Development and Validation of the Social Thermoregulation, Risk Avoidance, and Eating Questionnaire - 2

Latest draft: 24 March 2020

Pre-registration status: Not Registered[1]

Proposing (Tier 1) Authors:

Olivier Dujols
Université Grenoble Alpes, France

Richard A. Klein
Université Grenoble Alpes, France

Hans IJzerman
Université Grenoble Alpes, France

Advisory Committee (Tier 2) Authors:

Rodrigo Vergara
Universidad de Chile, Chile

Alan Fiske
University of California, Los Angeles, United States

Siegwart Lindenberg
Rijksuniversiteit Groningen, Netherlands

Qinglan Liu
Hubei University, China

Daniela Rocha Lopes
Independent Researcher, Grenoble, France

Marine Vuillermet
CNRS Dynamique Du Langage in Lyon, France

Gizem Ceviker
Middle East Technical University, Turkey

Mattie Tops
Leiden University, The Netherlands

[1] Project will be pre-registered prior to starting data collection, and again during the exploratory/confirmatory split analysis plan detailed in this proposal.

Ivan Ropovik
University of Presov

Abstract

This project's goal is to develop and validate the "Social Thermoregulation, Risk Avoidance, and Eating Questionnaire" (STRAEQ-2), a questionnaire that assesses 1) individual differences in the most crucial needs to survival in three dimensions: temperature regulation, risk avoidance, and food intake, 2) the ability to cope with these needs by outsourcing them to other people. An initial globally oriented scale will be developed expanding on an earlier questionnaire developed in a smaller subset of countries (STRAQ-1; Vergara et al., 2019). To improve the applicability of the scale, we will solicit our collaborators (84 sites) for the generation of the items (12 items per site) then a diverse advisory committee will preliminary draft a set of 120 items to be administered. We will collect data (expected N = ~15,000) across a range of international contexts (39 countries), and the sites will be clustered around theoretically meaningful variables (harvested through an algorithm). We will pair down the items using iterative factor analysis into the final scale through a pre-registered exploratory/confirmatory split-half data approach, and we will assess cross-cultural performance through invariance testing. To validate the measure, we will investigate the scale's nomological network through many better-known psychological constructs. In the process, we intend to create a large, cross-national dataset that has high reuse potential.

Keywords: Personality, Attachment, Data Driven Research, Preregistration, Environmental Demands

Development and Validation of the Social Thermoregulation, Risk Avoidance, and Eating Questionnaire - 2 (STRAEQ-2)

A considerable and unresolved question in psychology is what personalities are, what they are for, and how they are formed. The Big-5 model of personality (Fiske, 1949) is one of the most famous, robust, and replicable descriptions of human personality. However, it is to date unclear what shapes those traits or how they emerge. Most of the current understanding of personality has been based on data-driven methods with little underlying theoretical explanation (but see DeYoung et al, 2013). There is thus great need for mechanistic accounts of traits as variations to coping with the environment. In this proposal, we focus on three basic needs, how they are resolved, and how both are represented in personality: temperature regulation, risk avoidance, and food intake. For each of these three major dimensions, we examine four subscales: how sensitive individuals are to these threats, how they individually desire to cope with the threat, how they socially desire to cope with the threat, and how confident in others they are in responding to the threat. We think that our project will present a considerable increase in our understanding of human personality, by identifying basic principles for what shapes personality. In order to do so, we combine a theoretical approach to personality with a data-driven method to identify individual differences in 1) coping with environmental threats and 2) the tendencies to outsource these to others.

This project, the "Social Thermoregulation, Risk Avoidance, and Eating Questionnaire" (STRAEQ-2), will thus aim to better measure how people cope with environmental demands. The project workflow will consists of three phases. First, our worldwide network of collaborators (110 researchers at 84 sites) will generate items (by defining strategies how people cope with these three threats in their own countries (currently 39). As such, it will be the first measurement instrument jointly developed by researchers across the globe. Second, our advisory team will select the final list of items that they see as representative for the constructs we intend to measure. Third, we will ask the STRAEQ-2 in a battery of questions, so that we will 1) be able to identify the factors in the STRAEQ-2 and 2) identify the scale's nomological network (by probing questionnaires that are central to our field, like the Big Five, ECR-RS, Social Network Index; see Figures 1 and 2). As part of this latter investigation, we will also assess the consequences of the (lack of) adaptation by assessing self-reported health, stress, and well-being (see

Figure 3). Finally, to increase the potential reuse of our dataset, we will include data harvested from the Internet.

In terms of analysis methods, the project will combine inductive, data-driven methods (exploring data through iterative factor analyses and bootstrapped analyses) a "hold-out strategy" (2/3 of the data will be analysed in an exploratory phase) to identify 1) the factors of the scale and 2) the nomological network of the scale. After pre-registration on the OSF and with ZPID, the remaining third of the data will be used to validate the previously obtained results). We start with general theoretical principles that are not precise predictions. We will then sharpen our a priori defined principles with data-driven methods and then generate more precise hypotheses that will be tested in the hold-out set, using a highly confirmatory approach.

The Environmental Foundations of Personality

Personality traits can be thought of as providing adaptive solutions to environmental demands, particularly those that pose direct threats to the organism (Buss, 2010). Three of the most basic environmental demands are temperature fluctuations, physical dangers (e.g., physical attacks, disease), and lack of food. All three have been and are major concerns for survival throughout human phylogeny and ontogeny. Homeothermic animals (including humans) need to maintain their internal temperature within a comfortable range. Not being able to *thermoregulate* leads to the animal's certain death. Similarly, animals need to remain vigilant to physical threats in the environment and to avoid for instance predators or people who want to do harm. Often overlooked in psychological research, but no less important, is having access to food prevents starvation. Although in modern societies the threat of all of these have been less pressing, the evolutionary timeframe in which it has been less pressing is extremely short, and most of these concerns still present major concerns for human infants who need to rely for all of these on their caregivers. That means these threats should thus also be formative for personality.

The environment's relative impact on personality has been documented extensively in research on nonhuman animals (for a review, see Tops, Quirin, & IJzerman, 2019). Nonhuman animals have been found to develop personality styles to help cope with stable versus unstable environments. Stable environments (clement climates, relative lack of diseases, infrequent bodily threats, and easy access to food) are associated with "proactive" personality styles that reflect rigidity, higher levels of aggression, less impulse control, and greater social dominance (Tops et al., 2019). Unstable environments (relatively harsher climates, a greater threat of contracting diseases, frequent bodily threats, and difficult access to food) are associated with "reactive" personality styles that reflect greater flexibility, lower levels of aggression, greater impulse control, and less social dominance (Koolhaas et al., 1999). Proactive personality styles allow the animal to explore and seek out opportunities and rewards, whereas reactive

personality styles allow the animal to endure uncertain prospects for survival. Differences in temperature fluctuation (clement climates don't vary much beyond 22 °C), intensity and frequency of environmental risks, and food availability should impact the development of personality.

A way to cope with the environment is to distribute the threat among individuals of a group, as it allows resources to be outsourced to others in order to respond to threats. Successful groups thus generally promote a switch from reactive to proactive styles (cf. Tops, Koole, IJzerman, & Buisman-Pijlman, 2014). An individual animal's personality style may be shaped by general threats to its existence (e.g., climate, specific risks), idiosyncratic occurrences to that animal (e.g., random accidents or events), their own capacity to respond to those risks, as well as the ability for their group, or specific individuals within that group, to help address these threats. In humans, some evidence exists on the neural level that parallel animal personality types: Coping with demands is reflected in brain networks divided into two poles on a continuum of short-term versus long-term control. Networks related to short-term control help in processing novel stimuli/situations in the environment whereas familiar stimuli/situations are processed by the networks associated with long-term control. The systems together integrate behavioral and physiological control to optimize behavior and physiology in response to threat to one's existence, whether general or idiosyncratic, and the ability to outsource this to other animals (e.g., Del Giudice, 2014; Ellis, Figueredo, Brumbach, & Schlomer, 2009; Mehrabian, 1995; Tops, Boksem, Luu, & Tucker, 2010; cf. Block, 2002). It is reasonable to surmise that differences in sensitivity to threats and the ability to outsource them should subsequently manifest in the development of mean differences in personality.

Individual differences in how to cope with environmental demands (alone or with others)

The environment can pose challenges to humans via fluctuations in temperatures, immediate bodily harm, and lack of food (cf. Schaller, 2008), and we thus *a priori* expect that human needs relative to the environment are organised around three major dimensions each one corresponding to one of these three treats (see Figure 1). However, as a hypersocial species, humans have increased their efficiency in responding to those threats with the help of others. Human adults can cope with environmental threats by themselves, but it is less costly for our brain and metabolism to distribute the threats on others we predict will be there for us (cf. Beckes & Coan, 2011). Indeed, attachment theory has posited that the reliability of the caregiver shapes to what degree humans come to depend on each other afterwards (Bowlby, 1968, 1982). The relative availability of the caregiver gives rise to stable individual differences typically known as "attachment styles". Depending on the nature of the caregiver's availability, these manifest in attachment avoidance (a tendency not to rely on close others), attachment anxiety (a tendency to need intimacy, but also reassurance), or attachment security (a tendency to trust (close) others). The current

available evidence tends to show some stability in these individual differences from infancy to adulthood (Fraley, 2002; Waters, Merrick, Treboux, & Albersheim, 2000). Individual attachment differences should therefore also be related to individual differences in how we perceive threats, our own ability to deal with those threats (either by ourselves or with others), and whether we are confident that others will help us cope with those threats.

Measuring Threats and Outsourcing: STRAQ-1

By-and-large, personality should thus be affected or even substantially shaped by threats (often environmental demands) and the abilities to cope with the threats (often through a relative dependency on others). Adult attachment has been linked to other personality measures (e.g., Big Five), but to date only one scale showed how threats are coped with via social means: the STRAQ-1 (Vergara et al., 2019; see Appendix A.1-4 for detailed information regarding this previous iteration). In this project, Vergara et al. (2019) administered an overinclusive set of 57 items relating to temperature regulation, sensitivity, social distribution of risks, and related constructs to $N = 1{,}510$ participants across 12 countries as part of the Human Penguin Project (IJzerman et al., 2017). They found initial support for some of the basic notions of the proposal we laid out here: Through naive bootstrapping and cross-validation they developed a robust individual difference scale in countries as diverse as Singapore, Turkey, China, Norway, and the United States, showing reliable individual difference patterns in the desire to socially thermoregulate (Total Omega = .83; Cronbach's Alpha = .77), a distinct desire to solitary thermoregulate (Total Omega = .59; Cronbach's Alpha = .7), a sensitivity to higher temperatures (Total Omega = .83; Cronbach's Alpha = .77), and a desire to avoid risk (Total Omega = .57; Cronbach's Alpha = .57). They also found that Attachment Anxiety was linked to desires for solitary thermoregulation ($r = .08$, $p < .001$), while attachment avoidance was negatively linked to social thermoregulation ($r = -0.32$, $p < .001$). The reliability and the relationship between avoidance and the desire to socially thermoregulate were confirmed in an independent (French) sample (IJzerman et al., 2018).

Improvements to the Previous Project

In the previous version, the reliability of the items was variable across countries. We suspect this was so because researchers from the Netherlands and Chile generated the items. In addition, the previous iteration did not distinguish between the *desire* to outsource and the *confidence* that others would be available to regulate. Finally, the previous version did not take into account the additional subscale relevant to food and food sharing. The present, second iteration aims to improve all of those issues, while also collecting data in a much larger sample of countries and participants. As in the previous project, we do not have strong a priori hypotheses about the exact nature of the nomological network and the factor structure. We will therefore use iterative factor analysis to detect the correct version of the model.

However, based on the previous iteration, we were able to write down some basic starting assumptions about our model that will drive our iterative factor analyses. These starting assumptions (on the basis of which we will start our iterative factor analyses) are captured in Figure 1.

Research Overview

The next steps in this project are therefore 1) to expand the scale to be more inclusive towards motives related to dealing with environmental threats (by adding eating behaviors), 2) to further improve the scale's psychometric properties by letting researchers from diverse countries generate the items (which will then be carefully curated by our team), 3) to therefore make the scale more cross-culturally robust (by incorporating the expertise of diverse researchers in generating scale items) and 4) to gather more comprehensive data on environmental threats that may contribute to personality.

The goal of the project is therefore to 1) develop a scale (the STRAEQ-2) to assess responses to environmental threats and people's ability to outsource them, 2) collect data from better-known questionnaires to locate our scale and responses to environmental demands in existing psychological literature, and to 3) harvest data to assess environmental threats, so that a rich dataset is available thereafter that other researchers can reuse. The STRAEQ-2 will consist of three major dimensions focusing on three underlying environmental demands: social thermoregulation, risk regulation, and food intake. Each of these dimensions will be explored in terms of four separate dimensions: sensitivity to the environmental threat, solitary regulation of the threat, desire to outsource the threat to others, and confidence that others will help down regulate the threat. Within each of the subscales, questions will be developed about different types of relationships (e.g., loved ones versus strangers; for item examples see Appendix B.1-3).

Authorship and Contributorship

We will use a contributorship model of credit. The CRediT taxonomy includes 14 categories to clarify the roles of each contributor (Brand et al., 2015). Concretely, every contributor will be credited for every role assumed . We will write all contributions in a paragraph that we hope to let end up in the article (otherwise, we will include it in the supplemental materials). We will also combine the CRediT taxonomy with ORCID iDs allowing authors to be linked with the publications in the journal's metadata. As people are using ORCID more often, we hope that in the long term all of an individual's contributions will be available in their ORCID IDs. Finally, at the end of our project, the end, we will set up a questionnaire to double check with all collaborators their perception of their contribution to the project.

Study 1: Item Generation for the STRAEQ-2

Method

In Study 1 we generated items for the STRAEQ-2 via our collaborators across the world. The first phase of Study 1 was the item generation by collaborating laboratories, which was followed by a rating by an Advisory Committee (Fig.1 has information on the labs and committee). Based on the rating by the Advisory Committee, we selected the items for the STRAEQ-2 to be tested in the main study.

Phase 1: Item Generation

Early involvement in scale development from diverse collaborators is necessary to avoid generating Western-focused items that do not apply across non-Western regions. In Study 1, all collaborating sites were encouraged to generate one item per STRAEQ-2 subscale in English (12 in total). To do so we created an online survey in Qualtrics. For each of the 3 major dimensions of the scale we first explained the general construct. Then, for each of the subdimensions of the scale we provided a description of the concept and three examples of items. At the end of the survey, collaborators had the possibility to leave a comment and to generate extra items if they wanted to. All the materials for this first phase are available on the project's OSF page: https://osf.io/ghbzk/.

Participating Laboratories

We received 55 valid responses[2] from 53 laboratories in 33 countries with a considerable variability of locations around the globe (for 1 out of the 55 we could not identify where they were from) for a total of 737 items for the STRAEQ-2 (all subscales included). In Table 1, we provide an overview of how many items per subscale were generated. The full list of items is included on our OSF page: (link to where it is posted).

- **Temperature Regulation** **(266)**
  - *how sensitive individuals are to these problems* *(77)*
  - *how people desire to cope individually* *(71)*
  - *how people desire to cope socially* *(67)*
  - *how confident they are that others will help* *(51)*
- **Risk Avoidance** **(225)**
  - *how sensitive individuals are to these problems* *(56)*
  - *how people desire to cope individually* *(55)*
  - *how people desire to cope socially* *(57)*
  - *how confident they are that others will help* *(57)*
- **Food intake** **(246)**
  - *how sensitive individuals are to these problems* *(57)*
  - *how people desire to cope individually* *(50)*
  - *how people desire to cope socially* *(83)*
  - *how confident they are that others will help* *(56)*

[2] We excluded 67 entries/logins in the survey with no generation of at least one item for the STRAEQ-2. These entries were mostly labs that were examining the survey to see what was expected from them.

Table 1. *Numbers of STRAEQ-2 items (per subscale and in total) generated by the collaborators*

Step 2: Item Selection

After transferring all the generated items into a Google Document, the lead team corrected misspelling in the items, reformulated items and removed doubles (all modifications available at https://osf.io/ghbzk/*)*. Then, members of an Advisory Committee - experts chosen to represent a substantial cultural variability and expertise in the topic domain were asked to rate each individual item. Via an online Qualtrics survey the Advisory Committee rated (on a Likert scale ranging from 1 "Not at all" to 7 "Very much") to what degree they thought the items were representative of the description of the construct for each subscale.

Rodrigo Vergara	Universidad de Chile, Chile	Researcher in Psychology and Biology
Alan Fiske	University of California, Los Angeles, United States	Professor of Anthropology
Siegwart Lindenberg	Rijksuniversiteit Groningen, Netherlands	Professor of Sociology
Qinglan Liu	Hubei University, China	Graduate Student in Psychology
Daniela Rocha Lopes	Independent Researcher, Grenoble, France	Brazilian Psychotherapist
Marine Vuillermet	CNRS Dynamique Du Langage in Lyon, France	Postdoctoral Fellow in Linguistics
Hans IJzerman	University of Grenoble Alpes, France	Assistant Professor in Psychology
Gizem Ceviker	Middle East Technical University, Turkey	PhD Candidate in Psychology
Olivier Dujols	University of Grenoble Alpes, France	PhD student in Psychology
Mattie Tops	Vrije Universiteit Amsterdam/Leiden University Medical Center	Associate Professor in Clinical Psychology

fig1. *Advisory committee members (Tier 2 Authors)*

Methods - Next Studies

Participants and Time Investment

The total study package currently contains 430 individual items, and we estimate it will take approximately 1 hours and 5 minutes to complete based on the included scales. However, we will also pilot test the study package for length and adjust it as needed to fit into a single 65-minute session at all labs. This package will then be administered to participants at as many sites as available around the globe. The package will be administered as an online survey for sites with reliable computer and internet access, or as a pencil-and-paper package at sites without those resources. Each site will aid in developing the

cross-cultural relevance of the scale items of the STRAEQ-2, and we propose to collect data from 100 participants at each site.

Translation

All sites will review the final questionnaires and items for suitability to their local sample. One area where adaptation will be required at many sites is in language translation. Each participating lab site will be responsible for their own translation. We recommend that at least two translators per language sign up via an app indicating their language and take a translation role: first translation (A), or back-translation (B). After both will get access to their specific document and take part in the final comparison. We will also highlight that translators should avoid word-by-word translations. This process would involve translation from English to the target language, back-translation to English by a different member of the team, a comparison for suitability and necessary changes, and final review for clarity by non-academic volunteers. When multiple teams are translating into the same language, we will encourage their collaboration on the translation. To account for the added translation burden, teams from these sites will be allowed to bring additional authorship-earning collaborators onto their team. This will be evaluated on a case-by-case basis depending on the need, with the expectation that teams will rarely exceed five authors per location and each included author makes a substantial contribution to the translation process. The lead team will assist in coordinating these efforts and have considerable experience doing so in prior projects (IJzerman et al., 2018; Klein et al., 2014; 2018). All translations will go via a shiny app, especially created for this purpose.

Scale Development: Item Generation

The procedure for scale development will be as follows. We will invite several outside labs to be involved at this strategy/development stage. Early involvement in scale development from diverse collaborators is necessary to avoid biasing the entire process by starting with a western-oriented scale that may not be applicable across many areas. The advisory committee also represents substantial variability already, consisting of a linguist with expertise in South American indigenous languages, an established anthropologist with expertise in Burkina Faso, a neuroscientist with expertise in personality, and representatives from South America and Asia with expertise in psychology (for its members, see Appendix C).

This group of experts and volunteering collaborators will create a preliminary draft of the full set of 120 items to be administered in the present project. Following this, the scale items will be proposed to participating lab sites. Each lab site will be encouraged, but not required, to generate one additional item

per dimension of each subscale[3]. Conceptually, we expect 3 major dimensions - thermoregulation, risk regulation and food intake - because from early childhood to adulthood, these are the most important threats that can be outsourced to significant others. We expect each of these threats to be divided into 4 minor dimensions - sensitivity, desire to fulfill the need by oneself, the desire to fulfil need with other people, and confidence in others to help fulfill the need - based on the fact that there are individual differences in how we perceive threats, ourselves and others' ability to help us. Thus, each site will be asked to generate a total of 12 items (one item per subscale). The advisory committee will then rank their preferred items per subscale. Project leads will finalize the list of items, so as to include 30 items per subscale (120 in total).

Before distribution to the collaborating sites for data collection, sites will first get a chance to review for applicability in their sample and request changes. Our goal is not to make a single one-size-fits-all scale that can be administered exactly across sites, but rather to try to anticipate our own blind spots and make it as cross-culturally generalizable as possible. In addition, if site leads feel there are aspects of their sample related to thermoregulation, food tendencies, and risk management that we do not capture in the final proposed STRAEQ-2 items then we will allow them to add additional items administered at their site only. Four sites will then pilot the first draft of the STRAEQ-2, which includes the option for participants to give feedback on clarity of the items[4]. In addition, during that pilot we will more precisely test the length of the entire package and cut if the package is too lengthy.

Nomological Network of the STRAEQ-2: Additional Questionnaires

We will also collect data from the following questionnaires: the IPIP Big-Five factor markers short inventory (50 items, Goldberg et al., 1992), Experiences in Close Relationships (ECR-RS, 36 items; Fraley, Heffernan, Vicary, & Brumbaugh, 2011), the TEMPS-A short form measure of temperament (39 items, Akiskal et al., 2003), the Three Factor Eating Questionnaire (18 items, Stunkard & Messick, 1985), the Social Network Index (12 items, Cohen et al., 1997), self-reported health in one-item (1 item, DeSalvo et al., 2006; Meng et al., 2014), Perceived Stress Scale - Short Form (10-items, Cohen, Kamarck, & Mermelstein, 1983), Behavioral Inhibition and Behavioral Approach (24 items, Carver & White, 1994), the Interpersonal Reactivity Index (28 items, Davis, 1994), a SPF-ILs to measure affection, behavioral confirmation, status, comfort and stimulation (SPF-IL; 15 items; Nieboer et al., 2005), the Three Domain Disgust ScaleDisgust Sensitivity Scale-Revised (21 items, Tybur, Lieberman, & Griskevicius, 2009), the

[3] Sites that choose to contribute items will be compensated by being elevated from Tier 3 authors to Tier 2 authors (e.g., their names will come earlier in the author order).

[4] One of these sites will be English-speaking to verify the "master version" of the survey. The other three will be sampled to be as diverse as possible, and locations where we expect the concepts may have the most difficulty being understood. This will also depend on convenience and availability of the research leads of these sites.

Multidimensional Assessment of Interoceptive Awareness (32 items, Mehling et al., 2012), and the Covid-19 scale (18 items, PSACR, 2020). In addition, we will collect data on participants' longitude and latitude, their gender, their age, their sexual orientation, their self-reported height and weight, their nationality, their parents' nationality, and the region, city, or zip code where they spent the majority of their childhood.

Additional Data via Data Harvesting

After data collection, the lead team will supplement the dataset with an algorithm, developed by one of our lab members, which will automatically retrieve information based on location and time data. We will collect climatic data from the Dark Sky weather forecasting API (https://darksky.net; minimum, maximum, and average temperature of the day of data collection, humidity of the day of data collection, wind speed of the day of data collection, the average temperature of that month, average yearly temperature, and average difference between the highest and lowest temperature of the year), pathogen prevalence from the Global Infectious Diseases and Epidemiology Online Network (http://www.gideononline.com; focusing on leishmaniasis, trypanosomes, malaria, schistosomes, filariae, spirochetes and leprosy), GDP of the region and of the country, homicide of the region and of the country of that year (and of the preceding 10 years), education of the region and of the country of that year[5]. We will also ask participants the location where they spent the majority of their childhood, so we could retrieve the above information from when the participant actually lived in the area.

Analytic Approach

Open Science Workflow

We strive for entirely open and transparent reporting. We will make all analysis scripts, materials, and de-identified data available on the Open Science Framework and/or GitHub. For maximum reproducibility we use the open-source R language (R Core Team, 2015). We anticipate using the following R packages:

1. tidyverse collection of packages (Wickham, 2017) for importing, handling, and visualizing data.
2. caTools (Tuszynski, 2014) for random selection.
3. psych (Revelle, 2016) for several analysis tools.
4. nFactors (Raiche, 2010), GPArotation (Bernaards & Jennrich, 2005), MNV (Korkmaz & Goksuluk, 2014), and lavaan (Rosseel, 2012) for factor analyses.
5. semTools (semTools Contributors, 2016) for invariance testing.
6. Hmisc (Harrell & Dupont, 2016) for correlations.

[5] The exact variables collected and sources of data may change depending on what is found to be optimal during script development.

Data Protection

While open data sharing is a primary goal, we are first and foremost concerned with protecting participant anonymity. To this end two versions of the dataset will be created: the "full" dataset containing all collected variables, including sensitive ones, will be kept private and maintained by the lead authors. This full dataset will be encrypted and stored on servers within the EU, following GDPR guidelines in our data storage and handling. This full dataset will only be shared with researchers who obtain permission from their local ethics board (or equivalent) to perform data analyses using these sensitive data. When possible, only partial datasets will be shared (e.g., sharing only relevant columns required for the proposed analyses). The second, "de-identified" dataset will be created by stripping the full dataset of all variables that may be used on their own to identify participants, or that could be used in conjunction with other variables to triangulate a reasonable guess about whom particular data were gathered from. This process will be completed after the full dataset (including sensitive information) has been compiled to allow a wide-lense regarding potential triangulation of individual responses, but at a minimum this includes deleting information such as: gender, age, sexual orientation, location data, parent nationality, etc. This means that, after de-identification, we will not be able to delete participants anymore, as they will not be able to identify themselves (with which we follow GDPR guidelines). Because the full dataset will still be available to researchers with ethics approval, we can be overly cautious when in doubt (e.g., if there is an open response variable that cannot be reviewed for identifying information, or when only a few participants meet a certain criteria). In addition, before any data are made public, the de-identified dataset will be reviewed by an expert in data confidentiality to ensure all potentially identifying information is removed. We will have an independent researcher check our dataset to investigate whether de-identification was successful.

General Approach Across Questions

The general approach is to have a split/half logic for data analysis. We propose to split the data into exploratory (⅔ of the data) and confirmatory or "holdout" (⅓ of the data) datasets, using stratified random sampling (e.g., randomly selecting ⅔ and ⅓ of the data *per* cluster; see below for information regarding clusters). The holdout set will be locked away, while a complete analysis script is built using the exploratory (⅔) split. This script will then be pre-registered and repeated as a confirmatory test on the holdout (⅓) split using the final factor solution derived from the training dataset. We propose two possibilities for guaranteeing these holdout data are not analyzed prematurely:

1. The most foolproof method is to place an outside party[6] in control of the data from the beginning, with the present proposing authors never having access to the ⅓ holdout

[6] This party could be an independent individual, someone at ZPID, or editors at a TBD journal.

dataset until the exploratory analyses have been pre-registered. In this approach, we have the data and then send the data and script to the outside party. The outside party then sets the seed on the basis of which observations are sampled from the data to generate the exploratory (⅔) and confirmatory (⅓) splits. The exploratory split would be provided to the present proposing authors for analysis, while the ⅓ holdout split is kept private. Only after hypotheses and specific analysis code to test those hypotheses are developed and pre-registered on the OSF would the ⅓ confirmatory split be released to the proposing authors for analysis. The proposing authors can provide R code to facilitate these steps. The seed is then set by the outside party and not share until the project is complete.

2. A simpler method is to leave data in the possession of the proposing authors. Allow us to perform the ⅔-⅓ splits on our own, and trust that we will lock away and not observe the ⅓ confirmatory split until after pre-registration. This proposal is less verifiable, but would rest on the assumption that examining the ⅓ split prior to registration of the exploratory analyses (without disclosing this) would constitute fraud.

Regardless, until the registration of the exploratory analysis script occurs, the confirmatory split will *not* be examined or analyzed, perhaps aside from basic inspection while performing the data split (e.g., ensuring scales are coded correctly, variables are consistently named). Before the exploratory analyses, we will also exclude participants with incomplete data for any STRAEQ-2 item. We will now provide more detail about the exploratory and confirmatory stages of the project.

Scale Development - Exploratory Analyses

Our exploratory analyses will follow a similar strategy as the first iteration of the questionnaire (STRAQ-1)[7]. These analyses will first be built using the exploratory (⅔) split. We will start with exploratory factor analyses, using an iterative approach following these steps:

A. We first aim to find a robust solution for the number of factors to extract. We will randomly sample subsets of the dataset, looped over 1000 set.seed() randomizations. The number of factors to extract will be determined by the modal OC and PA solution.

[7] Considering this is the second version of the scale, there is an argument that this first analysis should be a confirmatory factor analysis. Indeed, we do expect 12 factors: 3 major dimensions (Food Intake, Thermoregulation, and Risk Regulation), each divided into 4 minor dimensions (sensitivity, desire to fulfill the need by oneself, desire to fulfill need with other people, and confidence in others to help fulfill the need). However, given the addition of a major dimension (Food Intake), and the fact that we are generating entirely new scale items intended to be more cross-culturally relevant (e.g., each site generating new items, and advisory committee selecting the best) with only a few specific items inherited from the STRAQ-1, we feel starting with an exploratory factor analysis is more appropriate.

B. A factor analysis will be run with the recommended number of factors, using principal axes (assuming that multivariate normality will not be met), oblimin rotation, and 1000 bootstrap iterations to arrive at a robust solution.
C. Factor loadings < .3 will be ignored. First, we will drop items that do not load onto any factor, then re-run (A) to re-determine the number of factors to extract. We will repeat this until all items have at least one factor loading >= .3.
D. Then, we will drop items that load >.3 on multiple factors, and again repeat (A) to re-determine the number of factors to extract.
E. The preceding steps will be repeated until all items have a factor loading > .3 and load on only one factor. This is the general procedure; however, in particular cases items may be treated differently due to theory-driven or practical concerns.

Theoretically Informed Clusters

To analyze the data, and increase the STRAEQ-2 reliability, we will aggregate laboratories by theoretically informed clusters according to 3 criteria: 1) climate, 2) level of physical security (e.g., homicide rate, prevalence of disease), and 3) availability of access to food (starvation). We will use data previously harvested on the internet to create these clusters (climatic data from the Dark Sky weather forecasting API, pathogen prevalence, GDP of the region and of the country, homicide of the region and of the country of that year, and education of the region and of the country of that year). Performing statistical analysis at the cluster level will be a good compromise between an analysis at the laboratory level (low power) or at the global level (loss of variability), to observe individual differences in response to the STRAEQ-2. Finally, we will also create laboratory clusters by language family. This second clustering, used as a control condition, will be compared to our first theoretically informed clustering.

Scale Development - Confirmatory Analyses

After arriving at the final factor solution using the exploratory ⅔ dataset, we will pre-register that solution before conducting a matching confirmatory factor analysis on the "hold out" ⅓ dataset. This pre-registration will be completed on the Open Science Framework, including our analysis script and specific predictions as to hypotheses and what would indicate that our model is rejected. For the factor analyses, our pre-registered analyses will serve as an immediate indicator of how robust the exploratory factor solution was, and the hold-out dataset serves as an incentive to avoid overfitting the model, or any other analyses, to the ⅔ dataset.

Locating STRAEQ-2 in other psychological constructs - Exploratory and Confirmatory Analyses

Utilizing the ⅔ exploratory split, we will examine correlations between subscales, and correlations between subscales and other included scales to assess convergent/divergent validity. As

above, the complete script and any specific predictions based on the analysis of the ⅔ dataset will be registered on the OSF, and then tested on the ⅓ confirmatory split. Any relationships specified in the registration will be tested and reported on the ⅓ confirmatory split, regardless of outcome.

Performance Across Cultures

We will also use the exploratory/confirmatory split approach to assess cross-cultural performance through measurement invariance testing. Because *N* collected at each site will be comparatively low (minimum of $N = 100$), for adequate statistical power we will again cluster sites together based on theoretically relevant aspects - climate, level of physical security (e.g., homicide rate, prevalence of disease), and availability of access to food (starvation) - and test measurement invariance across these clusters. Assuming between 200-500 observations are necessary for proper invariance testing (a guideline we derive from e.g., Meade & Bauer, 2007), it is very possible that there will be some cultural clusters that end up with too little data for this test. In these instances we will simply have to temper our conclusions about performance in those samples and any interpretations we can make about them compared to others.

Statistical Power

We chose this particular split (⅔ exploratory, ⅓ confirmatory) to allot as much data as possible to sharpen our models, while holding out enough data for adequate confirmatory tests across our proposed analyses. We estimate a minimum of 75 sites will collect data, at 100 participants each, for a total minimum sample of 7,500 participants. This allots 2,475 for confirmatory analyses. We are unaware of existing methods to precisely compute statistical power for EFA/CFA. However, one common rule-of-thumb for EFA of 10 participants per item suggests we need 120 items * 10 = 1200 participants for the EFA (Kline, 2013). A sample > 2,000 should also be more than adequate to test this through CFA (Wolf, Harrington, Slark, & Miller, 2013). Samples > 2,000 will also allow high-powered tests, in the confirmatory split, of even weak correlations found in the exploratory split (e.g., G*Power indicates 99% power to detect a correlation of $r = 0.1$; Faul, Erdfelder, Buchner, & Lang, 2009).

Of course, this discussion applies only to analyses that use the aggregated dataset across all (or most) sites, and does not apply to situations where only a subset of samples are analyzed (e.g., the discussion of invariance testing above). It may very well be that some interesting observations will not have enough data to be verified in the confirmatory ⅓ data split, and in these cases they will be clearly labelled as exploratory and intended only to provide preliminary ideas for future follow-up studies.

Detecting How the Environment is Related to Personality

Finally, we do not have defined expectations for relationships between environment and personality, only that we expect them to exist and we suspect that these relationships may be complex. We

will propose other authors to write commentaries on our work to be able to detect these relationships. We will provide financial incentives ($150 per report written, with a maximum of 10 reports) to do these analyses and publish using our datasets.

Summary of project steps and anticipated timeline[8]:

1. **Initial scale (STRAEQ-2) construction.** Anticipate taking ~3 months after the proposal is agreed upon. In consultation with the STRAEQ-2 Advisory Committee and early collaborators we will refine concepts underlying STRAEQ-2. Advisory committee will also propose a first set of preliminary items for the STRAEQ-2. Leads will provide first proposal for additional measures to be included in data collection to test discriminant and convergent validity. Advisory committee will evaluate and refine where necessary.
2. **Scale development + Review by Advisory Board.** Anticipate ~2 months. Concepts will be proposed to participating lab sites. Each lab site will be encouraged, but not required, to generate one additional item per subscale (sites that contribute items and collect data will be elevated to Tier 2 authors, those that collect data only will be in Tier 3 authors, affecting authorship position). As a basis of comparison, each member of the advisory board will rank their preferred items for each subscale. Following further discussion, each subscale will be reduced to 30 items (90 items in the full questionnaire), with project leads having final say.
3. **Cross-cultural scale review by collaborating sites.** Anticipate ~2 months. Distribute proposed STRAEQ-2 to collaborating teams. Request each to review, propose changes relevant for their sample, or supplemental items. Advisory committee reviews all suggestions, attempts to incorporate into single English version scale.
4. **Four sites will pilot the first draft of the STRAEQ-2.** Anticipate ~2 months. Small pilot with a first draft of the STRAEQ-2, which includes the option for participants to give feedback on clarity of items.
5. **Material preparation and translation for main project.** Anticipate ~2-3 months. Final STRAEQ-2 and accompanying measures are first coded into a Qualtrics script in English. Inventory will be made to assess which sites will conduct pencil-and-paper assessments. The full protocol is then distributed to each team, keeping in mind loyalty to original meaning.
6. **Data collection.** Anticipate ~6-8 months. Each contributing team collects data from a minimum of 100 participants.

[8] Note that this timeline is extremely uncertain - it's quite possible it could take substantially shorter or longer.

7. **Analysis**. Anticipate ~3 months. Analysis will be conducted by the lead team in accordance with the analysis plan agreed upon above.
8. **Write-up and publication.** Anticipate ~4 months (may overlap with analysis). The manuscript will be drafted by the lead team and then reviewed, edited, and approved by all contributors to the project.

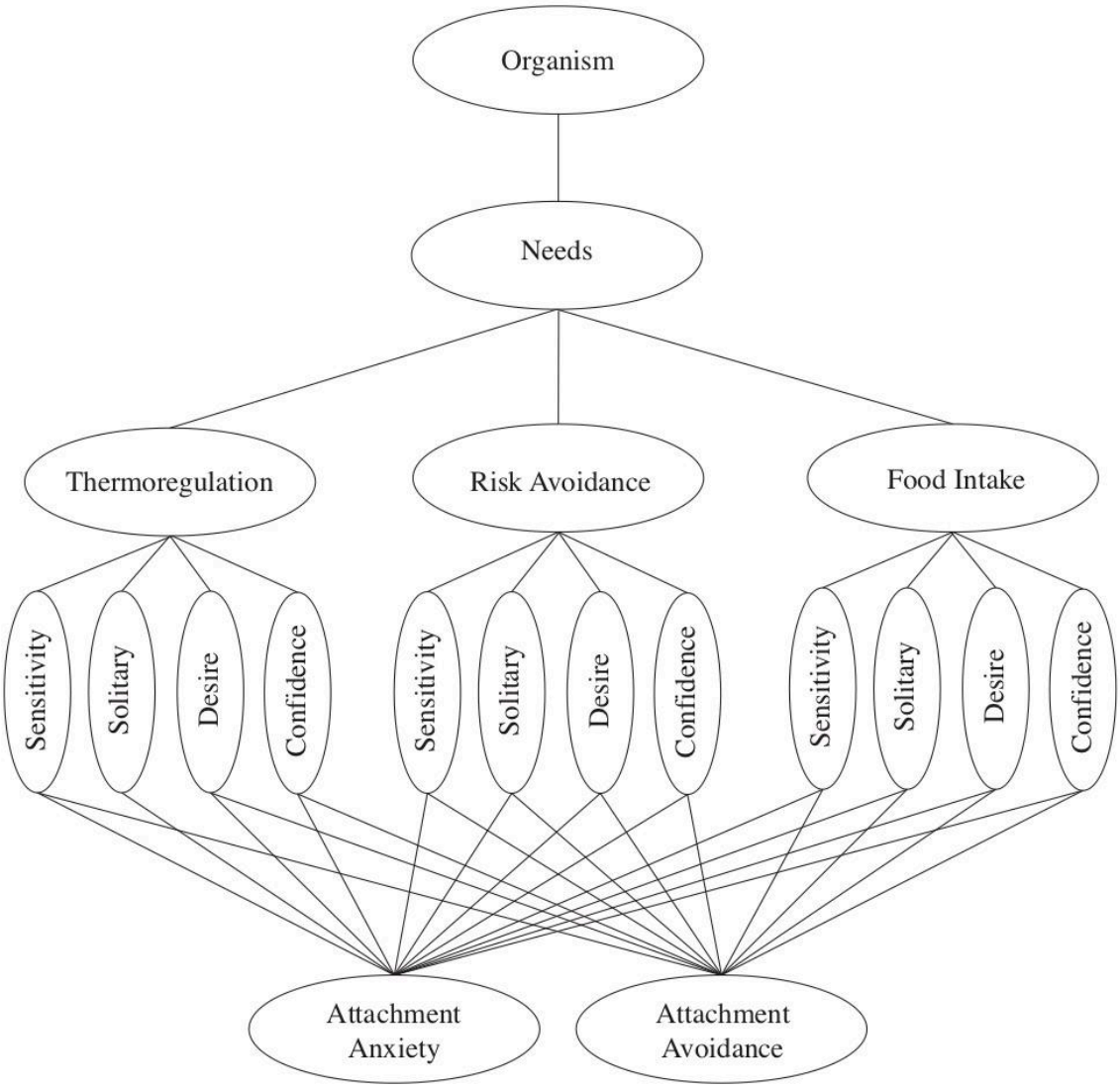

Figure 1. We anticipate that personality is organized around three major dimensions of environmental demands: Social Thermoregulation, Risk Avoidance, and Food Intake. Each we expected themselves to be divided into four subscales: Sensitivity to the treat, solitary regulation of the treat, desire to outsource the treat to others, and confidence that others will help. These subscales we then expect to be linked to individual differences in attachment (Fraley, Heffernan, Vicary, & Brumbaugh, 2011).

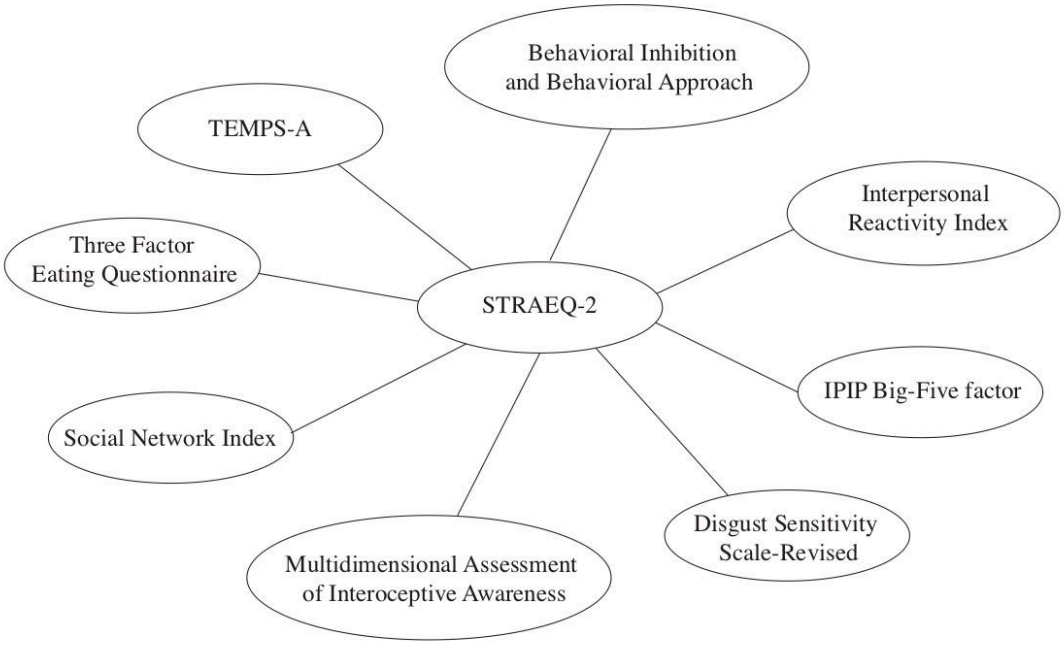

Figure 2. STRAEQ-2 nomological network including the following questionnaires: Behavioral Inhibition and Behavioral Approach (24 items, Carver & White, 1994), the Interpersonal Reactivity Index (28 items, Davis, 1994), the IPIP Big-Five factor markers short inventory (50 items, Goldberg et al., 1992), the Disgust Sensitivity Scale-Revised (25 items, Tybur, Lieberman, & Griskevicius, 2009), the Multidimensional Assessment of Interoceptive Awareness (32 items, Mehling et al., 2012), the Social Network Index (12 items, Cohen et al., 1997), the Three Factor Eating Questionnaire (18 items, Stunkard & Messick, 1985), the TEMPS-A short form measure of temperament (39 items, Akiskal et al., 2003).

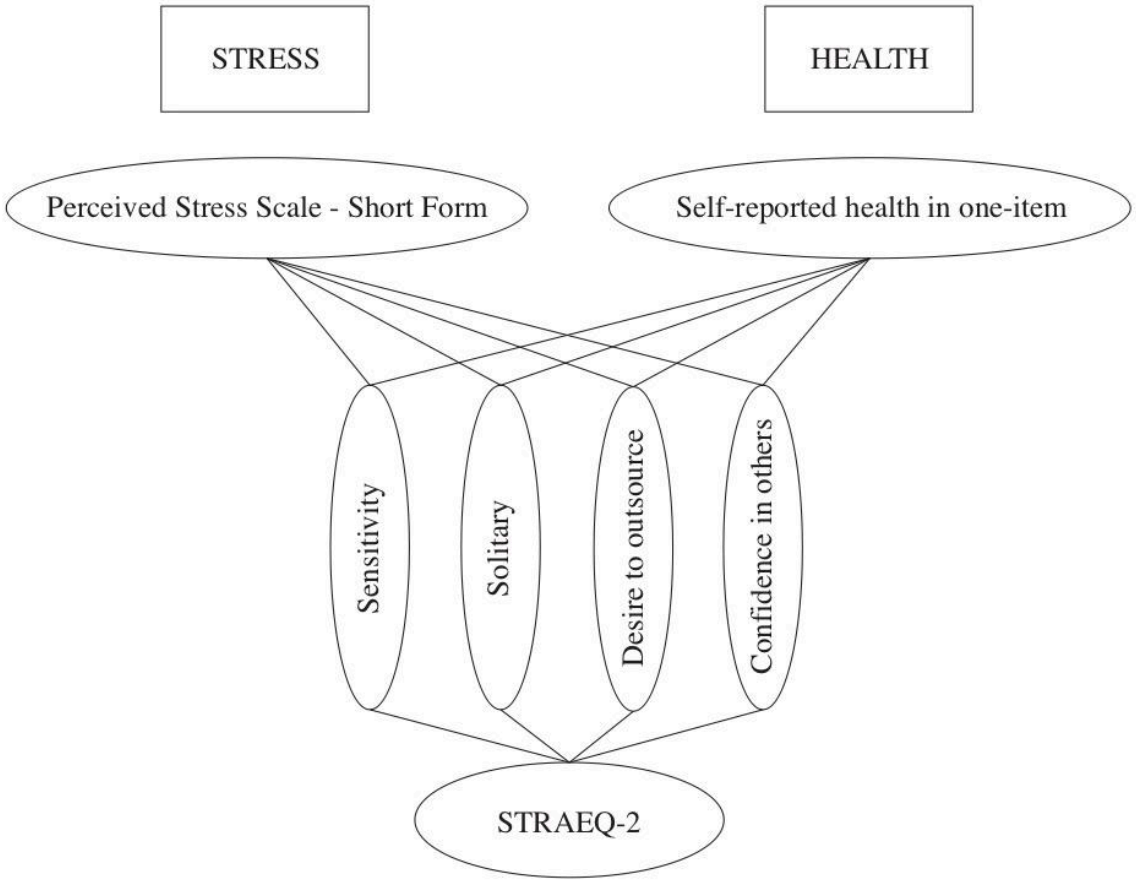

Figure 3. STRAEQ-2 projected links with stress and health.

Appendix A.1

Social Thermoregulation and Risk Avoidance Questionnaire (STRAQ-1) Infosheet

Researcher General Information

The STRAQ-1 was designed to understand the motivations underlying interpersonal bonding (i.e., *attachment*). A secondary goal was to investigate whether adding the STRAQ-1's items could add explained variance in self-reported health and stress over attachment alone. The current model was formed through iterative analyses (cross-validation and naive bootstrapping) of datasets that have been collected from (12) different countries. The scale is currently available in Portuguese, Polish, Turkish, Mandarin, German, English, Norwegian, Serbian and Spanish. The STRAQ-1 has four subscales to predict attachment: High Temperature Sensitivity, Social Thermoregulation, Solitary Thermoregulation, and Risk Avoidance. Furthermore, we also related the STRAQ-1 subscales to other factors, such as social network size, social embeddedness, attachment style, stress and self-reported health. The following project page has more detailed explanation of the data collection process of the current STRAQ-1 (https://osf.io/2rm5b/).

Appendix A.2

Subscales of the STRAQ-1

	High Temperature Sensitivity	Social Thermoregulation	Solitary Thermoregulation	Risk Avoidance
Goal	This subscale measures individual differences in sensitivity to high ambient temperature. Measures comfort and discomfort in relation to temperature.	This subscale measures individual differences in the desire to warm up with someone on a regular basis when cold or when feeling distressed.	This subscale measures individual differences in the desire to warm up without the aid of others when feeling cold or distressed.	This subscale measures individual differences in the tendency to avoid (social) exploration.
How to Interpret	Higher scores indicate greater discomfort when the environment is too hot (and greater preference for cold environments.)	Higher scores indicate greater desire to socially thermoregulate when cold or distressed.	Higher scores indicate greater desire to thermoregulate solitarily when cold or distressed.	Higher scores indicate a lower likelihood to explore (social) situations.
Classification Levels	Low 1.00-2.70 Medium 2.7-3.57 High 3.57-5.00	Low 1.00-2.60 Medium 2.60-3.60 High 3.60-5.00	Low 1.00-2.87 Medium 2.87-3.75 High 3.75-5.00	Low 1.00-2.67 Medium 2.67- 3.67 High 3.67-5.00

Appendix A.3

Researcher Information: Meaning of the STRAQ-1

The following table comes from analyses examining correlations between STRAQ-1 subscales and other variables measured in our 12-country study. These other variables include (but are not limited to) questionnaires such as attachment style, social networks, and self-reported health (full list of questionnaires available on the project's page: https://osf.io/2rm5b/). In the table we report significant correlations between the 4 subscales and factors, obtained via split-half validation and naive bootstrapping.

STRAQ-1	HIGH Temperature Sensitivity	Social Thermoregulation	Solitary Thermoregulation	Risk Avoidance

	People who score higher on the subscale of High Temperature Sensitivity tend to score higher on attachment anxiety. They also tend to have higher self-reported stress and worse self-reported health. People with higher scores on High Temperature Sensitivity also tend to be older and heavier. They tend to score higher on identifying one's own feelings, and tend to have a greater attachment to their smart phone and online identity. People closer to the equator also tend to score higher on this scale, while people scoring higher on this scale tend to have smaller network sizes and report having lower self-control.	People who score higher on the subscale of Social Thermoregulation tend to score lower on attachment avoidance. They also tend to have better self-reported health. People with higher scores in Social Thermoregulation also tend to higher attachment to their online identity. They also tend to be less externally oriented in their cognitive style of thinking (and thus tend to be better in recognizing their own emotion). They tend to have larger social networks and are more prone to feeling nostalgia.	People who score higher on the subscale of Solitary Thermoregulation tend to score higher on attachment anxiety and tend to have higher self-reported stress. People with higher scores on Solitary Thermoregulation tend to be shorter and weigh less. People with higher scores tend on Solitary Thermoregulation also tend to have higher attachment to their smartphone, and online identity. They also tend to be less externally oriented in their cognitive style of thinking (and thus tend to be better in recognizing their own emotion) and tend to be more embedded in different social networks. They also tend to have a slightly greater variety of social groups they participate in.	People who score higher on the Risk Avoidance subscale tend to score higher on attachment anxiety. They tend to have higher self-reported stress, and worse self-reported health. People with higher scores on Risk Avoidance tend to be older in. They tend to score higher on attachment to their home, to their smartphone, and to their online identity. They tend to be worse in identifying their own feelings and they tend to be more externally oriented in their cognitive style of thinking (and thus worse in emotion recognition). They tend to have smaller social networks and they tend to live closer to the equator.

Appendix A.4

Researcher Information: STRAQ-1 (The Questionnaire)

Instructions to provide to participants:

Below is a list of statements. Please read each statement carefully and rate how frequently you feel or act in the manner described. If you strongly disagree with the statement, please select 1; if you disagree, please select 2; if you don't feel like you agree or disagree, please select 3; if you agree select 4; finally, if you strongly agree select 5. There are no right or wrong answers, we are solely interested in how you feel. If you are not currently in a dating or

marital relationship with someone, answer the questions pertaining to a partner with respect to a former partner or a relationship that you would like to have with someone.

STRAQ-1 Items (notes reverse scored)*

High Temperature Sensitivity	*I am sensitive to heat*
	*I find warm days pleasant**
	*I find hot days pleasant**
	I don't like when it's too hot
	When I feel warm I do not want to do anything
	I can't focus when it is too hot
	I prefer to relax in a cold place
Social Thermoregulation	*I usually have more physical contact with others than most people*
	When people are close to me, I like to be really close to them
	When I feel cold I seek someone to cuddle with
	I like to warm up my hands or feet by touching someone who I am close to
	I prefer to warm up with someone rather than with something
Solitary Thermoregulation	*I am not sensitive to coldness**
	When it is cold, I more quickly turn up the heater than others
	When it is cold, I wear more clothing than others
	I can't focus when it is too cold.
	*When I feel cold I don't turn on the heater**
	When I am troubled I like to take a long warm shower to clear up my thoughts
	A warm beverage always helps me relax when I am down
	If I am feeling distressed I seek a warm place to calm down
Risk Avoidance	*I try to maintain myself in familiar places*
	I don't trust people I have not met before
	I try to be accompanied by people that I know at all times

STRAQ-1 Items (Short Version)

High Temperature Sensitivity	*I find hot days pleasant**
	I don't like when it's too hot
Social Thermoregulation	*I prefer to warm up with someone rather than with something*
	I like to warm up my hands or feet by touching someone who I am close to
Solitary Thermoregulation	*A warm beverage always helps me relax when I am down*
	When it is cold, I more quickly turn up the heater than others
Risk Avoidance	*I try to maintain myself in familiar places*
	I try to be accompanied by people that I know at all times

Appendix B.1

1. Thermoregulation:

This scale broadly refers to the need to maintain one's internal temperature within a comfortable range. It captures four aspects: Sensitivity to the need, the desire to regulate by oneself, the desire to regulate this via others, and the confidence that others will fulfill this need (e.g., it could be a person wants to socially regulate their temperature, but thinks they lack a close bond with someone in order to do so). Fulfilling the need in social ways can be achieved by being physically close (hugging, snuggling, or feeling warm because of someone's actions towards the person), with the simplest non-human animal analogy being how penguins huddle together for warmth. Avoidance to fulfill this need in social ways could manifest in resolving this via heaters or showers.

Examples per subscale

Sensitivity to need:

- "I am often uncomfortable because I am too warm or too cold."
- "I am very particular about the temperature inside my house."

Solitary regulation of the need:

- "When it is cold, I more quickly turn up the heater than others."
- "A warm beverage always helps me relax when I am down."

Desire to address need socially versus solitarily:

- "I prefer to warm up with someone rather than with something." (From STRAQ-1, highest factor loading to the social thermoregulation subscale).
- "When it is cold, I wear more clothing than others"
- "When it is cold, I would want to snuggle with a person I feel intimate with to become (physically) warmer"
- "When it is cold, I would want to snuggle with a friend or family member for warmth."
- "When it is cold, I would want to snuggle with a stranger or acquaintance for warmth."

Confidence in others to help:

- "When I am cold, I can always find someone to warm up with if I want to."
- "If I wanted to warm up by snuggling when cold, I could find a person I feel intimate with to do so."
- "If I wanted to warm up by snuggling when cold, I could find a friend or family member to do so."
- "If I wanted to warm up by snuggling when cold, I could find a stranger or acquaintance to do so."

Appendix B.2

2. Risk Regulation:

This subscale broadly originates from the need to address physical threats in the environment, for instance predators or people who want to do you harm. In many societies this need likely extends to many non-physical threats, such as financial burdens or potential emotional trauma (e.g., giving a public presentation or facing romantic rejection). We again distinguish between sensitivity to the need (e.g., general risk tolerance vs aversion), the desire to regulate by oneself, the desire for a person to outsource risks and dangers among others (e.g., taking turns keeping watch), and confidence in others to help (e.g., knowing that a close friend would provide aide if needed).

Examples per subscale:

Sensitivity to need:

- "A problem has to be really severe before I will seek help from other people."
- "I quickly notice when situations become threatening or stressful."

Solitary regulation of the need:

- "When I am at risk, I prefer to resolve things by myself. "
- "When I have to give a presentation, I prefer to prepare by myself and not be with others."

Desire to address need socially versus solitarily:

- "When someone or something makes me feel unsafe, I try to take away the danger by myself"
- "When someone or something makes me feel unsafe, I like to rely on a person I feel intimate with to feel safer."
- "When someone or something makes me feel unsafe, I like to rely on friends or family to feel safer."
- "When someone or something makes me feel unsafe, I like to rely on strangers or acquaintances to feel safer."

Confidence in others to help:

- "When I face a threat, if I want to rely on others to feel safe, I could find a person I feel intimate with."
- "When I face a threat, if I want to rely on others to feel safe, I could find a friend or family member.
- "When I face a threat, if I want to rely on others to feel safe, I could find a stranger or acquaintance.

Appendix B.3

3. Food Intake:

The original core need here is simply preventing starvation. In adulthood, threat of starvation is less pressing, but, food sharing has likely conferred numerous benefits throughout evolutionary time. We again distinguish four subscales: First, sensitivity to hunger (e.g., whether feeling slightly hungry is an urgent need or is tolerable), desire to regulate by oneself, the desire to address the need through the help of others (e.g., how willing someone would be to share food and get food in return, if it was an option), and the confidence in others to be available to fulfil the need (e.g., being confident that a friend would be willing to share food if asked). Because in adulthood, people often do not rely on others to receive food, we only get at the matter indirectly (e.g., food sharing in a restaurant).

Examples per subscale:

Sensitivity to need:

- "I quickly feel when I am hungry."
- "If I have to skip a meal it makes me very unhappy."

Solitary regulation of the need:

- "I always have a snack for me for when I'm hungry, so that I can rely on myself for my food."
- "At home, I always have a can of food to open when I'm hungry so I don't have to be dependent on others.."

Desire to address need socially versus solitarily:

- "At a restaurant, I don't want to share my food with others."
- "At a restaurant, I like ordering food that can be shared with friends at the table."
- "At a restaurant, I like ordering food that can be shared with work colleagues at the table."
- "At a restaurant, I like ordering food that can be shared with other people at the restaurant, even if I don't know those people."

Confidence in others to help:

- "At a restaurant, if I asked for a bit of one of my friends' food, they would give it to me."
- "At a restaurant, if I asked for a bit of one of my colleagues' food, they would give it to me."
- "At a restaurant, if I asked for a bit of a stranger's food, they would give it to me."

Appendix C
Advisory committee members (Tier 2 Authors)

Rodrigo Vergara	Universidad de Chile, Chile	Researcher in Psychology and Biology
Alan Fiske	University of California, Los Angeles, United States	Professor of Anthropology
Siegwart Lindenberg	Rijksuniversiteit Groningen, Netherlands	Professor of Sociology
Qinglan Liu	Hubei University, China	Graduate Student in Psychology
Daniela Rocha Lopes	Independent Researcher, Grenoble, France	Brazilian Psychotherapist
Marine Vuillermet	CNRS Dynamique Du Langage in Lyon, France	Postdoctoral Fellow in Linguistics
Gizem Ceviker	Middle East Technical University, Turkey	PhD Candidate in Psychology
Mattie Tops	Vrije Universiteit Amsterdam/Leiden University Medical Center	Associate Professor in Clinical Psychology

References

Beckes, L., & Coan, J. A. (2011). Social baseline theory: The role of social proximity in emotion and economy of action. *Social and Personality Psychology Compass, 5*, 976-988.

Bernaards, C. A. & Jennrich, R. I. (2005). Gradient projection algorithms and software for arbitrary rotation criteria in factor analysis. *Educational and Psychological Measurement, 65*, 676–696.

Block, N. (2002). The harder problem of consciousness. *The Journal of Philosophy, 99*(8), 391-425.

Bowlby, J. (1969). *Attachment: Attachment and loss*. New York, NY: Basic Books.

Buss, D. M. (2010). Personality and the adaptive landscape: The role of individual differences in creating and solving social adaptive problems. In D. M. Buss, & P. H. Hawley (Eds.), *The Evolution of Personality and Individual Differences* (pp. 29-57). Oxford: Oxford University Press.

Brand, A., Allen, L., Altman, M., Hlava, M., & Scott, J. (2015). Beyond authorship: attribution, contribution, collaboration, and credit. *Learned Publishing*, *28*(2), 151-155.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67*, 319-333.

Cohen, S., Doyle, W. J., Skoner, D. P., Rabin, B. S., and Gwaltney, J. M., Jr. (1997). Social ties and susceptibility to the common cold. *Journal of the American Medical Association, 277*, 1940-1944.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*, 385-396.

Costa Jr., P. T., & McCrae, R. R. (2008). The revised NEO personality inventory (NEO-PI-R). *The SAGE handbook of personality theory and assessment* (pp. 179-198). Thousand Oaks, CA, US: Sage Publications, Inc.

Davis, M. H. (1994). *Empathy: A social psychological approach*. Colorado: Westview Press.

Del Giudice, M. (2014). An evolutionary life history framework for psychopathology. *Psychological Inquiry, 25*, 261-300.

DeSalvo, K. B., Bloser, N., Reynolds, K., He, J., & Muntner, P. (2006). Mortality prediction with a single general self‐rated health question. *Journal of General Internal Medicine, 21*, 267-275.

DeYoung, C. G., Weisberg, Y. J., Quilty, L. C., & Peterson, J. B. (2013). Unifying the aspects of the big five, the interpersonal circumplex, and trait affiliation. *Journal of Personality, 81*, 465-475.

Ellis, B. J., Figueredo, A. J., Brumbach, B. H., & Schlomer, G. L. (2009). Fundamental dimensions of environmental risk. *Human Nature, 20*, 204-268.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160.

Figueredo, A. J., Sefcek, J. A., Vasquez, G., Brumbach, B. H., King, J. E., & Jacobs, W. J. (2005). *Evolutionary Personality Psychology* (pp. 851-877). Hoboken, NJ, US: John Wiley & Sons Inc.

Fiske, D. W. (1949). Consistency of the factorial structures of personality ratings from different sources. *The Journal of Abnormal and Social Psychology, 44*, 329-344.

Fraley, R. C. (2002). Attachment stability from infancy to adulthood: Meta-analysis and dynamic modeling of developmental mechanisms. *Personality and Social Psychology Review*, *6*, 123-151.

Fraley, R. C., Heffernan, M. E., Vicary, A. M., & Brumbaugh, C. C. (2011). The Experiences in Close Relationships—Relationship structures questionnaire: A method for assessing attachment orientations across relationships. *Psychological Assessment, 23*, 615-625.

IJzerman, H., Neyroud, L., Courset, R., Schrama, M., Post, J., & Pronk, T. M. Socially thermoregulated thinking: How past experiences matter in thinking about our loved ones. *PsyArXiv Preprints.* https://psyarxiv.com/25dmj

IJzerman, H., Lindenberg, S., Dalğar, İ., Weissgerber, S. S., Vergara, R. C., Cairo, A. H., ... & Hall, C. (2018). The Human Penguin Project: Climate, social integration, and core body temperature.

Collabra: Psychology, *4*(1).

Kline, R. (2013). Exploratory and confirmatory factor analysis. In Y. Petscher, C. Schatschneider, & D. L. Compton (Eds.). *Applied Quantitative Analysis in the Social Sciences* (pp. 171-207). Oxford, UK: Routledge.

Koolhaas, J. M., Korte, S. M., De Boer, S. F., Van Der Vegt, B J, Van Reenen, C. G., Hopster, H., ... Blokhuis, H. J. (1999). Coping styles in animals: Current status in behavior and stress-physiology. *Neuroscience & Biobehavioral Reviews, 23*, 925-935.

Korkmaz, S., & Goksuluk, D. Z. G. (2014). MVN: An R Package for Assessing Multivariate Normality. *The R Journal., 6*, 151–162.

Mehling, W. E., Price, C., Daubenmier, J. J., Acree, M., Bartmess, E., & Stewart, A. (2012). The multidimensional assessment of interoceptive awareness (MAIA). *Plos One, 7*, e48230.

Mehrabian, A. (1995). Framework for a comprehensive description and measurement of emotional states. *Genetic, Social, and General Psychology Monographs, 121*, 339-361.

Meng, Q., Xie, Z., & Zhang, T. (2014). A single-item self-rated health measure correlates with objective health status in the elderly: a survey in suburban Beijing. *Frontiers in Public Health, 2,* 27.

Nieboer, A., Lindenberg, S., Boomsma, A., & Bruggen, A. C. V. (2005). Dimensions of well-being and their measurement: the SPF-IL scale. *Social Indicators Research, 73*, 313-353.

Raiche, G. (2010). *nFactors: an R package for parallel analysis and non graphical solutions to the Cattell scree test.* R package.

Revelle, W. (2016). *psych: Procedures for Personality and Psychological Research.* Evanston, Illinois, USA: Northwestern University.

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software, 48*, 1-36.

Schaller, M., & Murray, D. R. (2008). Pathogens, personality, and culture: Disease prevalence predicts

worldwide variability in sociosexuality, extraversion, and openness to experience. *Journal of Personality and Social Psychology, 95*, 212-221.

semTools Contributors. (2016). *semTools: Useful tools for structural equation modeling.* R package version 0.4-14.

Stunkard, A. J., & Messick, S. (1985). The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research, 29*, 71-83.

Tops, M., IJzerman, H., & Quirin, M. (2018). The phylogenetic roots of individual differences: Differences in updating of information representations as model for personality. Available on PsyArxiv: https://psyarxiv.com/4yj6r/download?format=pdf.

Tops, M., Boksem, M. A. S., Luu, P., & Tucker, D. (2010). Brain substrates of behavioral programs associated with self-regulation. *Frontiers in Psychology, 1*

Tops, M., Boksem, M. A. S., Quirin, M., IJzerman, H., & Koole, S. L. (2014). Internally directed cognition and mindfulness: An integrative perspective derived from predictive and reactive control systems theory. *Frontiers in Psychology, 5*

Tops, M., Koole, S. L., IJzerman, H., & Buisman-Pijlman, F. T. A. (2014). Why social attachment and oxytocin protect against addiction and stress: Insights from the dynamics between ventral and dorsal corticostriatal systems. *Pharmacology Biochemistry and Behavior, 119*, 39-48.

Tuszynski, J. (2014). *caTools.* R package.

Tybur, J. M., Lieberman, D., & Griskevicius, V. (2009). Microbes, mating, and morality: Individual differences in three functional domains of disgust. *Journal of Personality and Social Psychology, 97*, 103-122.

Vergara, R. C., Hernández, C., Jaume-Guazzini, F., Lindenberg, S., Klein, R. A., & IJzerman, H. (2019). Development and validation of the Social Thermoregulation and Risk Avoidance Questionnaire (STRAQ-1). *International Review of Social Psychology*, *32*.

Waters, E., Merrick, S., Treboux, D., Crowell, J., & Albersheim, L. (2000). Attachment security in infancy and early adulthood: A twenty‐year longitudinal study. *Child Development*, *71*, 684-689.

Wei, W., Lu, J. G., Galinsky, A. D., Wu, H., Gosling, S. D., Rentfrow, P. J., ... & Gui, W. (2017). Regional ambient temperature is associated with human personality. *Nature Human Behaviour, 1*, 890.

Wickham, H. (2017). *Tidyverse.* R package.

Wolf, E. J., Harrington, K. M., Clark, S. L., & Miller, M. W. (2013). Sample size requirements for structural equation models: An evaluation of power, bias, and solution propriety. *Educational and Psychological Measurement, 73*, 913-934.