in harsh climates: b = −.096, 95%CI [-.244, .052], $p = .204$, k = 19 and was positive, but not significant in benign climates: b = .106, 95%CI [−.216, .428], $p = .519$, k = 67. Note that the sample sizes were uneven due to the uneven distribution of samples along economic wealth and climatic stress. The moderation effect is nevertheless not completely aligned with our prediction. Although climatic stress tended to reduce the strength of association

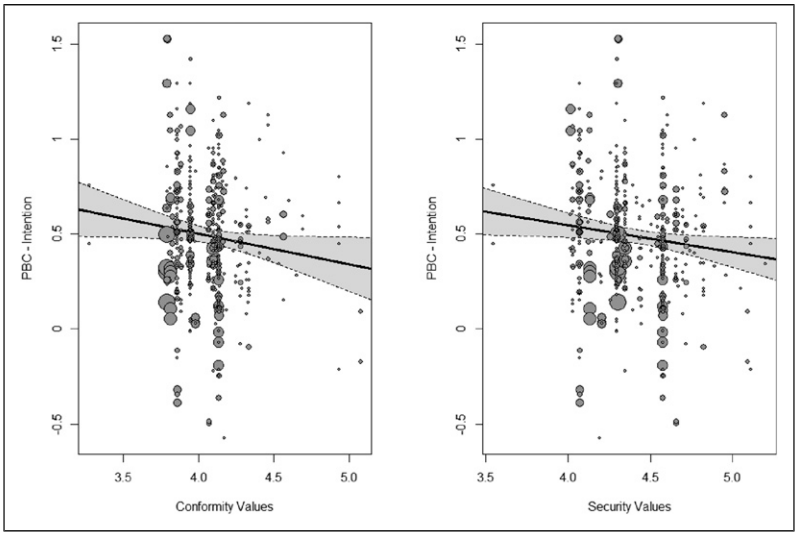

Figure 5. Increased Conformity values (left) and Security values (right) are associated with weakened perceived behavioral control associations with behavioral intentions. *Note*: See Figure 3 for an explanation of the point sizes.

between perceived behavioral control and intentions in poor countries, the effect of increased wealth on the perceived behavioral control – intention link in harsh climates was negative, which is contrary to the theoretical predictions.

There was a significant effect of Power values on the perceived behavioral control association with behavior (b = .145, 95%CI [.041, .248], p = .006). In this model, the effects of behavior valence (b = .107, p = .033) was also significant. The strengthened effect of perceived behavioral control associations with behavior in more power-oriented societies was contrary to our predictions (see Figure 6).

Additional Analyses

We ran several additional analyses with other cultural dimensions (including the remaining culture-level dimensions defined by Hofstede, Schwartz, Inglehart and Welzel). The only significant effect at $p < .01$ was for Flexibility versus Monumentalism (Minkov et al., 2018) on the association between subjective norms and behavior (b = −.077, 95%CI [−.123, −.030], p = .001). Increased flexibility was associated with weakened subjective norm – behavior associations.

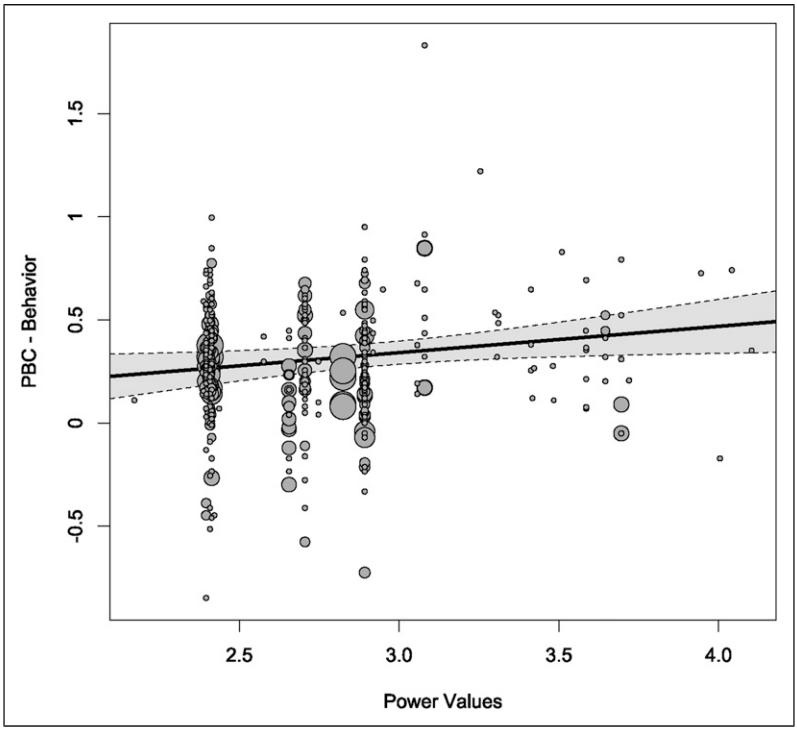

Figure 6. Increased Power values are associated with strengthened perceived behavioral control associations with behavior. *Note*: See Figure 3 for an explanation of point sizes.

Discussion

We conducted a meta-meta-analysis including data from 956 samples across 54 countries, we found that (a) predictions of behavior overall as well as (b) subjective norm effects on both intentions and behavior within the theory of planned behavior varied substantively across societies. At the same time, most of the variance was observed at the sample level within countries, suggesting heterogeneity due to within-country effects that may be due to social context, study effects or other variability between studies within the same country. When examining possible moderator variables of the cross-cultural variability, we found weak support for ecological and economic predictions, but support in line with predictions for Tightness on attitude-intention associations and Collectivistic values on perceived behavioral control – behavioral intention associations. We also found one value effect contrary to our predictions. We do discuss these patterns in turn, focusing first on the broader pattern and then moving to the individual moderator results.

First, the data clearly suggest that a) systematic cultural effects need more attention in psychological research. We found sizable cross-cultural variability around the predictors of behaviors within the model, yet, we did not find any significant moderation effects in line with our predictions when behavior was the outcome variable. Psychology typically does not strongly focus on behavioral variables compared to studying mental constructs (attitudes, beliefs, intentions, etc.), yet, at this behavioral level we are likely to see more cultural variability. The lack of significant effects and the power value effect contrary to our prediction strongly indicate that behavior needs greater attention. We strongly encourage more cross-cultural work that examines behavior (or at least behavior reports).

Second, there was substantive variability within countries which highlights that there are unexamined effects within this widely used model that require further attention. We are the first to systematically compare patterns of variability across levels of analysis and across behavior domains. These patterns are of importance and interest both for researchers or practitioners trying to predict intentions and behavior as well as researchers of culture. For the former group, it implies that there are important theoretical variables that moderate the linkages within the model but which are currently underexplored (for similar arguments: Fischer & Karl, 2022; Hassan & Shiu, 2017; Morren & Grinstein, 2021; Zhang et al., 2012). These moderators may be situation-specific features, could be behavior-domain specific or demographic (e.g., see the bias towards student samples in psychology). In short, there is plenty of unexplained variance across studies at the sample level that is worth exploring further. For the cross-cultural researchers, this is a strong reminder that cross-cultural differences are sizable, but these effects may often pale when compared to differences within cultures. This has been observed in previous studies across psychological constructs (Fischer & Schwartz, 2011; Saucier et al., 2015) and intimately related to continuing discussions about the appropriate level of analysis (Akaliyski et al., 2021; Fischer et al., 2005; Fischer & Ferreira, 2024; Kozlowski & Klein, 2000). The data reported here suggests that within-country variability is sizable, might be due to various factors and needs more attention.

Third, the variability estimates for intentions and behaviors were somewhat different. We do not want to overestimate this given the different sample sizes. At the same time, we think that this requires some further reflection in light of previous work that has suggested that behavioral intentions may not translate into behaviors (McEachan et al., 2011; Rhodes & Dickau, 2013). This is especially important if we consider that cultural dimensions may influence how intentions can be converted into actual behavior. The work on tightness looseness is of particularly relevance as greater normative tightness may restrict how individuals can turn their intentions into actions (Gelfand et al., 2011). Such constraints require further theoretical and empirical attention.

Fourth, we want to call attention to the fact that cultural dimensions overall seem to have been more theoretically aligned with the attitude-intention and perceived behavioral control associations within the model. This seems to underscore the fact that contemporary psychology is better at explaining variability in more individualistic attitude and perceptions compared to more social effects (Chater & Loewenstein, 2022; Smith et al., 2013). It is somewhat ironic that this also seems to be the case for cross-cultural dimensions that have been proposed to counter the individualistic bias in psychology.

Fifth, the current analysis suggests that value dimensions have greater potential to explain cross-cultural variability in both behavioral intentions and behavior. Although there has been a renewed interest in ecological and economic predictors in psychology (Sng et al., 2018; Thornhill & Fincher, 2020; Van de Vliert, 2013; Welzel, 2013), such effects may in effect operate via shifts in values. However, the lack of direct effects (even when tested individually without controlling for sociocultural predictors) suggests that ecological and economic variables are quite distal compared to values, which operate as direct moderators. Such more distal effects are in line with previous research. Economic effects seem to have relatively immediate impact on values (van Herk & Poortinga, 2012), which suggests that large scale interventions using economics (e.g., universal income) aimed at changing behavior may need to consider the temporal dynamics via intermediate value effects. Given the importance of the theory of planned behavior for behavior interventions, such multilevel temporal dynamics require further attention.

Culture-Level Effects on Attitudes and Behavioral Control Effects

The finding of tightness on attitude – intention effects underscores the importance of normative regulation on cognition, including intentions to perform behavior (Gelfand et al., 2011). It suggests that normative effects at the culture level may operate in selecting motivational frames prior to having an effect on behavior itself. This is an interesting finding in line with the original theory that suggested that tightness may activate and mold behavioral expectations and scripts. Yet, the effect on intentions, but not behavior is somewhat surprising given that normative effects are supposed to be more directly relevant for behavior. As suggested by one anonymous reviewer, one possible avenue for exploring this further is to examine impression management strategies (attempts to present oneself favourably to others, Paulhus, 1984). Previous research has suggested that there are substantive cross-cultural differences in impression management and related strategies, with individuals from more collectivistic or hierarchical contexts being able to manage impressions more easily and using broadly defined impression-management strategies more extensively (Riemer & Shavitt, 2011; van Hemert et al., 2002). Returning to Tightness-looseness, a recent naturalistic study has found

substantive effects of this dimension on impression management in online contexts (e.g., greater expression of positive emotions, reduced expression of negative emotions) (Liu et al., 2018), suggesting that tightness-looseness effects on intentions are worth exploring further. The relative importance of societal norm effects on cognition versus behavior is an important area for further research.

We found converging evidence that more collectivistic values, measured either as culture-level embeddedness values (Schwartz, 2006) or aggregated individual level Conformity and Security values (Fischer, 2012; Schwartz et al., 2012), are associated with weakened perceived behavioral control associations with intentions. In line with classical theorizing in cultural psychology (Triandis, 1995), this suggests that in contexts with greater focus on social groups, perceived behavioral control is less predictive of intentions. It is quite plausible that in such more group-oriented contexts, the importance of individual efficacy as a core component of behavioral control is less salient than expectations of collective efficacy. To the extent that this is the case, it may be worth adding collective efficacy in further applications in more collectivistic and group-oriented contexts. Some of the literature on exercising seems to be moving in this direction, by emphasizing the importance of social support and social contracts with others for maintaining motivation to exercise (Kassavou et al., 2013). The findings overall also seem to imply that perceived behavioral control effects are more impacted by increased collectivistic orientations, and not so much by increasing autonomy and individualization (e.g., removing group effects). This shift towards more socially or collectively oriented notions of efficacy is worth exploring, especially considering how the general trend to greater individualization in a socially connected world may impact perceived behavioral control effects over the longer run.

Considering the unexpected effects, first the effect of Power values on the perceived behavioral control association with behavior was noteworthy. It implies that in contexts in which individuals are more oriented to attain power over others and accumulate wealth and resources, the extent to which individuals feel that they have control over their behavior increases the link with actual behavior. We predicted the opposite relationship based on extant theorizing on values, that has focused the detrimental effects of Power values (Schwartz et al., 2012; Sortheix & Schwartz, 2017). However, reconsidering the contextual effects it appears plausible that an environment in which individuals are very much goal-oriented and focused on gaining control, the effects of perceived behavioral control on behavior at the individual level may be strengthened. We strongly recommend further research on this interesting alternative hypothesis, in particular studies focusing on subgroups with particular value profiles that may help elucidate these patterns further.

Finally, our findings for the climatoeconomic model suggested a more complex relationship. The association of perceived behavioral control with

intentions was significantly weakened in poor societies with increasing climatic demands. This is in line with the original theorizing (Van de Vliert, 2013). Yet, we did not observe the important second part of the prediction that economic resources buffer the negative of climate, as none of the other effects were close to statistically significant. Statistical power issues in our analysis together with the uneven distribution of primary research may have contributed to our failure to find supporting evidence. However, observing the pattern of the economic effect in harsh versus benign climates suggested a pattern opposite to the predictions. This clearly requires further attention. The climatoeconomic theory has been very effective in predicting a number of psychological processes, so this unexpected pattern certainly is worth exploring in future research.

Limitations and Future Research Directions

Our results are not without limitations. Although we tried to be as inclusive as possible, the distribution of previous research limits the claims that we can make about cultural differences. As can be seen in Table 2, most studies have been conducted in Western Europe, the US, Canada and Australia. Research conducted in other cultural regions is typically represented by only one or two studies with relatively small sample sizes. We need more (published and indexed) research with samples from outside North American and European contexts that is available for meta-analytical summaries to help us better understand what variables are important for influencing intentions and behaviors globally.

It is also of importance to consider the representativeness and comparability of samples, both in terms of the representative of the predominant culture within each country and in relation to each other. We cannot say anything about the individual representativeness of samples for their respective countries. A related issue is the lack of information on comparability or invariance of the instruments used to operationalize the key variables within the theory (Fischer et al., 2025; Maassen et al., 2023)

Examining the overall behavior domain effects, we believe it is important to explore them further. The uneven distribution of effect sizes across cultures did not allow us to test for culture by domain interactions. Such interactions are of potential importance when contemplating the specific effects of attitudes or perceived behavioral control versus subjective norms within the theory. What was noteworthy in this respect are the relative strong domain effects on perceived behavioral control, to the extent that perceived control may vary by domain (due to differential situational constraints on behavior domains) across countries, this constitutes an interesting avenue for further theoretical and empirical work. Considering culture, most cultural theories are domain neutral and assume that cultural differences operate similarly across

behavioral domains (Peterson et al., 2018). However, norms are likely to be domain specific (Gibbs, 1965; Jackson, 1960) and there are arguably substantive differences in behavior norms in populations around the world, which may influence both subjective norm and perceived levels of personal control over the behavior. The applicability of broad cultural dimensions to different behavior domains regulated by specific norms needs more research.

Conclusion

Our re-analysis of previous meta-analyses demonstrated that there is substantive variability in the effects of theory of planned behavior constructs when predicting behavior as well as systematic cultural variability in subjective norm effects. At the same time, subjective norm effects were largely unexplained in random effect models and mainly the attitude effects varied systematically in line with past cross-cultural theories. This is a clear demonstration that both situational and cultural variability need greater attention in future research. We hope that the findings of this meta-meta-analysis help to focus future research and highlight the importance of greater attention to both situational and cultural variability in psychological theories.

Author Contributions

RF developed the research idea, conducted the literature search, supervised coding of studies, conducted analyses, wrote the first draft, commented and revised the final draft; JAK conducted analyses, commented and revised the final draft.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This project was supported by the São Paulo Research Foundation (Fundação de Amparo à Pesquisa do Estado de São Paulo, FAPESP) for the project entitled: *Recomeçar melhor: Implementação de uma plataforma digital para avaliação e promoção de saúde mental durante e pós-pandemia COVID-19* (Build back better: Implementation of a digital health platform to evaluate and promote mental health during and following the COVID-19 pandemic), Process no: 2021/08774-1.

ORCID iD

Ronald Fischer https://orcid.org/0000-0002-3055-3955

Note

1. We also examined the potential to merge both scores using a regression forecasting approach in which we predicted missing 2021 scores from 2011 data (which is relevant for 6 countries that had missing information) using this equation: −0.269 + 0.684 * Zscore(Science2011) (Michele Gelfand, March 3, 2025, personal communication). These scores were highly correlated with our average score r = .91, $p <$ .001 and we report replications of our results using this alternative score in the supplement.

References

Abrams, D., Ando, K., & Hinkle, S. (1998). Psychological attachment to the group: Cross-cultural differences in organizational identification and subjective norms as predictors of workers' turnover intentions. *Personality and Social Psychology Bulletin*, *24*(10), 1027–1039. https://doi.org/10.1177/01461672982410001

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11–39). Springer. https://doi.org/10.1007/978-3-642-69746-3_2

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Akaliyski, P., Welzel, C., Bond, M. H., & Minkov, M. (2021). On "Nationology": The gravitational field of national culture. *Journal of Cross-Cultural Psychology*, *52*(8-9), 771–793. https://doi.org/10.1177/00220221211044780

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology*, *40*(Pt 4), 471–499. https://doi.org/10.1348/014466601164939

Aschauer, W., Seymer, A., Bodi-Fernandez, O., Herzog, M., Hadler, M., Höllinger, F., Bacher, J., Welzel, C., Böhnke, K., Delhey, J., Deutsch, F., Eichhorn, J., Kühnen, U., Moraes, D., Kemer, T., Chang, Y.-T., Chu, Y.-H., Huang, O., Casas, A., … Stier, J. (2021). *Values in crisis international (SUF edition)* [Dataset]. AUSSDA. https://doi.org/10.11587/LIHK1L

Beugelsdijk, S., Kostova, T., & Roth, K. (2017). An overview of Hofstede-inspired country-level culture research in international business since 2006. *Journal of International Business Studies*, *48*(1), 30–47. https://doi.org/10.1057/s41267-016-0038-8

Bilsky, W., Janik, M., & Schwartz, S. H. (2011). The structural organization of human values-evidence from three rounds of the European social survey (ESS). *Journal of Cross-Cultural Psychology*, *42*(5), 759–776. https://doi.org/10.1177/0022022110362757

Boer, D., & Fischer, R. (2013). How and when do personal values guide our attitudes and sociality? Explaining cross-cultural variability in attitude-value linkages. *Psychological Bulletin*, *139*(5), 1113–1147. https://doi.org/10.1037/a0031347

Bosnjak, M., Ajzen, I., & Schmidt, P. (2020). The theory of planned behavior: Selected recent advances and applications. *Europe's Journal of Psychology*, *16*(3), 352–356. https://doi.org/10.5964/ejop.v16i3.3107

Central Intelligence Agency. (2021). *The world Factbook*. https://www.cia.gov/the-world-factbook/

Chater, N., & Loewenstein, G. (2022). The i-frame and the s-frame: How focusing on individual-level solutions has led behavioral public policy astray. *Behavioral and Brain Sciences*, *46*(1), Article e147. https://doi.org/10.1017/S0140525X22002023

Cialdini, R. B., Wosinska, W., Barrett, D. W., Butner, J., & Gornik-Durose, M. (1999). Compliance with a request in two cultures: The differential influence of social proof and commitment/consistency on collectivists and individualists. *Personality and Social Psychology Bulletin*, *25*(10), 1242–1253. https://doi.org/10.1177/0146167299258006

Fincher, C. L., & Thornhill, R. (2012). Parasite-stress promotes in-group assortative sociality: The cases of strong family ties and heightened religiosity. *Behavioral and Brain Sciences*, *35*(2), 61–79. https://doi.org/10.1017/S0140525X11000021

Fischer, R. (2012). Value isomorphism in the European social survey: Exploration of meaning shifts in values across levels. *Journal of Cross-Cultural Psychology*, *43*(6), 883–898. https://doi.org/10.1177/0022022111413276

Fischer, R. (2021). Origins of values differences: A two-level analysis of economic, climatic and parasite stress explanations in the value domain. *Cross-Cultural Research*, *55*(5), 438–473. https://doi.org/10.1177/10693971211031476

Fischer, R., & Boer, D. (2011). What is more important for national well-being: Money or autonomy? A meta-analysis of well-being, burnout, and anxiety across 63 societies. *Journal of Personality and Social Psychology*, *101*(1), 164–184. https://doi.org/10.1037/a0023663

Fischer, R., & Boer, D. (2015). Motivational basis of personality traits: A meta-analysis of value-personality correlations. *Journal of Personality*, *83*(5), 491–510. https://doi.org/10.1111/jopy.12125

Fischer, R., & Ferreira, M. C. (2024). Culture and organizations: Theoretical and methodological perspectives. In M. J. Gelfand & M. Erez (Eds.), *The oxford handbook of cross-cultural organizational behavior*. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190085384.013.2

Fischer, R., Ferreira, M. C., Assmar, E. M. L., Redford, P., & Harb, C. (2005). Organizational behaviour across cultures: Theoretical and methodological issues for developing multi-level frameworks involving culture. *International Journal of Cross Cultural Management*, *5*(1), 27–48. https://doi.org/10.1177/1470595805050823

Fischer, R., & Karl, J. A. (2022). Predicting behavioral intentions to prevent or mitigate COVID-19: A cross-cultural meta-analysis of attitudes, norms, and perceived behavioral control effects. *Social Psychological and Personality Science*, *13*(1), 264–276. https://doi.org/10.1177/19485506211019844

Fischer, R., Karl, J. A., Luczak-Roesch, M., & Hartle, L. (2025). Why we need to rethink measurement invariance: The role of measurement invariance for cross-cultural research. *Cross-Cultural Research*, *59*(2), 10693971241312459. https://doi.org/10.1177/10693971241312459

Fischer, R., & Mansell, A. (2009). Commitment across cultures: A meta-analytical approach. *Journal of International Business Studies*, *40*(8), 1339–1358. https://doi.org/10.1057/jibs.2009.14

Fischer, R., & Poortinga, Y. H. (2012). Are cultural values the same as the values of individuals? An examination of similarities in personal, social and cultural value structures. *International Journal of Cross Cultural Management*, *12*(2), 157–170. https://doi.org/10.1177/1470595812439867

Fischer, R., & Schwartz, S. (2011). Whence differences in value priorities? Individual, cultural, or artifactual sources. *Journal of Cross-Cultural Psychology*, *42*(7), 1127–1144. https://doi.org/10.1177/0022022110381429

Fischer, R., & Van de Vliert, E. (2011). Does climate undermine subjective well-being? A 58-nation study. *Personality and Social Psychology Bulletin*, *37*(8), 1031–1041. https://doi.org/10.1177/0146167211407075

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Addison-Wesley.

Gelfand, M. J., Jackson, J. C., Pan, X., Nau, D., Pieper, D., Denison, E., Dagher, M., Lange, P. A. M. V., Chiu, C.-Y., & Wang, M. (2021). The relationship between cultural tightness–looseness and COVID-19 cases and deaths: A global analysis. *The Lancet Planetary Health*, *5*(3), e135–e144. https://doi.org/10.1016/S2542-5196(20)30301-6

Gelfand, M. J., Raver, J. L., Nishii, L., Leslie, L. M., Lun, J., Lim, B. C., Duan, L., Almaliach, A., Ang, S., Arnadottir, J., Aycan, Z., Boehnke, K., Boski, P., Cabecinhas, R., Chan, D., Chhokar, J., D'Amato, A., Ferrer, M., Fischlmayr, I. C., … Yamaguchi, S. (2011). Differences between tight and loose cultures: A 33-nation study. *Science*, *332*(6033), 1100–1104. https://doi.org/10.1126/science.1197754

Gibbs, J. P. (1965). Norms: The problem of definition and classification. *AJS; American journal of sociology*, *70*(5), 586–594. https://doi.org/10.1086/223933

Harrer, M., Cuijpers, P., Furukawa, T., & Ebert, D. D. (2019). *dmetar: Companion R package for the guide "Doing Meta-Analysis in R"* [R package version 0.0.9000]. https://dmetar.protectlab.org/authors.html

Hassan, L. M., & Shiu, E. (2017). The role of national cultural values within the theory of planned behaviour. In C. L. Campbell (Ed.), *The customer is NOT always right? Marketing orientationsin a dynamic business world* (pp. 813). Springer International Publishing. https://doi.org/10.1007/978-3-319-50008-9_223

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations*. Sage.

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: A meta-analytic review. *PLoS Medicine*, *7*(7), Article e1000316. https://doi.org/10.1371/journal.pmed.1000316

Inglehart, R. (1997). *Modernization and postmodernization*. Princeton University Press.

Inglehart, R., & Baker, W. E. (2000). Modernization, cultural change, and the persistence of traditional values. *American Sociological Review*, *65*(1), 19–51. https://doi.org/10.2307/2657288

Jackson, J. M. (1960). Structural characteristics of norms. *Teachers College Record: The Voice of Scholarship in Education*, *61*(10), 136–163. https://doi.org/10.1177/016146816006101007

Kassavou, A., Turner, A., & French, D. P. (2013). Do interventions to promote walking in groups increase physical activity? A meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *10*(1), 18. https://doi.org/10.1186/1479-5868-10-18

Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 3–90). Jossey-Bass/Wiley.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping* (1st ed.). Springer Publishing Company.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Sage Publications.

Liu, P., Chan, D., Qiu, L., Tov, W., & Tong, V. J. C. (2018). Effects of cultural tightness–looseness and social network density on expression of positive and negative emotions: A large-scale study of impression management by Facebook users. *Personality and Social Psychology Bulletin*, *44*(11), 1567–1581. https://doi.org/10.1177/0146167218770999

Maassen, E., D'Urso, E. D., Van Assen, M. A. L. M., Nuijten, M. B., De Roover, K., & Wicherts, J. M. (2023). The dire disregard of measurement invariance testing in psychological science. *Psychological Methods*. https://doi.org/10.1037/met0000624

McDermott, M. S., Oliver, M., Svenson, A., Simnadis, T., Beck, E. J., Coltman, T., Iverson, D., Caputi, P., & Sharma, R. (2015). The theory of planned behaviour and discrete food choices: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, *12*(1), 162. https://doi.org/10.1186/s12966-015-0324-z

McEachan, R. R. C., Conner, M., Taylor, N. J., & Lawton, R. J. (2011). Prospective prediction of health-related behaviours with the Theory of Planned Behaviour: A meta-analysis. *Health Psychology Review*, *5*(2), 97–144. https://doi.org/10.1080/17437199.2010.521684

Minkov, M., Bond, M. H., Dutt, P., Schachner, M., Morales, O., Sanchez, C., Jandosova, J., Khassenbekov, Y., & Mudd, B. (2018). A reconsideration of Hofstede's fifth dimension: New flexibility versus monumentalism data from 54 countries. *Cross-Cultural Research*, *52*(3), 309–333. https://doi.org/10.1177/1069397117727488

Morren, M., & Grinstein, A. (2021). The cross-cultural challenges of integrating personal norms into the Theory of Planned Behavior: A meta-analytic structural equation modeling (MASEM) approach. *Journal of Environmental Psychology*, *75*(1), Article 101593. https://doi.org/10.1016/j.jenvp.2021.101593

Murray, D. R., & Schaller, M. (2010). Historical prevalence of infectious diseases within 230 geopolitical regions: A tool for investigating origins of culture. *Journal of Cross-Cultural Psychology*, *41*(1), 99–108. https://doi.org/10.1177/0022022109349510

Paquin, R. S., & Keating, D. M. (2017). Fitting identity in the reasoned action framework: A meta-analysis and model comparison. *The Journal of Social Psychology*, *157*(1), 47–63. https://doi.org/10.1080/00224545.2016.1152217

Paulhus, D. L. (1984). Two-component models of socially desirable responding. *Journal of Personality and Social Psychology*, *46*(3), 598–609. https://doi.org/10.1037/0022-3514.46.3.598

Pelham, B., Hardin, C., Murray, D., Shimizu, M., & Vandello, J. (2022). A truly global, non-WEIRD examination of collectivism: The Global Collectivism Index (GCI). *Current Research in Ecological and Social Psychology*, *3*(3), Article 100030. https://doi.org/10.1016/j.cresp.2021.100030

Peterson, M. F., Søndergaard, M., & Kara, A. (2018). Traversing cultural boundaries in IB: The complex relationships between explicit country and implicit cultural group boundaries at multiple levels. *Journal of International Business Studies*, *49*(8), 1081–1099. https://doi.org/10.1057/s41267-017-0082-z

R Core Team. (2021). *R: A language and environment for statistical computing* [Computer software]. R Foundation for Statistical Computing. https://www.R-project.org/

Rhodes, R. E., & Dickau, L. (2013). Moderators of the intention-behaviour relationship in the physical activity domain: A systematic review. *British Journal of Sports Medicine*, *47*(4), 215–225. https://doi.org/10.1136/bjsports-2011-090411

Riemer, H., & Shavitt, S. (2011). Impression management in survey responding: Easier for collectivists or individualists? *Journal of Consumer Psychology: The Official Journal of the Society for Consumer Psychology*, *21*(2), 157–168. https://doi.org/10.1016/j.jcps.2010.10.001

Saucier, G., Kenner, J., Iurino, K., Bou Malham, P., Chen, Z., Thalmayer, A. G., Kemmelmeier, M., Tov, W., Boutti, R., Metaferia, H., Çankaya, B., Mastor, K. A., Hsu, K.-Y., Wu, R., Maniruzzaman, M., Rugira, J., Tsaousis, I., Sosnyuk, O., Regmi Adhikary, J., … Altschul, C. (2015). Cross-cultural differences in a global "Survey of World Views". *Journal of Cross-Cultural Psychology*, *46*(1), 53–70. https://doi.org/10.1177/0022022114551791

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In *Advances in experimental social psychology* (Vol. *25*, pp. 1–65). Academic Press. https://doi.org/10.1016/S0065-2601(08)60281-6

Schwartz, S. H. (1994). Beyond individualism/collectivism: New cultural dimensions of values. In *Individualism and collectivism: Theory, method, and applications* (pp. 85–119). Sage Publications, Inc.

Schwartz, S. H. (2006). A theory of cultural value orientations: Explication and applications. *Comparative Sociology*, *5*(2-3), 137–182. https://doi.org/10.1163/156913306778667357

Schwartz, S. H., Cieciuch, J., Vecchione, M., Davidov, E., Fischer, R., Beierlein, C., Ramos, A., Verkasalo, M., Lönnqvist, J.-E., Demirutku, K., others, & Konty, M. (2012). Personality processes and individual differences-refining the theory of basic individual values. *Journal of Personality and Social Psychology*, *103*(4), 663–688. https://doi.org/10.1037/a0029393

Smith, P., Fischer, R., Vignoles, V., & Bond, M. (2013). *Understanding social psychology across cultures. Engaging with others in a changing world* (2nd ed.). Sage Publications.

Sng, O., Neuberg, S. L., Varnum, M. E. W., & Kenrick, D. T. (2018). The behavioral ecology of cultural psychological variation. *Psychological Review*, *125*(5), 714–743. https://doi.org/10.1037/rev0000104

Sortheix, F. M., & Schwartz, S. H. (2017). Values that underlie and undermine well-being: Variability across countries. *European Journal of Personality*, *31*(2), 187–201. https://doi.org/10.1002/per.2096

Thornhill, R., & Fincher, C. L. (2014). *The parasite-stress theory of values and sociality: Infectious disease, history and human values worldwide* (pp. 449). Springer International Publishing AG. https://doi.org/10.1007/978-3-319-08040-6

Thornhill, R., & Fincher, C. L. (2020). The parasite-stress theory of cultural values and sociality. In *The Cambridge handbook of evolutionary perspectives on human behavior* (pp. 167–178). Cambridge University Press. https://doi.org/10.1017/9781108131797.015

Triandis, H. C. (1995). *Individualism and collectivism* (1st ed.). Routledge.

UNDP. (2022). *Human development report 2021-22*. UNDP (United Nations Development Programme). https://report.hdr.undp.org/

Van de Vliert, E. (2008). *Climate, affluence, and culture (Illustrated edição)*. Cambridge University Press.

Van de Vliert, E. (2013). Climato-economic habitats support patterns of human needs, stresses, and freedoms. *Behavioral and Brain Sciences*, *36*(5), 465–480. https://doi.org/10.1017/S0140525X12002828

Van de Vliert, E., & Postmes, T. (2012). Climato-economic livability predicts societal collectivism and political autocracy better than parasitic stress does: Comment on Fincher & Thornhill. *Behavioral and Brain Sciences*, *35*(2), 94–95. https://doi.org/10.1017/S0140525X11001075

van Hemert, D. A., van de Vijver, F. J. R., Poortinga, Y. H., & Georgas, J. (2002). Structural and functional equivalence of the Eysenck Personality Questionnaire within and between countries. *Personality and Individual Differences*, *33*(8), 1229–1249. https://doi.org/10.1016/S0191-8869(02)00007-7

van Herk, H., & Poortinga, Y. H. (2012). Current and historical antecedents of individual value differences across 195 regions in Europe. *Journal of Cross-Cultural Psychology*, *43*(8), 1229–1248. https://doi.org/10.1177/0022022111429719

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, *36*(1). 1. https://doi.org/10.18637/jss.v036.i03

Welzel, C. (2010). How selfish are self-expression values? A civicness test. *Journal of Cross-Cultural Psychology*, *41*(2), 152–174. https://doi.org/10.1177/0022022109354378

Welzel, C. (2013). *Freedom rising: Human empowerment and the quest for emancipation*. Cambridge University Press.

Welzel, C. (2014). Evolution, empowerment, and emancipation: How societies climb the freedom ladder. *World Development*, *64*(1), 33–51. https://doi.org/10.1016/j.worlddev.2014.05.016

Zhang, L., Zhu, J., & Liu, Q. (2012). A meta-analysis of mobile commerce adoption and the moderating effect of culture. *Computers in Human Behavior*, *28*(5), 1902–1911. https://doi.org/10.1016/j.chb.2012.05.008

Zomeren, M. v. (2016). *From self to social relationships: An essentially relational perspective on social motivation* (1st ed.). Cambridge University Press.

Author Biographies

Ronald Fischer works at the Cognitive Neuroscience and Neuroinformatics Unit at D'Or Institute for Research & Teaching, Brazil and the IDOR Pioneer Science Initiative. He is a Fellow of the Royal Society NZ Te Aparangi and the Association for Psychological Science. His has published more than 200 articles on cultural and evolutionary dynamics of values, personality and wellbeing.

Johannes A. Karl is a researcher at the Stanford Graduate School of Business, studying the intersection of evolutionary psychology and cultural dynamics. His research focuses on understanding personality, values, and well-being in diverse populations and how these constructs evolve across human history and influence human behavior.