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Supplementary information

Similarities and differences in concepts of mental life among adults and children in five cultures

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Supplementary Materials for

Similarities and Differences in Concepts of Mental Life Among Adults and Children in Five Cultures

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This file includes:

Data, materials, and code availability: The behavioral data that support the findings of this study, along with all study materials, have been deposited in Open Science Framework with the identifier DOI 10.17605/OSF.IO/8S36E (https://osf.io/8s36e). The analysis code that generated the results and visualizations that support the findings of this study is available on GitHub at https://github.com/kgweisman/mental-life-culture-development (and linked to this OSF project).

Extended Methods and Results

How do concepts of mental life vary across cultures? We examined conceptual representations of physiological, perceptual, cognitive, emotional, social, and other abilities among adults and children (ages 6-12y) in five cultural settings: the San Francisco Bay Area, USA; Cape Coast, Ghana; Chiang Mai, Thailand; Shanghai, China; and Port Vila and Malekula, Vanuatu. We reconstructed concepts of mental life "from the bottom up" by using exploratory factor analysis to track covariance patterns in participants' attributions of these capacities to humans, animals, natural objects, technologies, and supernatural beings.

This extended write-up of our methods and results overlaps substantially with the Methods and Results section in the main text, but provides additional details that might inform the reader's understanding of our results as well as guide any future attempts to replicate or extend these studies.

General protocol

This study was designed in an extended, iterative, collaborative process involving anthropologists and other cultural experts from each of our five field sites, with the goal of creating a standard protocol that would be equally familiar, natural, and culturally appropriate in all sites. The study was administered by local researchers in a common local language: English in the US, Fante (an Akan dialect) in Ghana, Thai in Thailand, Mandarin Chinese in China, and Bislama (an English-based creole language) in Vanuatu.

Target entities. Each participant answered questions about one of the following target entities: *children*, *dogs*, *mice*, *chickens*, *beetles* (or, in field sites in China, *crickets*), *flowers*, *rocks*, *cell phones*, *ghosts*, or *God.* In some sites, additional participants were recruited to answer questions about other target entities, but these data were not included in any of the current analyses. With the exception of *God*, all target entities were referred to in the plural (when the language marked a difference between singular and plural), in order to evoke the generic category rather than a specific individual.

Each target entity was illustrated with a high-resolution photograph printed in color and measuring approximately 5 inches by 8 inches. These photographs were chosen in close consultation with anthropologists working in the field, with the goal of presenting examples that were equally familiar or "typical" of that category of entity across our five field sites. In most cases, this resulted in a photograph that each field worker thought would be moderately familiar to participants in their field site (e.g., a child whose race/ethnicity did not match the most numerous racial/ethnic group in any of these settings; wisps of white mist in a vaguely humanoid shape, rather than a more stereotypical depiction of a "ghost" in any given setting).

See Supplementary Table 1 for descriptions of the images used to depict each target entity, the sources for these images, the phrases used to label each target entity (in all languages), and other notes about the target entities used in these studies. All images are available for viewing in the OSF repository associated with this project.

A preset order of target entities was generated prior to data collection, and was counterbalanced with the ordered sequence in which capacities were presented (see next section). Participants were assigned to assess whichever target entity was next on this list.

Capacities. Each participant assessed 23 capacities for whatever entity they were assigned to assess. These questions all followed a standard format: "Do [entities] [do X]" (e.g., "Do beetles feel love?").

Item selection. Our goals in compiling these mental capacity items were (1) to include a wide variety of capacities that covered a similar range to the capacities we have used in our previous work with US adults[1] and US children[2,3]; (2) to use items that were easy to translate, had similar meanings and connotations, were equally distinguishable from each other, and were commonly used in the five languages in which this work was conducted (English, Fante, Thai, Mandarin, and Bislama); (3) to use items that would be easily understood by children in early elementary school in our five field sites. We aimed to accomplish these goals with a list that was short enough that the task would take roughly five minutes for children to complete, to ensure high-quality data from children and to facilitate the kind of large-scale data collection necessary for our planned analyses.

We began with a list of 20 items from our most recent work with 4- to 9-year-old US children[3]; this list was an abridged version of our earlier work with older US children[2] which in turn featured "child-friendly" translations of the 40 items employed in our initial work with US adults[1]; see Supplementary Table 3. In our previous work, all three lists of items yielded very similar factor structures among separate samples of US adults.

We then subjected this preliminary list to an in-depth group discussion with the first author and the ethnographer(s) from each field site, a group which included fluent speakers of all five languages. This discussion led us to drop certain items that were not easily in all five languages (e.g., *be aware of things*), to reformulate certain items that were not distinguishable from other items in all five languages (e.g., *feel embarrassed* was replaced with *feel shy*, to be equally distinguishable from *feel guilty* across samples), and to reword some items to feel more similar across languages (e.g., *make choices* and *have thoughts* were replaced with *choose what to do* and *think about things*, to standardize syntax across languages). We also added one item, *pray*, to reflect the interest in spirituality and religion that was central to the broader Mind and Spirit Project. These items were then subjected to an iterative process of translation, back-translation, and revision. See Supplementary Table 2 for the final set of items in all five languages.

The final list covered a similar range of capacities used in our previous work, including physiological sensations (*get hungry*; *feel pain*; *feel tired*; *feel sick, like when you feel like you might vomit*), perceptual abilities (*hear things*, *smell things*, *sense temperatures*, *sense when things are far away*), cognitive capacities (*think about things*, *remember things*, *figure out how to do things*, *add and subtract numbers*), agency (*choose what to do*), basic emotions (*feel happy*, *feel sad*, *feel scared*, *get angry*), and more complex or social emotions and abilities (*get hurt feelings*, *feel guilty*, *feel shy*, *feel proud*, *feel love*), as well as one item from the additional domain of spiritual/religious abilities (*pray*). See Supplementary Table 3 for a detailed comparison of these items to the items used in our previous work in the US.

We would like to address three limitations of this final list of capacities—each of which suggests avenues of study that would be fascinating to address in future research.

First, this list included only one item closely related to "agency" (*choose what to do*), an aspect of mental life that has been the subject of great debate in the mind perception literature.[1,4,5] In our experience developing and conducting studies using different versions of the current study paradigm for use with children in the US, "agentic" capacities have proved to be

exceeding difficult to label using words that are understood by most children; anecdotally, 7- to 9-year-old US children frequently expressed uncertainty about phrases like "free will," "intentions," "goals," "self-control," and "self-restraint." In refining the current item list through the group discussion described above, such phrases also tended to be perceived as very difficult to equate across languages; even *choose what to do* was the subject of much conversation. In our view, these anecdotal observations point to the vocabulary of agency being an interesting topic of study in its own right, especially in light of other aspects of development and cultural variability in people's understanding of free will and choice.[6] In the current studies, however, the inclusion of only one "agentic" item presents something of a limitation, which future studies—perhaps using paradigms that are less reliant on verbal expression—would do well to address.

Related to the previous point, this list included fewer explicitly "moral" capacities than have been featured in previous work on mind perception, including our own work with US adults. Again, the omission of items we have used in previous work with US adults—e.g., *having beliefs*, *telling right from wrong*, *self-restraint*, *understanding how others are feeling*—was largely due to the difficulty of expressing these concepts in words that young children are familiar with. Although our team had some difficulty settling on words or phrases concerning capacities for morality that would be understood similarly across these five languages and settings, we suspect that removing the constraint that they should also be understood by young children would make this a feasible and worthy goal, especially given the importance of morality in several prominent theories of mind perception.[4,5]

Finally, our final list of items included more negatively-valenced capacities (hunger, pain, fatigue, nausea, sadness, fear, anger, hurt feelings, guilt, and perhaps shyness) than positively-valenced capacities (happiness, love, and perhaps pride)—at least as seen through the lens of commonsense notions of pleasant and unpleasant experiences in the US cultural setting. This is in part due to the difficulty of identifying vocabulary terms for physical pleasure that were familiar and age-appropriate for young children, a limitation inherited from our previous work with US children.[2,3] This may reflect the fact that many common words for physiological states—especially those familiar to young children—refer to biological needs or deviations from homeostasis (e.g., hunger, pain), rather than the satiation of these needs (feeling pleasantly full, the absence of pain). More broadly, the imbalance in negative vs. positive words in our list of capacities, particularly in the "social-emotional" domain, mirrors the seemingly common feature of many languages that emotion lexica differentiate more negative emotions than positive emotions.[7,8] Again, in our view these would be fascinating issues to explore empirically, both within a single population and across cultures and development. In the current studies, we speculate that including a wider range of positively valenced emotions would have exaggerated the cultural and developmental differences documented here, but this is an empirical question deserving attention in future research.

Order of presentation. Six ordered sequences of capacities were generated prior to data collection, fully counterbalanced with target entity (such that every target entity was assessed in every ordered sequence by approximately the same number of participants both within each sample and across samples). Participants were assigned to assess capacities in whichever sequence was next on this list. Three sequences were generated by generating three random sequences of capacities using a random number generator: (1) *figure out how to do things*, *add and subtract numbers*, *feel love*, *get hungry*, *smell things*, *sense when things are far away*, *feel happy*, *get hurt feelings*, *get angry*, *feel sick […]*, *feel pain*, *sense temperatures*, *feel sad*, *feel*

tired, *feel proud*, *pray*, *feel shy*, *feel scared*, *feel guilty*, *choose what to do*, *think about things*, *hear things*, *remember things*; (2) *feel happy*, *get hungry*, *feel tired*, *get hurt feelings*, *feel shy*, *pray*, *get angry*, *feel sick […]*, *feel guilty*, *think about things*, *figure out how to do things*, *feel sad*, *sense temperatures*, *choose what to do*, *smell things*, *feel pain*, *remember things*, *feel love*, *add and subtract numbers*, *sense when things are far away*, *hear things*, *feel scared*, *feel proud*; (3) *feel tired*, *add and subtract numbers*, *get angry*, *feel proud*, *feel sick […]*, *feel sad*, *figure out how to do things*, *feel shy*, *feel scared*, *sense temperatures*, *remember things*, *get hurt feelings*, *sense when things are far away*, *smell things*, *pray*, *hear things*, *get hungry*, *feel love*, *feel guilty*, *think about things*, *feel pain*, *feel happy*, *choose what to do*. The other three sequences were the reverse of these sequences. This ensured that, across participants, the average appearance of each capacity was half-way through the task, and that each capacity was presented in at least a few different contexts (e.g., asking about hunger and fatigue in close proximity vs. with many other capacities interspersed between them; asking about pain before vs. after sadness).

Response options. Participants were instructed to respond orally to our questions using one of three response options; see next section for how the response options were introduced. If they gave any other response, they were asked to use one of these options instead. Researchers circled the appropriate response on a data collection sheet.

In the US (English), the response options were *no*, *kind of*, and *yes*. In Ghana (Fante), the response options were *ɔhɔ*, *biribi tse dem* [lit. "somewhat"], and *nyo*. In Thailand (Thai), the response options were ไม่, ประมาณนั้น [lit. "about/around that"], and ใช่. In China (Mandarin Chinese), the response options were 没有, 可能有 [lit. "might have"], and 有. In Vanuatu (Bislama), the response options were *no*, *ating* [lit. "I think"], and *yes*.

Procedure. A researcher fluent in the language of administration recruited participants and administered the study.

For adults, this was generally done in person in a public setting selected to be a place where a representative sample of the general population would pass through (e.g., the department of motor vehicles); see descriptions of individual field sites for details. In our Chinese field site, some participants were recruited through personal connections (e.g., parents of friends) and the study was conducted via video chat, because researchers reported that recruiting strangers in public spaces and asking them personal questions (e.g., demographic information) was quite difficult in this cultural setting. In our field sites in Vanuatu, participants were recruited through word of mouth and the study was conducted in participants' homes.

For children, data collection took place primarily at a children's museum in the US; at schools in Ghana and Thailand; at schools, neighborhood committees, children's homes, and via video chat in China; and at schools, daycares, and children's homes in Vanuatu. In Vanuatu, many participants in the child sample were related to participants in the adult sample.

The researcher generally began by asking demographic questions, such as the participant's age, their place of birth, and the languages they spoke; see descriptions of individual field sites for details. In our Chinese field site, the researcher began by making polite conversation and asked all of the demographic questions after the study was complete.

The researcher introduced the current study using the following (rough) script, while handing the participant the photograph of the target entity or holding it up for them to view: "This game is about [target entities, e.g., beetles]. I want to know what you think [beetles] can

and cannot do. I'm going to ask you a bunch of questions about [beetles] and I want you to tell me what you think. 'No' means that [beetles] do not do this. 'Kind of' means that [beetles] only kind of or sort of do this. 'Yes' means that [beetles] *do* do this. Please tell me what you really think, even if these questions seem weird or the answers are really obvious. If you do not know what we mean by a certain word, that's no problem at all—it happens all the time. Just ask me and I will explain what I mean." Researchers were encouraged to explain that they were also conducting this research with children of different ages and with people in other cultures, in order to clarify why we were asking such unusual questions (particularly for adults).

The researcher then administered the task, proceeding through 23 questions of the form "Do [entities] [do X]" (e.g., "Do beetles feel love?") in a preset order, as described in the previous two sections; they were then asked 3-4 additional questions about the target entity that were not included in the current analyses ("Do [entities] have minds? Do [entities] have souls? Do [entities] bleed if they touch something sharp?" and, in China only, "Do [entities] have feelings in the heart-mind [心 (*xin*)]?"). Researchers reported that this task generally took less than 5 minutes to complete. In some cases, this was one of two tasks a participant completed; the other task asked participants to reason about and explain social interactions between humans. According to the researchers in each site, the current study was the first task administered in the vast majority of these cases.

Finally, the researcher asked the participant additional demographic questions (e.g., questions about social class and religion), answered any questions they might have about the research, and provided a small thank-you gift for their time (e.g., a $5 gift card for US adults, or a colorful pencil for US children; thank-you gifts varied across sites to be roughly equally matched in value).

Planned samples. We planned to recruit between 130-150 adults and 130-150 children in each site. We set the minimum number of participants using a common rule of thumb that the participants-to-items ratio for exploratory factor analysis should be at least 5:1; the full testing protocol included 26 items (the 23 mental capacities analyzed here, and the additional 3 questions asked at the end of the task that were not analyzed here), yielding a minimum sample size of 130 per sample. We set the maximum number of participants based on the idea that we wanted each of the target entities included in the study design to be assessed by 15 participants in each sample, which we thought would yield reasonably precise estimates of which capacities people tended to attribute to which entities in each site and the relative variability across individuals in these attributions.

Analysis plan

Data preparation and choice of correlations. In this supplement we present two treatments of these data.

First, we report results from analyses in which responses of *no* were coded as 0, *kind of* as 0.5, and *yes* as 1, and exploratory factor analyses were conducted using Pearson correlations. These were the results described in the main text of the paper. We favor this approach because it allowed us to use our raw data without preprocessing, and yielded interpretable factor solutions that successfully reduced the dimensionality of the dataset.

However, this decision was not entirely straightforward, for two reasons. First, participants in different sites used the response scale differently: In particular, participants in Ghana used the

middle option, *kind of*, relatively less often (only 1% of adults' responses and 1% of children's responses), and adults in Thailand used it relatively more often (19% of adults' responses as fully 26% of children's responses); see Supplementary Table 4 for scale use in all samples. These patterns are interesting and likely meaningful in their own right, but they make cross-cultural comparison difficult, because they suggest that in Ghana responses were essentially dichotomous while in Thailand these response options yielded something closer to a well-formed ordinal scale. Second, even for sites where participants used all three of the response options, it is not obvious what kind of correlations best capture the covariance structure among variables. In principle, polychoric correlations would be appropriate for such ordinal responses[9], but in practice this tended to yield large factor solutions in which many factors were characterized by only one high-loading item—widely considered to be a hallmark of a poor factor analysis solution.

With these considerations in mind, in this supplement we also present analyses in which we preprocess the data such that responses of *kind of* are treated equivalently to responses of *yes* (i.e., coded as 1) and run exploratory factor analyses using tetrachoric correlations, which are designed for use with dichotomous variables.[9] By and large this approach yields very similar results to the approach reported in the main text of the paper, which we consider to be some indication of the robustness of these results to different analysis choices.

Factor retention protocols. We used parallel analysis to determine how many factors to retain, as implemented in the "fa.parallel()" function in the "psych" package for R.[9] Parallel analysis is a simulation-based approach to factor retention, which compares observed eigenvalues to the eigenvalues that emerge from resampled and randomly generated datasets of the same size as the empirical data. We note that although this is a common approach to factor retention, there is some debate about whether parallel analysis (which operates over simulations of the original correlation matrix) is an appropriate factor retention protocol for use with exploratory factor analysis (which operates over a correlation matrix that removes each variable's unique variance). We encourage interested readers to experiment with alternative factor retention protocols using these datasets.

Exploratory factor analysis (EFA). For each sample, after determining how many factors to retain we conducted an exploratory factor analysis using ordinary least squares to find the minimum residual solution, as implemented in the "fa()" function in the "psych" package for R.[9] In the main text, we report results from solutions after oblique (oblimin) transformation; in this supplement we also report varimax-rotated solutions, which were generally quite similar.

As we state in the main text, our goal in analyzing each of these datasets was to derive a set of latent constructs—core components of a concept of mental life—that together give rise to people's intuitions about the mental capacities that these target entities might or might not have. To elaborate on this: From our theoretical perspective, the relationships that are the focus of the current studies—relationships between these constructs (represented by the factors we have called "body," "heart," "mind," etc.) on the one hand, and individual mental capacities (e.g., hunger, anger, memory), on the other—is not that each construct is composed of or constituted by discrete, non-overlapping sets of capacities (though this is also a reasonable theory, and one to which some readers might subscribe). Instead, we view the set of constructs uncovered in a particular sample—e.g., "body," "heart," and "mind" among US adults—as together giving rise to individual mental capacities, such that each capacity can be thought of as some combination of

these three underlying components. This theoretical perspective motivated our choice of exploratory factor analysis as our dimensionality reduction technique, and our use of cosine similarity as our primary method of comparing factors (see following section).

We have posted several alternative versions of this analysis in our online repository: https://github.com/kgweisman/mental-life-culture-development (also linked from our OSF repository: https://osf.io/8s36e/), including: (1) EFAs using orthogonal ("varimax") rotations rather than oblique transformations; (2) EFAs recoding answers of "kinda" as equivalent to "yes" (i.e., coded as 1) and using tetrachoric rather than Pearson correlations; (3) EFAs following the same analysis choices as in the main text but dropping participants who gave the same answer to every question (e.g., participants who said the target entity had all the capacities we asked about, or none of the capacities); and (4) dimensionality reduction using another common technique, principal components analysis (PCA). In brief, these analyses yield similar results to the EFA solutions reported here: Among all samples there is a "body-like" dimension characterized by strong loadings on items like *get hungry* and *feel pain* and a "mind-like" factor characterized by strong loadings on items like *remember things* and *figure out how to do*, but the conceptualization of "social-emotional" items is more variable across sites and between age groups. See Supplementary Figures 11-18 for equivalents to figures equivalent to Figs. 1-2 (main text) for each of these four alternative analyses.

Assessing similarity between factors. Our primary index of the similarity between pairs of factors—within a single solution, across adult solutions from different field sites, or across solutions from children vs. adults within a single field site—is the cosine similarity between the two sets of factor loadings (r_c, also known as the Tucker index of factor congruence). We calculated cosine similarities using the "cosine()" function in the "lsa" package for R.[10] We consider values ≥0.95 to indicate a high degree of similarity between factors; values in the range of [0.85-0.94] to indicate a moderate degree of similarity between factors; and values <0.85 to indicate no similarity between factors.[11]

Cosine similarity takes into account each factor's relationship to all 23 capacity items, regardless of the absolute strength of any particular factor loading or the potential for an item to load strongly on multiple factors. This in line with our theoretical perspective that each capacity can be thought of as emerging from some combination of all of the underlying conceptual components (i.e., all of the factors in a given EFA solution): Some capacities may be clearly rooted in a single underlying construct (i.e., a single factor), while others may emerge from the combination of two or more constructs (i.e., two or more factors); put another way, some factors may contribute strongly to a few capacities and be unrelated to other capacities, while other factors may contribute to varying degrees to a wide variety of capacities. By taking into account all of the factor loadings for each factor, cosine similarities reflect our interest in this full range of possibilities.

From an alternative perspective, however, one might be interested in defining and comparing constructs by the capacities that load strongly on each factor and not on other factors. To this end, in this supplement we also provide such a comparison, defining each factor by identifying the set of capacity items with factor loadings ≥0.50 on that factor and loadings <0.50 on all other factors in a given EFA solution. We compare these sets of items using the Jaccard index of similarity (*J*), which provides the proportion of items that loaded strongly on both

factors, out of all of the items that loaded strongly on either factor (commonly described as "union over intersection").

Developmental comparisons. Our analyses of development focus on comparisons of two age groups—"adults" vs. "children"—rather than analyses of age-related differences within the child sample. This is because our primary interest is the covariance structure of participants' responses, which we explore using EFA, an analysis that occurs at the level of a group of participants (rather than an individual participant); to our knowledge, there is currently no standard method for how factor structure might differ across a continuous variable like exact age. Our samples were not large enough to conduct EFAs on sub-samples of different age ranges (e.g., 6-9y vs. 9-12y), although we consider this a promising way forward for future research. Instead, the current comparisons of "children" vs. "adults" provide a first glimpse of how concepts of mental life might change between childhood and adulthood in each site, laying the foundation for future studies to confirm that differences between children and adults are primarily related to learning and development (rather than differences in sample characteristics, cohort effects, or other alternative explanations); and to hone in on how such differences might evolve and (most likely) diminish over the course of childhood.

Extended Results: San Francisco Bay Area, USA

Description of field site. Our US field site was located in the San Francisco Bay Area, California, a large metropolitan area with a population of close to 8 million people. It encompasses several large cities, is home to many universities, and is the center of the technology industry in the US ("Silicon Valley"). The population of the Bay Area is very diverse, in terms of race, ethnicity, religion, socioeconomic status, and educational attainment.

Data for the adult sample were collected in person by a trained research assistant in Los Gatos, a suburb of San Jose, primarily at the Department of Motor Vehicles (or, in 5 cases, at a train station for the local commuter rail).

Data for the child sample were collected in person by trained research assistants. 94% of participants in the child sample participated at a museum in San Jose; n=7 children participated at their elementary schools.

Participant demographics. The US adult sample consisted of n=127 adults (98% of our planned minimum sample), ranging in age from 18-75y. The US child sample consisted of n=117 children (90% of our planned minimum sample), ranging in age from 5-12y; although our minimum age was intended to be 7y, we included the three children younger than this cutoff in the sample because we were under our target goal of 130 children. Previous work with US children suggests that children as young as 4y of age are capable of participating in this task.[3]

See Supplementary Tables 4-5 for demographic information about these samples. At a high level, we note that these were ethnically diverse samples, reflecting the general population of the Bay Area; however, 98% of adults and 95% of children indicated that English was the language (or one of the languages) they spoke at home growing up. Judging from adults' responses to questions about class, these samples appear to have been drawn from a relatively highly-educated, middle-class urban community—though perhaps less highly educated and less wealthy than the popular image of people who live in Silicon Valley. Finally, many adults in this sample were at least moderately spiritual or religious, but relatively few reported practicing a specific

religion; most parents of children in this sample reported that their families were either Christian or not religious, or decline to answer questions about religion.

Primary results: US adults. Parallel analysis using Pearson correlations suggested retaining three factors. See Fig. 1 (main text) and Supplementary Figure 6 for all factor loadings.

After oblimin transformation, the first factor corresponded primarily to physiological sensations related to biological needs—a suite of capacities that we refer to as "body."[1] It was the dominant factor for the following items (listed here, and in all corresponding lists, in order from strongest to weakest factor loading): *get hungry*, *feel tired*, *smell things*, *feel pain*, *feel scared*, and *feel sick […]*. This factor accounted for 35% of the shared variance in the rotated three-factor solution, and 23% of the total variance in adults' mental capacity attributions.

The second factor corresponded primarily to social-emotional abilities—a suite of capacities that we refer to as "heart."[1] It was the dominant factor for the following items: *get hurt feelings*, *feel guilty*, *feel shy*, *feel sad*, *pray*, *feel proud*, *feel love*, *feel happy*, *get angry*, and *think about things*. This factor accounted for 36% of the shared variance in the rotated three-factor solution, and 23% of the total variance.

The third factor corresponded primarily to perceptual-cognitive abilities to detect and use information about the environment—a suite of capacities that we refer to as "mind"[1]. It was the dominant factor for the following items: *sense when things are far away*, *remember things*, *hear things*, *choose what to do*, *sense temperatures*, and *add and subtract numbers*. This factor accounted for 29% of the shared variance in the rotated three-factor solution, and 19% of the total variance.

Together, these three factors accounted for 65% of the total variance in US adults' mental capacity attributions. Interfactor correlations were moderate: Factor 1 ("body") and Factor 2 ("mind"): Φ=0.51, 26% variance shared; Factor 1 ("body") and Factor 3 ("heart"): Φ=0.48, 23% variance shared; Factor 2 ("mind") and Factor 3 ("heart"): Φ=0.54, 29% variance shared.

Primary results: US children. Parallel analysis using Pearson correlations suggested retaining three factors. See Supplementary Figure 6 for all factor loadings in a side-by-side comparison with US adults, as well as cosine similarities between US child and US adult factors.

After oblimin transformation, the first factor corresponded primarily to physiological sensations, as well as some social-emotional items that were likely considered unpleasant from a first-person perspective (shyness, sadness, anger, guilt). It was the dominant factor the following items: *get hungry*, *feel scared*, *feel tired*, *feel pain*, *feel shy*, *smell things*, *feel sick […]*, *feel sad*, *get angry*, and *feel guilty*. This factor accounted for 51% of the shared variance in the rotated three-factor solution, and 26% of the total variance in children's mental capacity attributions. This factor was similar to the US adult "body" factor (r_c=0.91), and not similar to either of the other US adult factors (r_cs<0.49); see Supplementary Figure 6.

The second factor corresponded primarily to perceptual-cognitive abilities. It was the dominant factor for the following items: *remember things*, *sense when things are far away*, *figure out how to do things*, *think about things*, *hear things*, *choose what to do*, *add and subtract numbers*, and *sense temperatures*. This factor accounted for 24% of the shared variance in the rotated three-factor solution, and 12% of the total variance. This factor was similar to the US adult "mind" factor (r_c=0.93), and not similar to either of the other US adult factors (r_cs<0.31); see Supplementary Figure 6.

The third factor corresponded primarily to social-emotional abilities—in particular, emotions that were likely considered pleasant to experience. It was the dominant factor for the following items: *feel proud*, *feel love*, *pray*, *feel happy*, and *get hurt feelings*. This factor accounted for 25% of the shared variance in the rotated three-factor solution, and 13% of the total variance. This factor was most similar to the US adult "heart" factor (r_c=0.83), and not similar to either of the other US adult factors (r_cs<0.23); see Supplementary Figure 6.

Together, these three factors accounted for 50% of the total variance in US children's mental capacity attributions. Interfactor correlations were slightly lower among children than they were among adults: Factor 1 ("body") and Factor 2 ("heart"): Φ=0.30, 9% variance shared; Factor 1 ("body") and Factor 3 ("mind"): Φ=0.43, 19% variance shared; Factor 2 ("heart") and Factor 3 ("mind"): Φ=0.49, 24% variance shared.

Summary. We consider the adult results to be a clear conceptual replication of our previous work with US adults[1,2]; of note, this is the first time that we have used this empirical paradigm in person in the general population instead of online in samples from Amazon Mechanical Turk, and the first time using this particular set of target entities and this particular set of capacities. The fact that the three-way distinction between "body," "heart," and "mind" emerged so clearly in this study speaks to the robustness of this conceptual structure among US adults, and validates the version of this task employed in the current studies.

Building on our previous work with US children[2,3], the results from our sample of US children suggest that this three-way distinction is largely in place by middle childhood in this cultural setting: There was a clear analogue for each of the US adult factors ("body," "heart," and "mind') in the child EFA solution, as confirmed by analyses of cosine similarities. Nevertheless, both the pattern of cosine similarities and a close qualitative examination of factor loadings suggest that, while the distinction between "body" and "mind" was quite adult-like in this sample of children, these children may not have fully mastered US adults' sense that all social-emotional abilities (not just positively-valenced ones) "hang together" as distinct from both body and mind. This dovetails neatly with other studies of US children, including our own studies using a very similar experimental paradigm, which have demonstrated that children overly attend to positive vs. negative valence in their understanding of emotion, relative to adults.[3,12,13]

Extended Results: Cape Coast, Ghana

Description of field site. Our Ghanaian field site was located in Cape Coast, the capital city of the Central Region of southern Ghana. Cape Coast is a mid-sized city with a population of roughly 200,000 people (compared to populations of over 2 million people in Accra, the nation's capital, 75 miles away). Cape Coast is one of the oldest settlements in Ghana, and was the site of some of the earliest contact between West Africa and Europe extending back to the 15th century. The city was one of the largest slave-trading centers in West Africa—a legacy which is palpable in everyday life in the city today, in part because of tourism surrounding historical sites such as Cape Coast Castle, a World Heritage Site. The dominant local industries are fishing and trading, and the city is also home to many secondary and technical schools as well as the prestigious University of Cape Coast.

Data for the adult sample were collected in person by a trained research assistant in the outdoor waiting area of a government-run insurance agency.

Data for the child sample were collected in person by trained research assistants at a private, co-educational day school running from daycare through junior high school. Like most schools in the area, the primary language of instruction was English, and the school was affiliated with a Christian church.

Participant demographics. The Ghanaian adult sample consisted of n=150 adults (100% of our planned maximum sample), ranging in age from 17-68y. The Ghanaian child sample consisted of n=150 children (100% of our planned maximum sample), ranging in age from 6-11y; although our minimum age was intended to be 7y, we included the six children younger than this cutoff in the sample to match the US child sample.

See Supplementary Tables 4-5 for demographic information about these samples. At a high level, we note that the predominant ethnicity in these samples was Fante, reflecting the Cape Coast area; 67% of adult participants and 71% of child participants mentioned the Fante language as one of the languages spoken at home when growing up, and 10% of adults and 19% of children mentioned Twi (which is mutually intelligible with Fante). The adult sample was diverse in terms of social class; the child sample was likely from a somewhat higher social class than the adult sample. Finally, these were overwhelmingly Christian samples, representative of the Cape Coast area.

Primary results: Ghanaian adults. Parallel analysis using Pearson correlations suggested retaining three factors. See Fig. 1 (main text) and Supplementary Figure 7 for all factor loadings.

After oblimin transformation, the first factor encompassed (what we would call) cognitive and emotional abilities. We refer to this as a "mind-like" factor, with an emphasis on the "inner sphere" (see main text, and summary below). It was the dominant factor for the following items (from strongest to weakest factor loading): *choose what to do*, *figure out how to do things*, *feel proud*, *remember things*, *think about things*, *add and subtract numbers*, *get angry*, *feel happy*, *feel love*, and *feel sad*. This factor accounted for 50% of the shared variance in the rotated three-factor solution, and 35% of the total variance in adults' mental capacity attributions.

The second factor was characterized by the physiological sensations that characterized the US "body" factor. We refer to this as a "body-like" factor. It was the dominant factor for the following items: *get hungry*, *feel pain*, *feel sick […]*, *feel tired*, *feel scared*, *smell things*, *hear things*, *sense temperatures*, *sense when things are far away*, and *get hurt feelings*. This factor accounted for 36% of the shared variance in the rotated three-factor solution, and 25% of the total variance.

The third factor was the dominant factor for three items—*feel shy*, *feel guilty*, and *pray*—and accounted for 14% of the shared variance in the rotated three-factor solution, and 10% of the total variance. We refer to this as an "interpersonal/religious" factor (see main text, and summary below).

Together, these three factors accounted for 70% of the total variance in Ghanaian adults' mental capacity attributions. Interfactor correlations were moderate: Factor 1 ("mind-like") and Factor 2 ("body-like"): Φ=0.27, 7% variance shared; Factor 1 ("mind-like") and Factor 3 ("interpersonal/religious"): Φ=0.34, 12% variance shared; Factor 2 ("body-like") and Factor 3 ("interpersonal/religious"): Φ=0.26, 7% variance shared.

Primary results: Ghanaian children. Parallel analysis using Pearson correlations suggested retaining three factors. See Supplementary Figure 7 for all factor loadings in a side-by-

side comparison with Ghanaian adults, as well as cosine similarities between Ghanaian child and Ghanaian adult factors.

After oblimin transformation, the first factor was characterized primarily by physiological sensations, as well as some social-emotional abilities—in particular, experiences that were likely considered unpleasant from a first-person perspective (hurt feelings, sadness, anger, guilt). It was the dominant factor for the following items: *feel sick […]*, *get hurt feelings*, *get hungry*, *feel pain*, *feel scared*, *feel tired*, *feel sad*, *get angry*, *smell things*, and *feel guilty*. This factor accounted for 49% of the shared variance in the rotated three-factor solution, and 29% of the total variance in children's mental capacity attributions. This factor was similar to the "body-like" factor among Ghanaian adults (Gh. Factor 2; r_c=0.87), and not similar to either of the other Ghanaian adult factors (r_cs<0.45); see Supplementary Figure 7.

The second factor encompassed cognitive abilities and social-emotional that were likely considered to be more pleasant from a first-person perspective (happiness, pride, love). It was the dominant factor for the following items: *choose what to do*, *figure out how to do things*, *sense when things are far away*, *remember things*, *feel happy*, *think about things*, *hear things*, *feel proud*, *sense temperatures*, and *feel love*. This factor accounted for 37% of the shared variance in the rotated three-factor solution, and 22% of the total variance. This factor was similar to the "mind-like" or "inner sphere" factor among Ghanaian adults (Gh. Factor 1; r_c=0.85), and not similar to either of the other Ghanaian adult factors (r_cs<0.30); see Supplementary Figure 7.

The third factor picked out two items that may have been considered unique to humans (and perhaps God): *pray* and *add and subtract numbers*. This factor accounted for 15% of the shared variance in the rotated three-factor solution, and 9% of the total variance. This factor was not similar to any of the Ghanaian adult factors (all r_cs < 0.57); see Supplementary Figure 7.

Together, these three factors accounted for 60% of the variance in Ghanaian children's mental capacity attributions. Interfactor correlations ranged from low to moderate: Factor 1 ("body-like") and Factor 2 ("mind-like"): Φ=0.58, 34% variance shared; Factor 1 ("body-like") and Factor 3 ("pray, add, etc."): Φ=0.17, 3% variance shared; Factor 2 ("mind-like") and Factor 3 ("pray, add, etc."): Φ=0.39, 15% variance shared.

Summary. Taken on their own, we would describe the results from adults in Ghana as highlighting a conceptual distinction between the private inner sphere (encompassing both cognition and emotion) vs. the body, with an additional third factor picking out interpersonal capacities involving other humans or, in the case of prayer, God. As we argue in the main text, we see these results as aligning well with ethnographic descriptions of Ghana, which have highlighted the importance of protecting one's private inner life from malevolent external forces by cultivating a close interpersonal relationship with God.[14–17]

The results from our sample of Ghanaian children suggest that the distinction between the private inner sphere and the body is emergent, if not entirely adult-like, by middle childhood in this cultural setting: There was a clear analogue for both of these adult factors in the child EFA solution, though cosine similarities between analogous child and adult factors were only moderate, suggesting some differences between age groups. A close qualitative examination of factor loadings suggests that the primary difference between children and adults was the treatment of negatively-valenced emotions (e.g., sadness, anger, guilt, shyness). Among adults, sadness and anger traveled together with positive emotions (e.g., happiness, love) and cognitive abilities to form the factor that we described above as the "private inner sphere," while guilt and

shyness (together with prayer) formed the factor that we described above as "interpersonal" (and religious). But among children, all of these negative emotions traveled together with the physiological sensations of the body. This resonates with the differences between children and adults in the US, which highlighted the possibility that valence (positive vs. negative) loomed larger to children than to adults in making sense of the social-emotional aspects of mental life. In addition, we speculate that this may also be related to the fact that emotion terms are frequently described in terms of embodied sensations in Fante and other Ghanaian languages[18]; for children, these linguistic connections may overshadow the more abstract distinctions and commonalities that inform adults' thinking about mental life, at least for more negative emotional and physical feelings.

Extended Results: Chiang Mai, Thailand

Description of field site. Our Thai field site was located in the city of Chiang Mai, the capital city of Chiang Mai Province in Northern Thailand, with a sprawling metropolitan area with a population of nearly 1 million people. The city was founded in the 13th century. It is home to dozens of Buddhist temples dating back to the 14th century, and to many universities, technical schools, and teacher colleges. The dominant local industries are tourism, the service industry, and manufacturing, including local handicrafts.

Data for the adult sample were collected in person by trained research assistants in a bus station hub.

Data for the child sample were collected in person by trained research assistants at two private Catholic day schools, although the vast majority of students were Buddhist and not Catholic.

Participant demographics. The Thai adult sample consisted of n=150 adults (100% of our planned maximum sample), ranging in age from 17-70y. The Thai child sample consisted of n=152 children (101% of our planned maximum sample), ranging in age from 6-11y; although our minimum age was intended to be 7y, we included the one child younger than this cutoff in the sample to match the US child sample.

See Supplementary Tables 4-5 for demographic information about these samples. At a high level, we note that these were ethnically Thai samples, overwhelmingly Buddhist, and fairly high in socioeconomic status.

Primary results: Thai adults. Parallel analysis using Pearson correlations suggested retaining three factors. See Fig. 1 (main text) and Supplementary Figure 8 for all factor loadings.

After oblimin transformation, the first factor corresponded primarily to physiological sensations; we refer to this as a "body-like" factor. It was the dominant factor for the following items: *get hungry*, *feel pain*, *feel scared*, *feel sick […]*, *feel tired*, *smell things*, and *feel love*. This factor accounted for 41% of the shared variance in the rotated three-factor solution, and 18% of the total variance in adults' mental capacity attributions.

The second factor corresponded primarily to (what we would call) social-emotional abilities; we refer to this as a "heart-like" factor. It was the dominant factor for the following items: *pray*, *get hurt feelings*, *feel sad*, *feel guilty*, *feel proud*, *get angry*, *feel shy*, and *feel happy*. This factor accounted for 33% of the shared variance in the rotated three-factor solution, and 14% of the total variance.

The third factor corresponded primarily to perceptual-cognitive abilities; we refer to this as a "mind-like" factor. It was the dominant factor for the following items: *figure out how to do things*, *sense when things are far away*, *remember things*, *hear things*, *think about things*, *add and subtract numbers*, and *choose what to do*. This factor accounted for 26% of the shared variance in the rotated three-factor solution, and 11% of the total variance.

Together, these three factors accounted for 43% of the total variance in Thai adults' mental capacity attributions. Interfactor correlations were moderate: Factor 1 ("body-like") and Factor 2 ("heart-like"): Φ=0.41, 17% variance shared; Factor 1 ("body-like") and Factor 3 ("mind-like"): Φ=0.32, 10% variance shared; Factor 2 ("heart-like") and Factor 3 ("mind-like"): Φ=0.42, 17% variance shared.

Primary results: Thai children. Parallel analysis using Pearson correlations suggested retaining four factors. See Supplementary Figure 8 for all factor loadings in a side-by-side comparison with Thai adults, as well as cosine similarities between Thai child and Thai adult factors.

After oblimin transformation, the first factor corresponded primarily to physiological sensations. It was the dominant factor the following items: *get hungry*, *smell things*, *feel pain*, *feel happy*, *feel tired*, *feel scared*, *feel sick […]*, and *sense temperatures*. This factor accounted for 34% of the shared variance in the rotated four-factor solution, and 16% of the total variance in children's mental capacity attributions. This factor was similar to the Thai adult "body-like" factor (r_c=0.85), and not similar to any of the other Thai adult factors (r_cs<0.28); see Supplementary Figure 8.

The second factor corresponded primarily to social-emotional abilities—in particular, emotions that were likely considered unpleasant. It was the dominant factor for the following items: *feel sad*, *get hurt feelings*, *feel guilty*, *get angry*, and *feel proud*. This factor accounted for 30% of the shared variance in the rotated four-factor solution, and 14% of the total variance. This factor was not similar to any of the Thai adult factors (r_cs<0.55); see Supplementary Figure 8.

The third factor corresponded primarily to perceptual-cognitive abilities. It was the dominant factor for the following items: *figure out how to do things*, *sense when things are far away*, *hear things*, *think about things*, *remember things*, *choose what to do*, and *feel love*. This factor accounted for 23% of the shared variance in the rotated four-factor solution, and 11% of the total variance. This factor was similar to the Thai adult "mind-like" factor (r_c=0.87), and not similar to any of the other Thai adult factors (r_cs<0.33); see Supplementary Figure 8.

The fourth factor was the dominant factor for three items—*add and subtract numbers*, *feel shy*, and *pray*—and accounted for 13% of the shared variance in the rotated four-factor solution, and 6% of the total variance. This factor was not similar to any of the Thai adult factors (r_cs<0.50); see Supplementary Figure 8.

Together, these four factors accounted for 47% of the total variance in Thai children's mental capacity attributions. Interfactor correlations ranged from very low to moderate: Factor 1 ("body-like") and Factor 2 ("heart-like"): Φ=0.54, 29% variance shared; Factor 1 ("body-like") and Factor 3 ("mind-like"): Φ=0.15, 2% variance shared; Factor 1 ("body-like") and Factor 4 ("add, shy, etc."): Φ=0.00, 0% variance shared; Factor 2 ("heart-like") and Factor 3 ("mind-like"): Φ=0.32, 10% variance shared; Factor 2 ("heart-like") and Factor 4 ("add, shy, etc."):

Φ=0.09, 1% variance shared; Factor 3 ("mind-like") and Factor 4 ("add, shy, etc."): Φ=0.27, 7% variance shared.

Summary. Taken on their own, we would describe the results from adults in Thailand as highlighting a three-way distinction between physiological sensations, social-emotional abilities, and perceptual-cognitive abilities—what we have called "body," "heart," and "mind." As we argue in the main text, the differentiation of social-emotional abilities as a distinct aspect of mental life could be rooted in secular, Western-style, scientific view of mental life, to which many of the participants in this sample likely have access through formal schooling. The same distinction could also, or alternatively, be rooted in cultural influences that are more specific to this setting, such as the need to attend to others' emotions in order to fit into a more interdependent society[19] or the need to monitor one's motives and expressions in order to lessen the karmic consequences of one's actions[20]; or could have emerged from a distinct intellectual tradition of categorizing mental life that has independently highlighted similar sets of distinctions.[21]

The results from our sample of Thai children suggest that the distinction between body and mind is emergent, if not entirely adult-like, by middle childhood in this cultural setting: There was a clear analogue for the "body-like" and the "mind-like" adult factors in the child EFA solution, though cosine similarities between analogous child and adult factors were only moderate, suggesting some differences between age groups. A close qualitative examination of factor loadings suggests that the primary difference between children and adults was the treatment of a subset of what might have been considered positive or pleasant social-emotional abilities: prayer, pride, shyness, and happiness. Among adults, these items all traveled together with other, negatively-valenced social-emotional abilities (hurt feelings, sadness, guilt) to form a single, unified "heart-like" factor. But among children, the factor most similar to this "heart-like" factor (Th. children Factor 2) picked out only the negative social-emotional items; prayer and pride failed to load strongly on any single factor, and happiness and shyness loaded most strongly on the "body-like" factor. Again, this resonates with the differences between children and adults in the US and Ghana, which highlighted the possibility that the valence (positive vs. negative) of social-emotional abilities played a larger role in children's representations of mental life than it did for adults.

Extended Results: Shanghai, China

Description of field site. Our Chinese field site was located in Shanghai, the most populous urban area in China (indeed, the second most populous in the world), with a population of over 24 million people. It has been inhabited for over 6000 years, has been a major commercial and financial center since the 19th century, and is now one of the primary hubs for international trade, with the world's busiest container port. The dominant local industries are retail, finance, information technology, real estate, and manufacturing; the city is also a major center for higher education, and is home to dozens of universities. The population of Shanghai is quite diverse in terms of region of origin within China, socioeconomic status, and educational attainment.

Data for the adult sample were collected by trained research assistants either in person in public spaces (e.g., city parks), or through personal connections (e.g., parents of friends) via video chat; researchers reported that recruiting strangers in public spaces and asking them personal questions (e.g., demographic information) was quite difficult in this cultural setting.

Data for the child sample were collected by trained research assistants at schools, neighborhood gathering places, in children's homes, and in some cases via video chat through personal connections.

Participant demographics. The Chinese adult sample consisted of n=136 adults (over 100% of our planned minimum sample, and 91% of our planned maximum sample), ranging in age from 18-87y. The Chinese child sample consisted of n=131 children (over 100% of our planned minimum sample and 87% of our planned maximum sample), ranging in age from 8-12y.

See Supplementary Tables 4-5 for demographic information about these samples. At a high level, we note that these were majority Han Chinese samples, in which all participants indicated they were born in China, in Chinese autonomous regions, or in Taiwan, though many had come from other provinces outside of Shanghai. Participants were generally fairly high in socioeconomic status, and generally indicated that they were not religious.

Primary results: Chinese adults. Parallel analysis using Pearson correlations suggested retaining three factors. See Fig. 1 (main text) and Supplementary Figure 9 for all factor loadings.

After oblimin transformation, the first factor corresponded primarily to (what we would call) social-emotional abilities; we refer to this as a "heart-like" factor. It was the dominant factor for the following items: *get hurt feelings*, *feel sad*, *feel proud*, *feel love*, *feel guilty*, *feel shy*, *feel happy*, and *pray*. This factor accounted for 39% of the shared variance in the rotated three-factor solution, and 20% of the total variance.

The second factor corresponded primarily to physiological sensations; we refer to this as a "body-like" factor. It was the dominant factor the following items: *get hungry*, *feel pain*, *feel scared*, *smell things*, *feel tired*, *get angry*, and *feel sick […]*. This factor accounted for 31% of the shared variance in the rotated three-factor solution, and 16% of the total variance in participants' mental capacity attributions.

The third factor corresponded primarily to perceptual-cognitive abilities; we refer to this as a "mind-like" factor. It was the dominant factor for the following items: *figure out how to do things*, *sense when things are far away*, *remember things*, *hear things*, *choose what to do*, *add and subtract numbers*, and *think about things*. This factor accounted for 30% of the shared variance in the rotated three-factor solution, and 15% of the total variance.

Together, these three factors accounted for 52% of the total variance in Chinese adults' mental capacity attributions. Interfactor correlations ranged from moderate to rather high: Factor 1 ("heart-like") and Factor 2 ("body-like"): Φ=0.46, 21% variance shared; Factor 1 ("heart-like") and Factor 3 ("mind-like"): Φ=0.62, 38% variance shared; Factor 2 ("body-like") and Factor 3 ("mind-like"): Φ=0.37, 14% variance shared.

Primary results: Chinese children. Parallel analysis using Pearson correlations suggested retaining four factors. See Supplementary Figure 9 for all factor loadings in a side-by-side comparison with Chinese adults, as well as cosine similarities between Chinese child and Chinese adult factors.

After oblimin transformation, the first factor corresponded primarily to (what we would call) social-emotional abilities, as well as some physiological sensations. It was the dominant factor the following items: *feel sad*, *get angry*, *feel guilty*, *feel love*, *get hurt feelings*, *feel happy*,

feel proud, *think about things*, *feel shy*, *feel pain*, *choose what to do*, *feel sick […]*, *feel tired*, and *sense temperatures*. This factor accounted for 52% of the shared variance in the rotated four-factor solution, and 29% of the total variance in children's mental capacity attributions. This factor was similar to the Chinese adult "heart-like" factor (r_c=0.87), and not similar to any of the other Chinese adult factors (r_cs<0.53); see Supplementary Figure 9.

The second factor corresponded primarily to physiological sensations. It was the dominant factor for the following items: *get hungry*, *smell things*, and *feel scared*. This factor accounted for 22% of the shared variance in the rotated four-factor solution, and 12% of the total variance. This factor was most similar to the Chinese adult "body-like" factor (r_c=0.77), and not similar to any of the other Chinese adult factors (r_cs<0.38); see Supplementary Figure 9.

The third factor corresponded primarily to perceptual-cognitive abilities. It was the dominant factor for the following items: *hear things*, *remember things*, *add and subtract numbers*, *sense when things are far away*, and *figure out how to do things*. This factor accounted for 16% of the shared variance in the rotated four-factor solution, and 9% of the total variance. This factor was most similar to the Chinese adult "mind-like" factor (r_c=0.81), and not similar to any of the other Chinese adult factors (r_cs<0.18); see Supplementary Figure 9.

The fourth factor was the dominant factor for a single item—*pray*—and accounted for 10% of the shared variance in the rotated four-factor solution, and 6% of the total variance. This factor was not similar to any of the Chinese adult factors (r_cs<0.41); see Supplementary Figure 9.

Together, these four factors accounted for 57% of the total variance in Chinese children's mental capacity attributions. Interfactor correlations ranged from low to moderate: Factor 1 ("heart-like") and Factor 2 ("body-like"): Φ=0.51, 26% variance shared; Factor 1 ("heart-like") and Factor 3 ("mind-like"): Φ=0.32, 11% variance shared; Factor 1 ("heart-like") and Factor 4 ("pray, etc."): Φ=0.26, 7% variance shared; Factor 2 ("body-like") and Factor 3 ("mind-like"): Φ=0.15, 2% variance shared; Factor 2 ("body-like") and Factor 4 ("pray, etc."): Φ=0.08, 1% variance shared; Factor 3 ("mind-like") and Factor 4 ("pray, etc."): Φ=0.13, 2% variance shared.

Summary. Taken on their own, we would describe the results from our primary analysis of adults in China as highlighting a three-way distinction between physiological sensations, social-emotional abilities, and perceptual-cognitive abilities—what we have called "body," "heart," and "mind." The same comments we made about the results from Thailand also apply here: the differentiation of social-emotional abilities as a distinct aspect of mental life could be rooted in secular, Western-style, scientific view of mental life, to which many of the participants in this sample likely have access through formal schooling. The same distinction could also, or alternatively, be rooted in cultural influences that are more specific to this setting, such as the need to attend to others' emotions in order to fit into a more interdependent society[19]; or could have emerged from a distinct intellectual tradition of categorizing mental life that has independently highlighted similar sets of distinctions.[22]

The sample of Chinese adults was the only case out of all of our adult and child samples in which treating responses of *kind of* as equivalent to *yes* suggested a qualitatively different factor solution, in which "heart" and "mind" did not emerge as separate factors but were instead integrated into a single factor. This result is still consistent with our general argument that "body" and "mind" were distinct in all samples, while understandings of social-emotional abilities varied—but it raises the possibility that Chinese adults' understanding of mental life may not be as similar to that of US adults' as our primary analyses would suggest. Indeed, the

integration of (what we would call) cognition and emotion into a single construct is strikingly resonant with the concept of 心 (*xin*; lit. "heart-mind") in Chinese philosophy.[22,23]

Nonetheless, much as in the US, the results from our sample of Chinese children suggest that a three-way distinction between "body," "heart," and "mind" is accessible to children by middle childhood in this cultural setting: There was a clear analogue for each of the Chinese adult factors in this child EFA solution, as confirmed by analyses of cosine similarities. The least adult-like of these factors was the "body-like" factor (Ch. children Factor 3)—but again, the age-related difference seems to have been driven at least in part by children's understanding of what we would call social-emotional items. Among adults, the "body-like" and "heart-like" factors were relatively comparable in size, both in terms of the amount of variance explained and in terms of the number of items that loaded much more strongly on one factor than the other—but among children, the "heart-like" factor was much larger on both counts, primarily because many "physiological" items loaded rather strongly on it (e.g., pain, fear, sensing temperatures, fatigue, nausea). Although this developmental comparison differs from the comparisons in the US, Ghana, and Thailand, where positive vs. negative valence was exaggerated in children's representations relative to adults, it remains the case that the most salient differences between children and adults in China were in what we would call the social-emotional domain.

We note that our samples of Chinese adults and children were the most sensitive to our analysis choices; to explore how these results varied across analyses, see https://github.com/kgweisman/mental-life-culture-development. Among other things, this suggests that at least some people in China may have access to representations of mental life that differ more from the "body-heart-mind" model of US adults than the results reported in the main text imply.

Extended Results: Port Vila and Malekula, Vanuatu

Description of field sites. We recruited participants in two field sites in Vanuatu, a small island nation in the South Pacific. Our dual sampling strategy in Vanuatu was an issue of convenience and sample size: As part of the broader Mind and Spirit Project, we were collecting data in both urban and rural sites in Vanuatu, and in order to recruit large enough samples for the current study (given the size of these communities and the time constraints of the larger project) we collected data for the current study in both locations.

The first site was located in the capital city, Port Vila, on the island of Efate. Port Vila is by global standards a small city, with a population of roughly 50-70,000 people (~44,000 in the 2010 census); however, it is the largest city in Vanuatu and the economic and commercial center of the country. The area has been inhabited for thousands of years, and was the site of the first exchanges with European explorers and colonists (including the Portuguese, British, and French) beginning in the early 17th century. The dominant industry in the city is tourism; it is also home to several secondary schools as well as one of the campuses of the University of the South Pacific and several vocational training institutes/colleges. The second site was on the more remote island of Malekula, which is a much more rural setting where most people engage in subsistence and small-scale agriculture or fishing; the total population of the island (including the villages where we collected data as well as other villages) is roughly 25,000 people.

Data for the adult sample were collected in person by a trained research assistant in people's homes in both sites.

Data for the child sample were collected in person by trained research assistants in children's schools or daycare centers in Port Vila, or in children's homes on Malekula. Children in both subsamples were often related to one or more participants in the adult sample.

Participant demographics. The Ni-Vanuatu adult sample consisted of n=148 adults (over 100% of our planned minimum sample, 99% of our planned maximum sample), ranging in age from 15-75y. An additional 16 adults participated but were excluded from the current analyses because they assessed a target entity that was not assessed in other field sites (a pig, n=15); or because we were missing information about which target entity they assessed (n=1). The Ni-Vanuatu child sample consisted of n=143 children (over 100% of our planned minimum sample, 95% of our planned maximum), ranging in age from 6-12y; an additional 26 children participated but were excluded from the current analyses because they assessed a target entity that was not assessed in other field sites (a pig, n=16), or because they were younger than the de facto minimum age of 6y in other samples (n=6) or older than the maximum age of 12y (n=4).

Due to an error on our part, information about ethnicity, place of birth, education, and perceptions of wealth and class were not collected in Vanuatu. We are confident that all participants would identify ethnically as Ni-Vanuatu, and that the subsample of adults who participated in and around the city Port Vila likely had more formal education than those adults who participated in rural villages on Malekula. These were overwhelmingly Christian samples, which is representative of the surrounding areas. See Supplementary Tables 4-5 for (limited) demographic information about these samples.

Primary results: Ni-Vanuatu adults. Parallel analysis using Pearson correlations suggested retaining two factors. See Fig. 1 (main text) and Supplementary Figure 10 for all factor loadings.

After oblimin transformation, the first factor encompassed (what we would call) cognitive and emotional abilities; we refer to this as a "mind-like" factor, with an emphasis on "social harmony" (see main text, and summary below). It was the dominant factor for the following items: *remember things*, *feel happy*, *choose what to do*, *add and subtract numbers*, *get hurt feelings*, *feel love*, *pray*, *think about things*, *feel sad*, *figure out how to do things*, *hear things*, *sense when things are far away*, and *smell things*. This factor accounted for 55% of the shared variance in the rotated two-factor solution, and 29% of the total variance in adults' mental capacity attributions.

The second factor corresponded primarily to physiological sensations; we refer to this as a "body-like" factor, with an emphasis on "sin" (see main text, and summary below). It was the dominant factor for the following items: *feel sick […]*, *feel tired*, *feel scared*, *feel pain*, *sense temperatures*, *get angry*, *get hungry*, *feel guilty*, *feel shy*, and *feel proud*. This factor accounted for 45% of the shared variance in the rotated two-factor solution, and 24% of the total variance.

Together, these three factors accounted for 53% of the total variance in Ni-Vanuatu adults' mental capacity attributions. The correlation between these two factors was quite high: Φ=0.69, 47% variance shared.

Primary results: Ni-Vanuatu children. Parallel analysis using Pearson correlations suggested retaining three factors. See Supplementary Figure 10 for all factor loadings in a side-by-side comparison with Ni-Vanuatu adults, as well as cosine similarities between Ni-Vanuatu child and Ni-Vanuatu adult factors.

After oblimin transformation, the first factor corresponded primarily to physiological sensations. It was the dominant factor the following items: *get hungry*, *hear things*, *smell things*, *feel sick […]*, *get angry*, *feel pain*, *sense temperatures*, *feel tired*, *sense when things are far away, feel happy*, and *feel scared*. This factor accounted for 49% of the shared variance in the rotated three-factor solution, and 24% of the total variance in children's mental capacity attributions. This factor was most similar to the Ni-Vanuatu adult "body-like" factor (r_c=0.84), and not similar to the other Ni-Vanuatu adult factor (r_c=0.39); see Supplementary Figure 10.

The second factor corresponded primarily to perceptual-cognitive abilities, as well as capacities for love and prayer. It was the dominant factor for the following items: *add and subtract numbers*, *choose what to do*, *feel love*[1], *figure out how to do things*, *remember things*, *pray*, and *think about things*. This factor accounted for 28% of the shared variance in the rotated three-factor solution, and 14% of the total variance. This factor was similar to the Ni-Vanuatu adult "mind-like" factor (r_c=0.89), and not similar to the other Ni-Vanuatu adult factor (r_c=0.01); see Supplementary Figure 10.

The third factor corresponded primarily to what we would call social-emotional abilities. It was the dominant factor for the following items: *feel guilty*, *feel shy*, *get hurt feelings*, *feel proud*, and *feel sad*. This factor accounted for 23% of the shared variance in the rotated three-factor solution, and 11% of the total variance. This factor was not similar to either of the Ni-Vanuatu adult factors (r_cs<0.57); see Supplementary Figure 10.

Together, these three factors accounted for 49% of the total variance in Ni-Vanuatu children's mental capacity attributions. Interfactor correlations were moderate: Factor 1 ("body-like") and Factor 2 ("mind-like"): Φ=0.31, 10% variance shared; Factor 1 ("body-like") and Factor 3 ("heart-like"): Φ=0.52, 27% variance shared; Factor 2 ("mind-like") and Factor 3 ("heart-like"): Φ=0.34, 11% variance shared.

Summary. Taken on their own, we would describe the results from Vanuatu as highlighting a distinction between the socially productive aspects of mental life, including cognition and the social-emotional abilities that are required to function well in society; vs. the socially counter-productive aspects of mental life, including bodily functions and the social-emotion abilities that have the potential to disturb social harmony (perhaps with a particular emphasis on abilities such that correspond to cardinal sins, e.g., pride, hunger, fatigue, anger). As we argue in the main text, we see these results as aligning well with ethnographic descriptions of Vanuatu, which have highlighted the prevalence of Christianity[24] and the high value placed on actively maintaining social harmony.[25,26]

The results from our sample of Ni-Vanuatu children suggest that some aspects of this conceptual organization are present among children in this cultural setting, but that children differed quite dramatically from adults in their understanding of what we would call the social-emotional aspects of mental life. There were clear analogues to both of these adult factors in the child EFA solution, but cosine similarities between child and adult factors was only moderate, suggesting age-related differences. A close qualitative examination of factor loadings clearly

[1] For the item *Do [targets] feel love?* we used the Bislama translation *Wan [targets] i save filim lav?*, but we note that a popular way to express something like "I love him" in Bislama is to say (the equivalent of) "I think about him"; indeed, in many of Vanuatu's vernacular languages, the word for "love" is cognate with the word for "think about" and/or "remember." These linguistic features may be related to the connection Ni-Vanuatu children perceived between love and the cognitive capacities that constituted the bulk of this factor.

reveals that the primary difference between children and adults was the treatment of what we would call social-emotional items. Among adults, happiness, hurt feelings, sadness, love, and prayer traveled together with cognitive abilities to form the factor that we described above as "socially productive" and "mind-like"; while anger, guilt, shyness, and pride traveled together with physiological sensations to form the factor that we described above as "socially counterproductive" and "body-like." But among children, most of these social-emotional abilities traveled together to form a third, "heart-like" factor—quite similar, in fact, to the three-part distinctions we observed among US, Thai, and Chinese adults as well as US children. This difference between Ni-Vanuatu children and adults is, in some sense, the converse of the age-related differences related to positive vs. negative valence observed in other sites: While in the US, Ghana, and Thailand, a distinction between positive vs. negative valence was more salient in children's responses, in Vanuatu a distinction between (socially) positive vs. (socially) negative was more salient in adult's responses. To our eyes, the difference between children and adults in Vanuatu is the most striking of all field sites, and deserving of further research; at a high level, however, it is in line with the general observation in all field sites that what differs most between children's and adults' is their understanding of the social-emotional aspects of mental life.

Extended Results: Cultural comparison of adults

Primary results. Cosine similarities (r_c) between all possible pairs of factors (both within a single sample and across samples) are presented in Fig. 2 in the main text. An analogous figure using the Jaccard index (J) instead of r_c is available in Supplementary Figure 1.

In the main text, we focused in particular on comparing the factors from the EFA solutions from Ghana, Thailand, China, and Vanuatu to the "body," "heart," and "mind" factors from the US solution. These results are presented in full in Fig. 3.

To recap our conclusions—first, in each of the four non-US sites EFA revealed one factor (and only one factor) that was at least moderately similar to the US "body" (all r_cs>0.86), which was not similar to the US "mind" (all r_cs<0.33). Likewise, there was one factor (and only one factor) that was much more similar to the US "mind" (all r_cs>0.74) than the US "body" (all r_cs<0.34). We argue that this is evidence of a kind of "mind-body dualism" held in common across these five diverse cultural settings.

Second, in two sites—Thailand and China—EFAs revealed a third factor that was highly similar to the US "heart" (r_cs>0.96) and not similar to the US "body" or "mind" (all r_cs<0.35), which we argued was evidence of a similar conceptual structure shared across these three samples. But in the other two sites—Ghana and Vanuatu—this was not the case. In Ghana, the three-factor EFA solution included two factors that were equally, and only very modestly, similar to the US "heart" (Gh. Factor 1: r_c=0.69, Gh. Factor 2: r_c=0.68); in Vanuatu, our factor retention protocol yielded only two factors, one of which was equally, and again only modestly, similar to "mind" (r_c=0.75) and "heart" (r_c=0.73). We argue that this is evidence of substantial cross-cultural variability in how people understand emotions to fit into the shared mind-body distinction.

To supplement these US-based comparisons, here we present figures comparable to Fig. 1 using each of the other four sites as the base for comparison (Supplementary Figures 2-5). For example, readers interested in grounding their cultural comparison in a Ghanaian concept of mental life should consult Supplementary Figure 2.

To supplement these US-based comparisons, we also present figures comparable to Supplementary Figure 13 using each of the other four sites as the base for comparison (Supplementary Figures 14-17). For example, readers interested in grounding their cultural comparison in a Ghanaian concept of mental life should consult Supplementary Figure 14.

Extended Results: Exploratory analysis of age, gender, and other demographics among adults

One strength of the current studies is that participants were recruited personally (either face-to-face in person or through social connections); this is in contrast with many large-scale quantitative studies with adults which are increasingly conducted online through anonymized recruiting strategies (e.g., Amazon Mechanical Turk). In some cases, however, this sampling strategy led to an oversampling of demographic groups who were likely deemed more "approachable" by our local research assistants, or who were more likely to consent to participating in the study—namely, younger people and women. Moreover, these tendencies varied across field sites: The gender imbalance was particularly pronounced in our adult samples from Vanuatu and Thailand, and we recruited more uniformly from a broader age range in China than in other sites. In addition, the distribution of experiences with formal education varied across samples, with a uniformly highly educated US sample, a sample from Ghana with uniformly low levels of formal education, and samples from Thailand and China (and most likely Vanuatu, given our urban and rural subsamples) that included both high and low levels of formal education. (See Supplementary Table 5 for all adult demographics.)

This raises the possibility that the "cultural models" revealed by the EFAs that were our primary analyses may be specific to these demographic groups, rather than representative of the broader cultural setting—and, by extension, the possibility that the differences across samples from different field sites described in the main text may reflect these demographic differences rather than or in addition to broader *cultural* differences.

To our knowledge, there is currently no established method for incorporating additional "covariates" into an exploratory factor analysis in order to test or statistically control for demographic differences in the covariance structures that are of central interest here. Moreover, exploratory factor analyses require large samples, and our planned sample size was selected with these needs in mind—making them too small to analyze sub-samples that are well-matched in terms of key demographic variables. Indeed, attempting to analyze subsamples of the current studies led to solutions that were easily perturbed by minor analysis choices, unlike the primary results reported in the main text.

Here we present a novel approach to assessing demographic differences in covariance structures. This approach hinges on comparing the covariance structure at the level of the individual participant (which we will call the "individual model") to the group-level covariance structure (the "group model"), which allows us to gauge the degree to which any individual participant "fits" the group model—and by extension the degree to which these fits between individual participants and the group model vary by age, gender, and other demographic variables within a given sample. This approach was inspired by pioneering work on "cultural consonance" and "cultural consensus modeling," especially studies of individual differences in endorsement of cultural models.[27–29] While previous work has focused on first-order answers to questions (e.g., Does the individual say that beetles can feel happy, and how does this compare to the overall tendency of the group?), the current analyses focus on second-order relationships among these answers, i.e., covariance structures (e.g., Do the individual's answers to questions

about happiness and hunger match, and how does this compare to the overall tendency of the group?).

In this initial application of this novel approach we focus on adult samples only, but we hope that this approach might also be a fruitful way of analyzing development.

Analysis plan. To represent the individual models for each participant, for every possible pair of capacities (e.g., *feel happy* and *get hungry*; *feel happy* and *get angry*; n=253 pairs), we calculated a "matching score" by taking the absolute value of the difference in an individual's responses to these two capacities from 1. That is, if a participant gave the same answer to both items—whether that answer was "yes" (scored as 1), "kinda" (scored as 0.5), or "no" (scored as 0)—they received a matching score of 1 for that pair of capacities. If a participant answered "yes" (1) to one question and "no" (0) to the other, they received a score of 0 for that pair of capacities. If a participant answered either "yes" (1) or "no" (0) to one question and "kinda" (0.5) to the other, they received a score of 0.5, indicating that their answered to these two questions partially matched. (Note that considering answers of "kinda" to be equivalent to "yes," i.e., coded as 1, yielded very similar results in the following analyses.)

To represent the group model for a given sample (e.g., US adults), we calculated the average of these matching scores across participants in a sample, yielding a real value between 0 and 1 for each possible pair of capacities (n=253 pairs). These average matching scores correspond, approximately, to the proportion of participants in the sample whose answers to these two questions matched (bearing in mind that some participants may have received matching scores of 0.5 if their answers partially matched; see previous paragraph). In principle, if every participant in the sample gave matching answers for a given pair of capacities (e.g., some participants said "yes" to both, some said "kinda" to both, and some said "no" to both), the average matching score represented in the group model would be 1. Likewise, if every participant in the sample gave opposite answers for a given pair of capacities (i.e., every participant said "yes" to one and "no" to the other), the average matching score represented in the group model would be 0. In practice, these group-level average matching scores ranged from 0.38 to 0.89 in the sample from the US, 0.51 to 0.95 in the sample from Ghana, 0.41 to 0.81 in the sample from Thailand, 0.41 to 0.86 in the sample from China, and 0.55 to 0.88 in the sample from Vanuatu, reflecting the fact that in all samples most of these mental capacities were perceived to "travel together" to at least some degree, and that there were no pairs of capacities that were considered to be mutually exclusive. (This is also reflected in the nearly uniformly positive factor loadings for the EFAs that are our primary analyses for these studies; see Figure 1.)

For each participant, we compared their individual model to the group model by calculating the mean squared error (MSE) between the matching scores for the 253 pairs of capacities in the individual model to the average matching scores for these pair of capacities in the group model. As in other applications of MSE, values closer to 0 indicate a stronger "fit" between the individual and group models. For each sample, the theoretical range for MSEs depended on the average matching scores in the group model, with the theoretical minimum determined by calculating MSE for a hypothetical participant whose responses *matched* (scored as 1) for all pairs of capacities for which the average matching score in the group model was ≥0.67, *partially matched* (scored as 0.5) for all pairs for which the average matching score was between 0.33 and 0.67, and *did not match* (scored as 0) for all pairs for which the average matching score was

≤0.33); and the theoretical maximum determined by calculating MSE for a hypothetical participant whose responses *did not match* (scored as 0) for all pairs for which the average matching score was ≥0.5 and *matched* (scored as 1) for all pairs for which the average matching score was <0.5. (Note that considering answers of "kinda" as equivalent to "yes," and calculating the theoretical minimum accordingly yielded very similar theoretical minima.) Theoretical ranges varied slightly across samples; see Supplementary Table 7. Knowing these theoretical ranges allowed us to rescale MSEs for participants in each sample from the theoretical range for participants in that sample to a standard range of [0, 1] using the "rescale" function in the "scales" package for R.[30] In our analyses, we examined both raw, unscaled MSEs (using standard linear regressions) and rescaled MSEs (using beta regressions to account for the restricted range).

See Supplementary Table 7 for summary statistics for raw and rescaled MSEs for all adult samples.

Having an index of fit with the group model for each individual in a sample allowed us to explore whether fit varied by five key demographic variables: age, gender, amount of formal education, experience growing up in rural vs. urban areas, and religious background. We explored these demographic variables in each adult sample (with the exception of Vanuatu, for which we had only limited demographic data; see Methods). We also explored differences across race/ethnicity among US participants; and across location (urban Port Vila vs. rural sites on Malekula) for the two sub-samples from Vanuatu.

To do this, for each sample we fit a series of regressions using each demographic variable as the sole predictor of MSE, as well as a single omnibus regression using all (available) demographic variables to predict MSE. We examined multiple versions of these analyses, including standard linear regressions predicting standardized raw MSEs (using the "lm" function in the "stats" package for R[31], and the "lmer" function in the "lme4" package for R[32]; as well as beta regressions predicted rescaled MSEs accounting for the restricted range (using the "betareg" function in the "betareg" package for R.[33] Unless otherwise noted, these analyses led us to draw very similar conclusions about which demographic variables might be related to "fit" between individual and group models in each sample.

Results. Here we provide a high-level summary of these results; see Supplementary Table 7 for regression coefficients and p-values for key analyses. For complete results, see https://github.com/kgweisman/mental-life-culture-development.

Among US adults, the only demographic variable that may have been related to the fit between individual and group models was gender: on average, MSEs were higher among men than women, suggesting that there may have been more consensus about which capacities "travel together" among women than men, and/or that the group model may be more representative of how women in this cultural setting think than of how men in this cultural setting think. However, the statistical significance of this difference varied across different versions of our analyses (see, e.g., the results from linear regressions vs. beta regression in Supplementary Table 7); we would thus urge caution in drawing concluding that gender was a meaningful predictor of fit in this sample.

Among Ghanaian adults, the only demographic variable that was a significant predictor of fit between individual and group models was age: MSEs tended to decrease with age, suggesting

that there may have been more consensus among older people about which capacities "travel together," and/or that the group model may be more representative of how older people think.

Among Thai adults, both age and level of education were significant predictors of fit between individual and group models was age: MSEs tended to increase with age to decrease with education. This suggests that there may have been more consensus about which capacities "travel together" among younger people and people with more formal education, and/or that the group model may be more representative of how younger people and people with more formal education think.

Among Chinese adults, the only demographic variable that was a significant predictor of fit between individual and group models was level of education: MSEs tended to be lower among adults with at least some college education than among adults with no college education, suggesting that there may have been more consensus about which capacities "travel together" among people with more formal education, and/or that the group model may be more representative of how people with substantial formal education think.

Among Ni-Vanuatu adults, the only demographic variables that we were able to assess (due to our failure to collect complete demographic information for adults) were gender, age, and location; note, however, that location serves as a reasonable proxy for socioeconomic status, with participants recruited in and around the urban center of Port Vila likely to have more wealth and more formal education than participants recruited in rural locations on the island of Malekula. (Note also that all but one participant identified as Christian.) Of these, only location was a significant predictor of fit between individual and group models: MSEs were higher in the subsample of adults who participated in and around Port Vila than the subsample of adults who participated in rural locations on Malekula. This suggests that there may have been more consensus about which capacities "travel together" among participants in rural locations, and/or that the group model may be more representative of how people in more rural areas think.

Discussion. To our knowledge, this is a novel approach to exploring variability in the covariance structures across individuals and relating that variability to the covariance structures evidence at the group level. We thus urge caution in interpretation, and welcome critical feedback and extensions of this approach.

One high-level takeaway from these preliminary results is that in the two field sites where EFAs surfaced adult conceptual structures that were most similar to the well-documented "body-heart-mind" structure among US adults[1,2]—Chiang Mai, Thailand, and Shanghai, China—these exploratory analyses suggested that the group model was most representative of younger participants and/or participants who had more formal education. This echoes speculations that have arisen frequently in conversation amongst ourselves, as well as in conversations with other scholars working in China in particular, that the similarities across our US, Thai, and Chinese samples might reflect the growing influence of Western medical and psychiatric models of the mind.[34] Conversely, in the two field sites where EFAs surfaced adult conceptual structures that were least similar to that of US adults, the current analyses suggested that the group model was most representative of older participants (in Ghana) and/or participants recruited in more rural areas (in Vanuatu); in both cases, such participants were likely to have had somewhat less exposure to formal, Western-style education or other vehicles for "Westernization."

On the whole, these results lend us more confidence that the patterns of similarity and difference across samples surfaced by the EFAs highlighted in the main text correspond to

cultural similarities and differences rather than reflecting merely incidental demographic differences between our samples. At the same time, they highlight the possibility that in many of these settings we are likely witnessing *historical* conceptual change, as younger generations (perhaps influenced by more exposure to formal, Western-style education) begin to think differently than their elders about the fundamental components of mental life.

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Please note that only references included in these supplemental materials are listed here.

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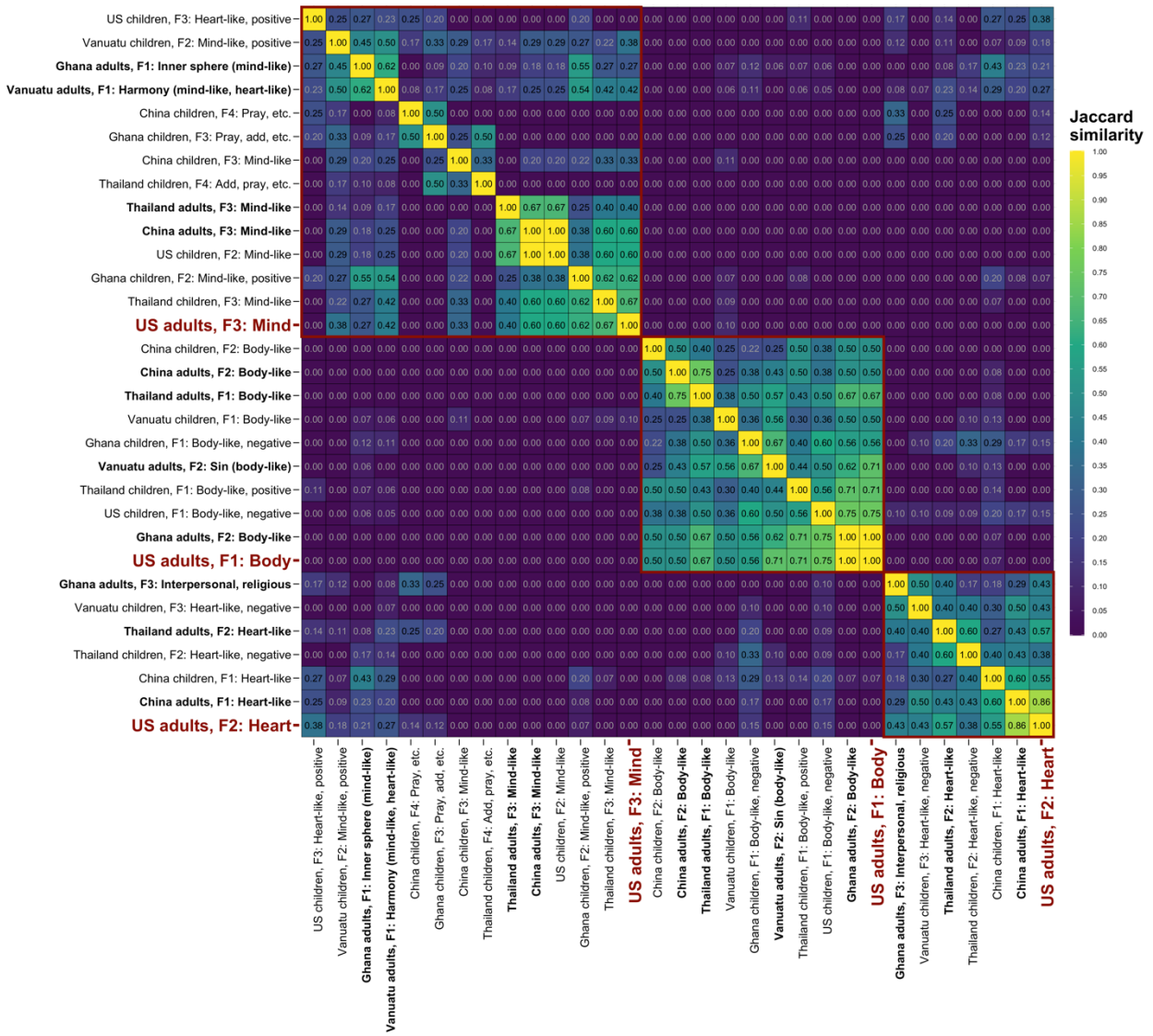
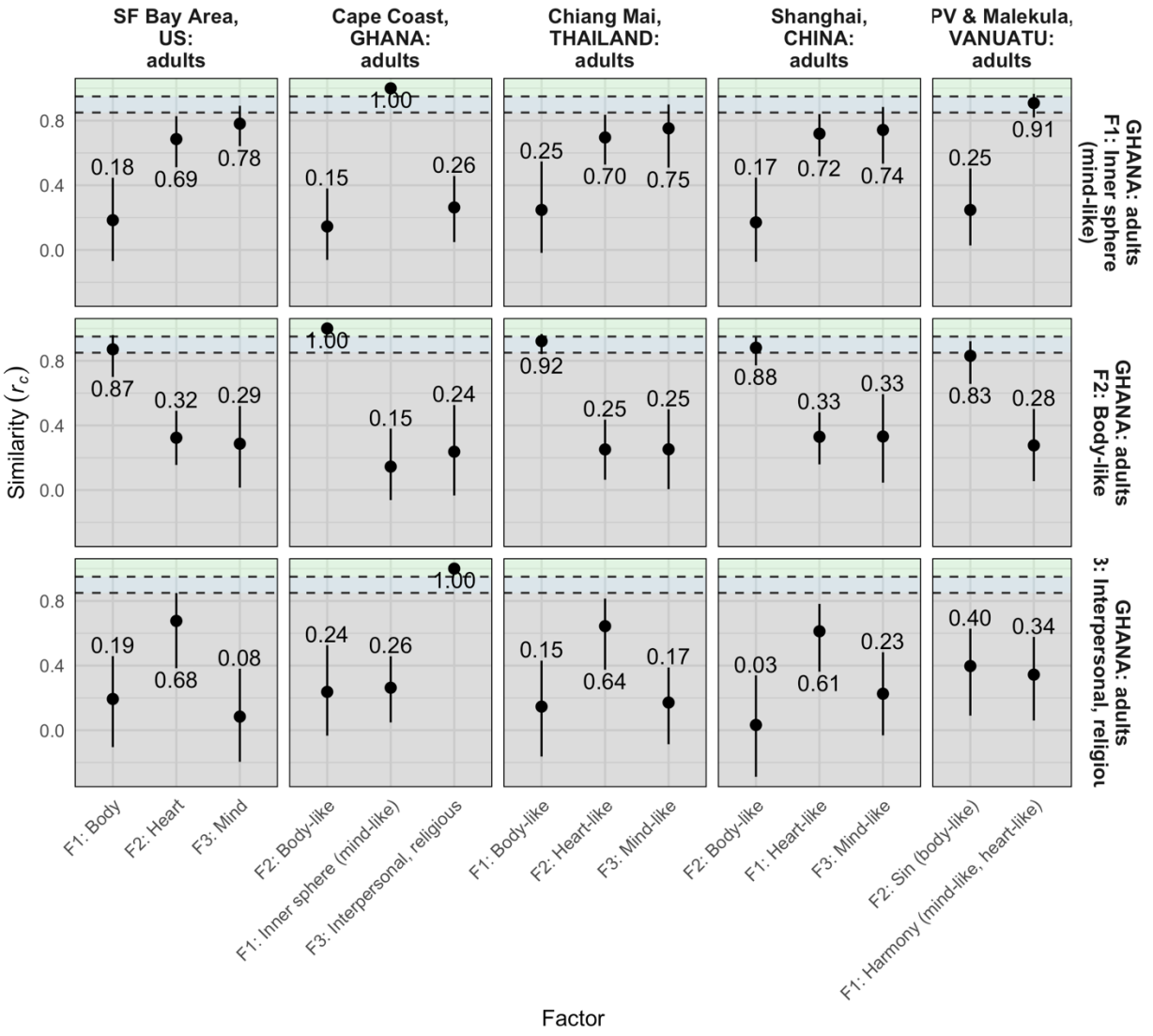
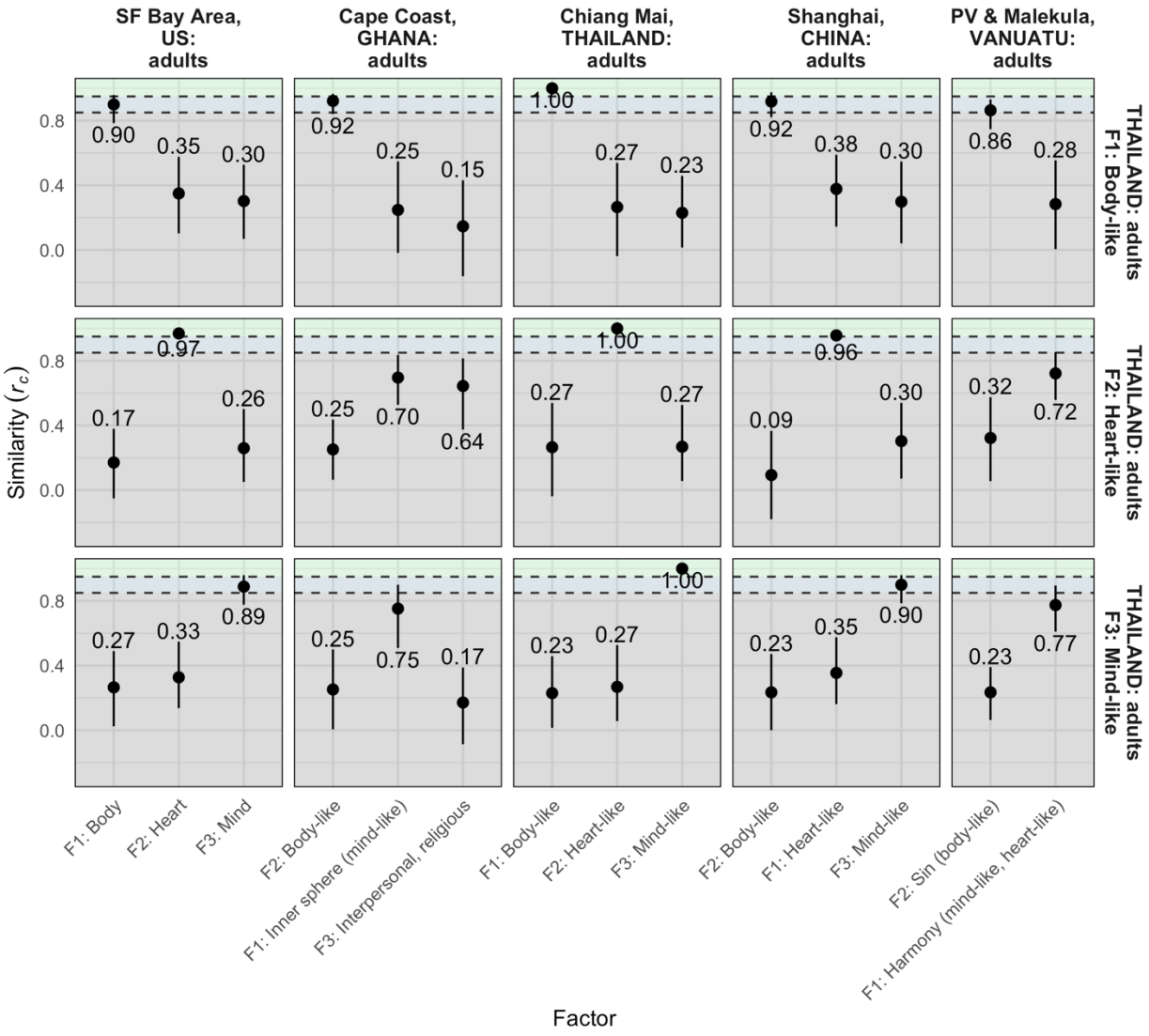


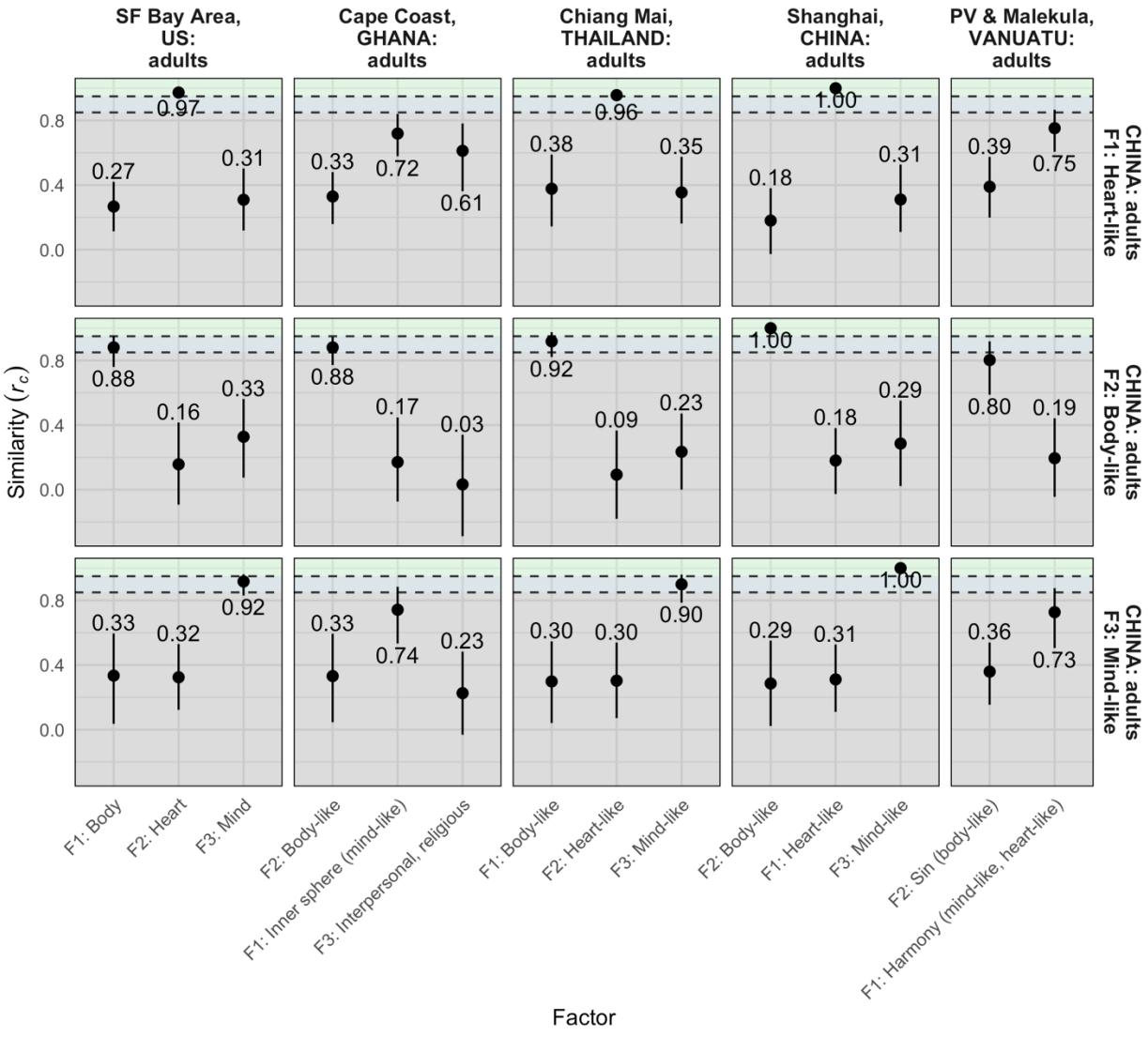
Supplementary Figure 1. Jaccard index of similarity (*J*) between all pairs of factors in the EFA solutions presented in Fig. 1 (main text), indicating how similar each factor is to every other factor; higher r_c (in yellow and green) indicates greater inter-factor similarity. Along the axes, factors from adult samples are in bold, and the three US adult factors—"body," "heart," and "mind"—are highlighted in larger red text. Factors are ordered via hierarchical clustering without privileging any sample as the base for comparison. This figure is analogous to Fig. 2 (main text).



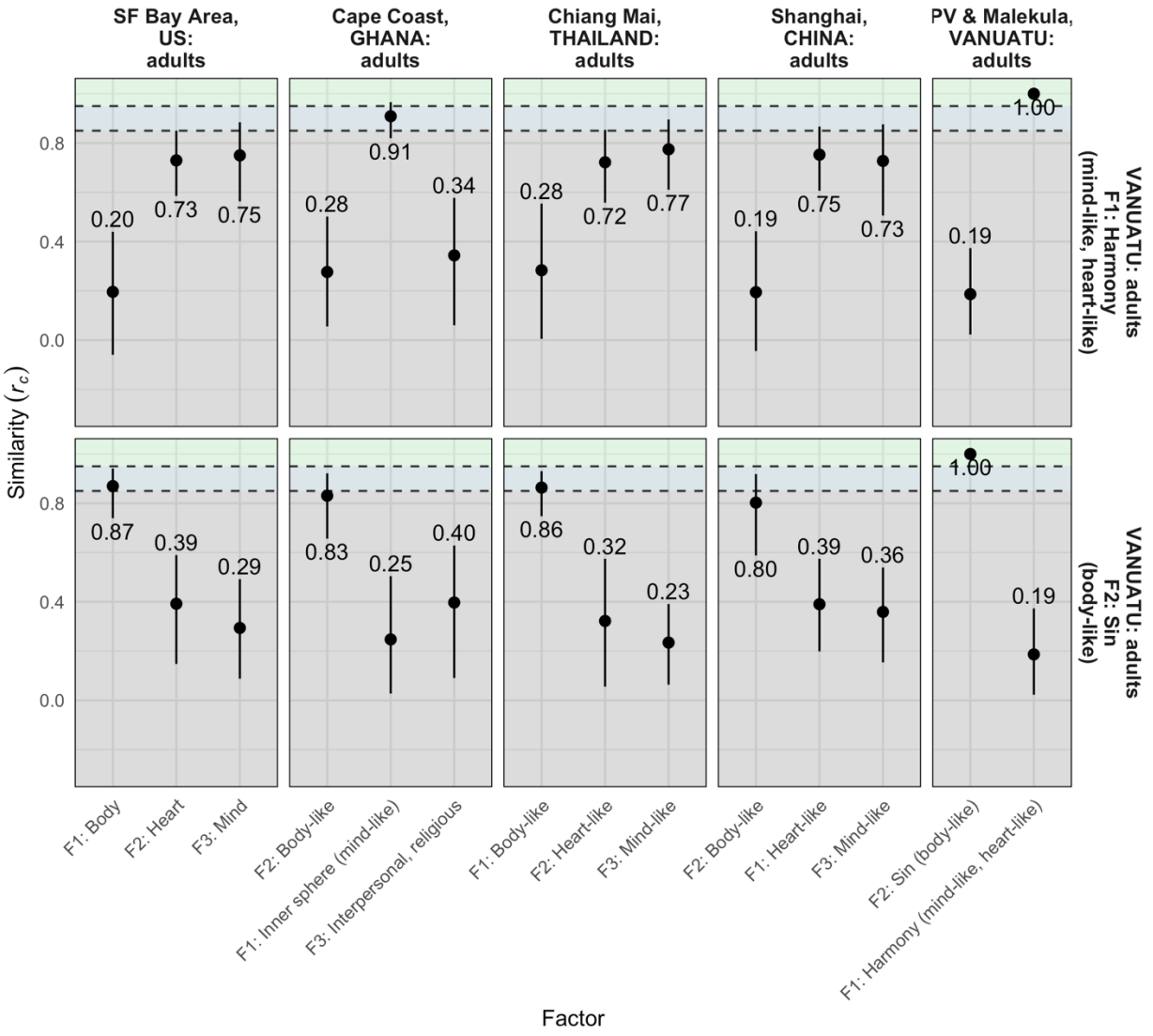
Supplementary Figure 2. Vector cosines (r_c) between each of the factors in the adult EFAs presented in Fig. 1 (main text), and the three factors from the Ghanaian adult sample, which we have described as "inner sphere (mind-like)" (top row), "body-like" (middle row) and "interpersonal/religious" (bottom row). Error bars are 95% bootstrapped confidence intervals. Dotted lines demarcate principled cutoffs for high similarity ($r_c \geq 0.95$, green zone) and moderate similarity ($r_c \geq 0.85$, blue zone).[11] This figure is analogous to Fig. 3 in the main text, using Ghana rather than the US as the base for cultural comparison.



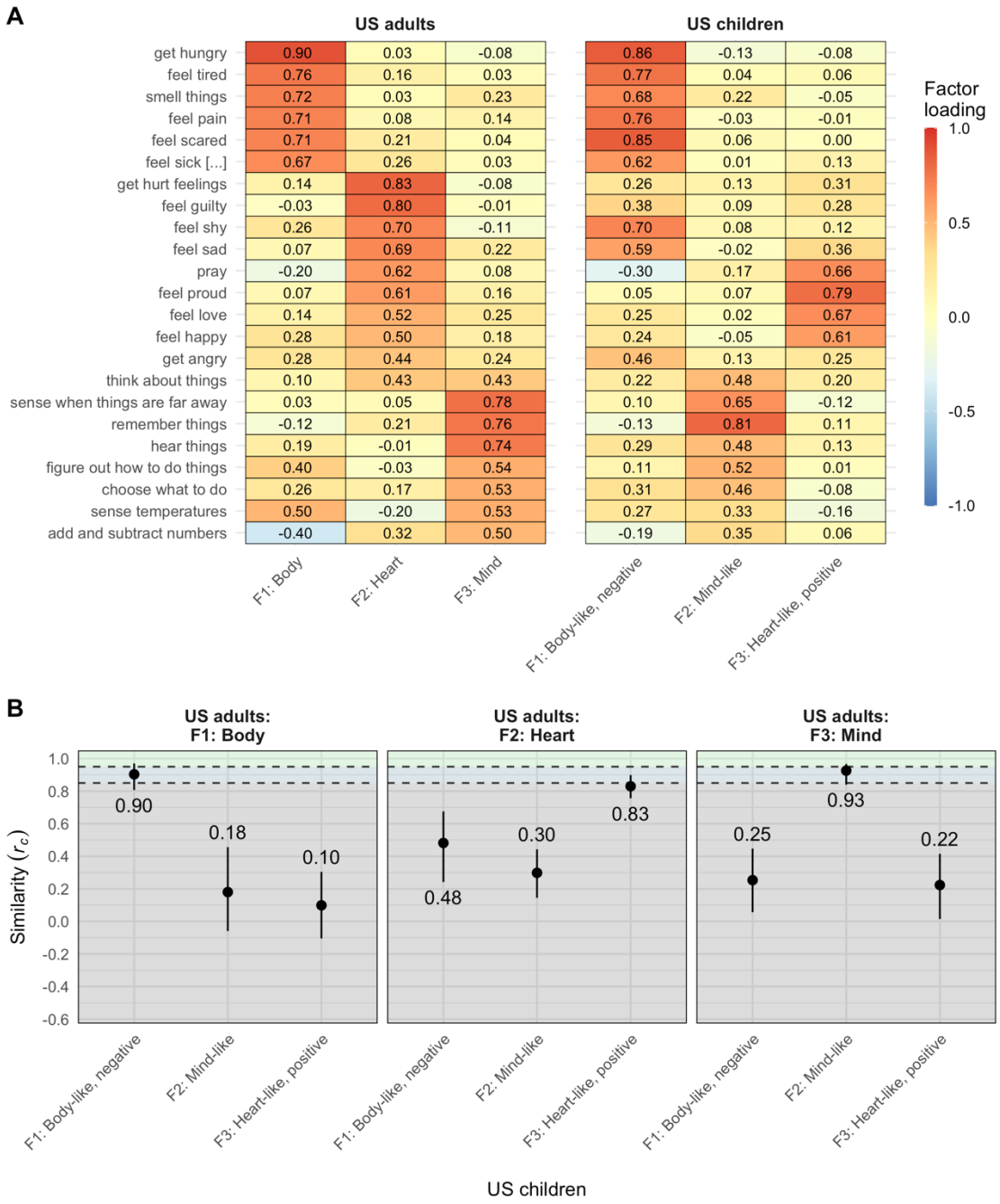
Supplementary Figure 3. Vector cosines (r_c) between each of the factors in the adult EFAs presented in Fig. 1 (main text), and the three factors from the Thai adult sample, which we have described as "body-like" (top row), "heart-like" (middle row) and "mind-like" (bottom row). Error bars are 95% bootstrapped confidence intervals. Dotted lines demarcate principled cutoffs for high similarity ($r_c \geq 0.95$, green zone) and moderate similarity ($r_c \geq 0.85$, blue zone).[11] This figure is analogous to Fig. 3 in the main text, using Thailand rather than the US as the base for cultural comparison.



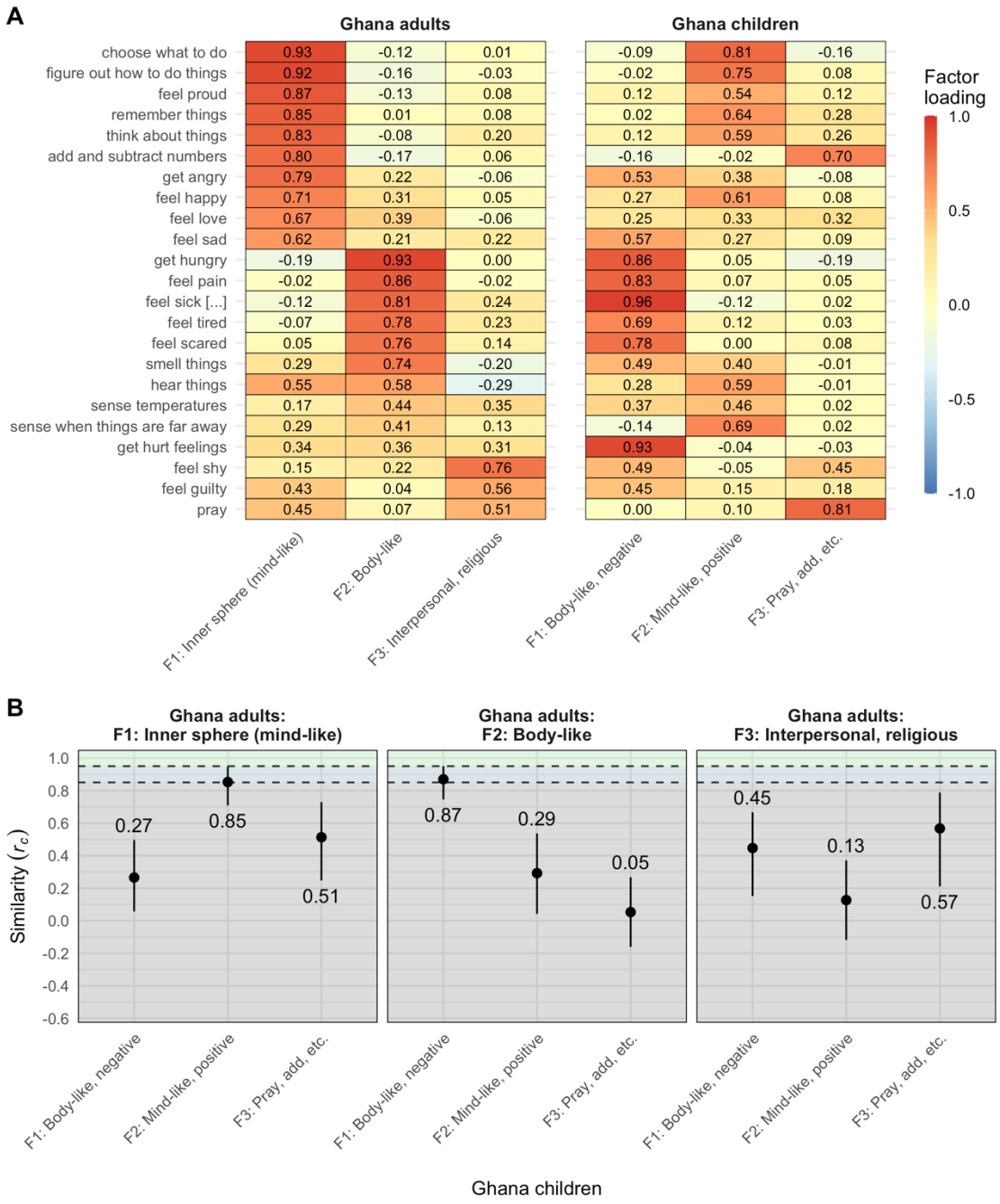
Supplementary Figure 4. Vector cosines (r_c) between each of the factors in the adult EFAs presented in Fig. 1 (main text), and the three factors from the Chinese adult sample, which we have described as "body-like" (top row), "heart-like" (middle row) and "mind-like" (bottom row). Error bars are 95% bootstrapped confidence intervals. Dotted lines demarcate principled cutoffs for high similarity ($r_c \geq 0.95$, green zone) and moderate similarity ($r_c \geq 0.85$, blue zone).[11] This figure is analogous to Fig. 3 in the main text, using China rather than the US as the base for cultural comparison.



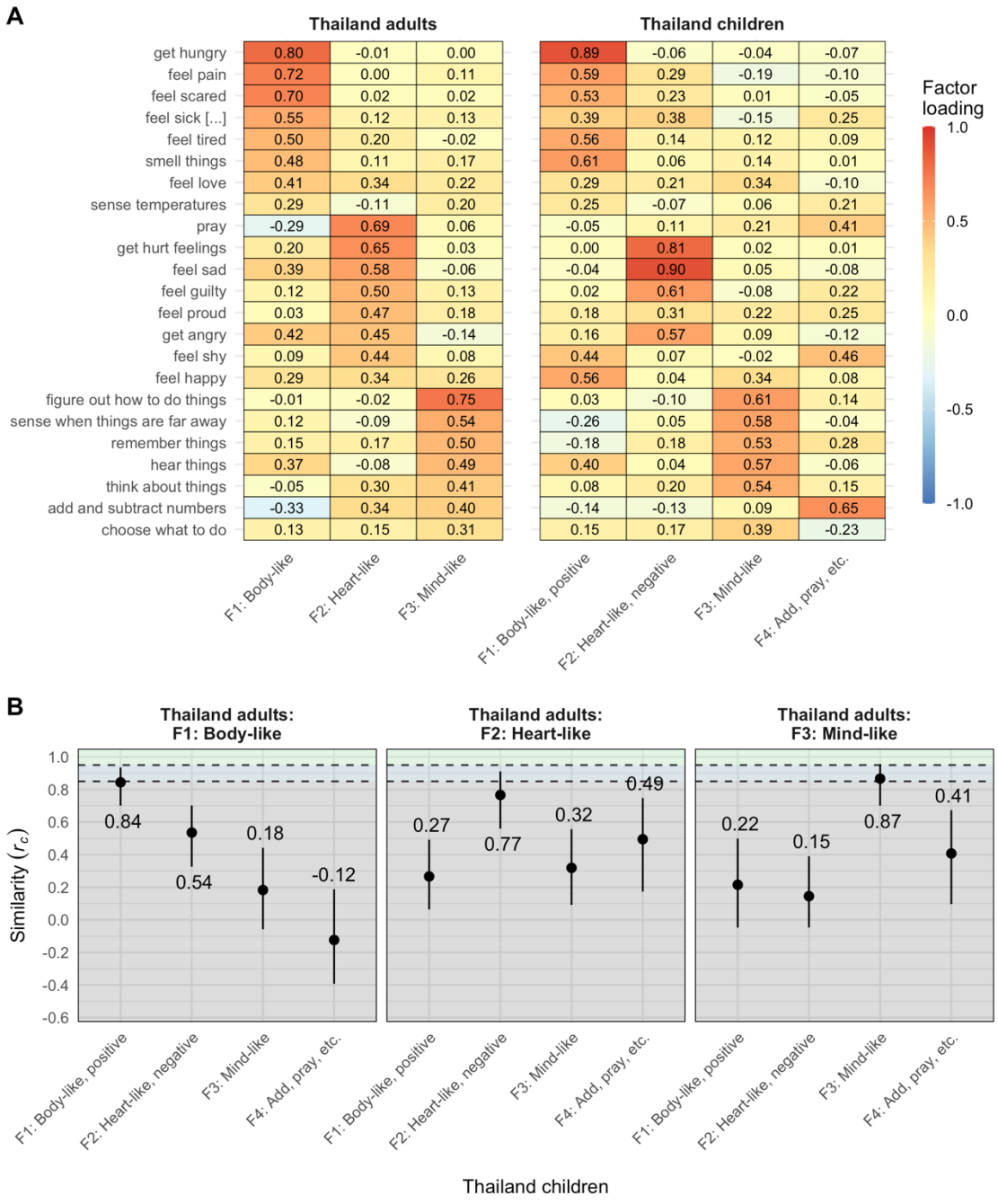
Supplementary Figure 5. Vector cosines (r_c) between each of the factors in the adult EFAs presented in Fig. 1 (main text), and the two factors from the Ni-Vanuatu adult sample, which we have described as "social harmony (mind-lke)" (top row), and "sin (body-like)" (bottom row). Error bars are 95% bootstrapped confidence intervals. Dotted lines demarcate principled cutoffs for high similarity ($r_c \geq 0.95$, green zone) and moderate similarity ($r_c \geq 0.85$, blue zone).[11] This figure is analogous to Fig. 3 in the main text, using Vanuatu rather than the US as the base for cultural comparison.



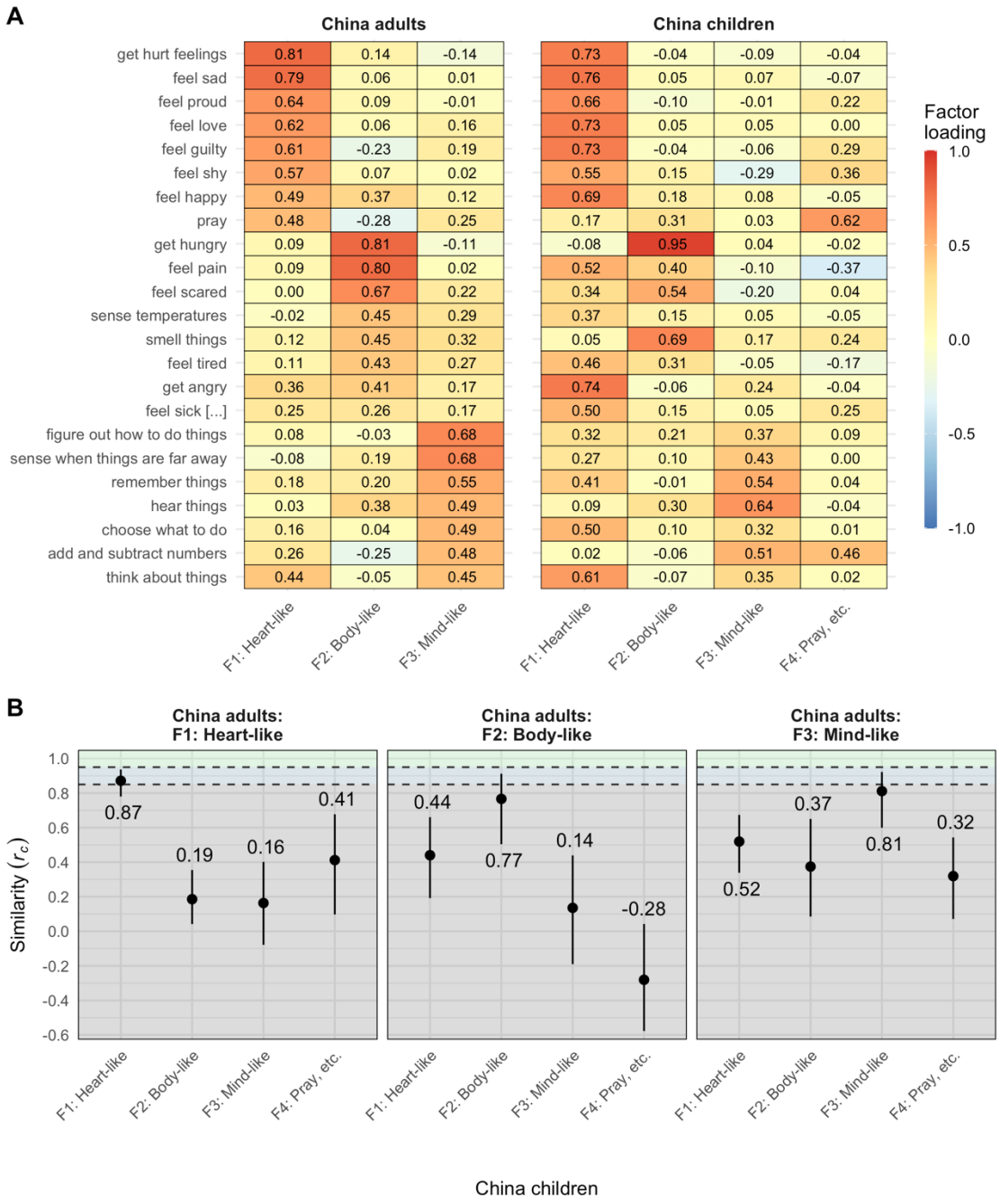
Supplementary Figure 6. Side-by-side comparison of EFA solutions for US adults and children. (A) Factor loadings. Strong positive factor loadings (red) identify emblematic capacities for each factor. Capacities are sorted by their dominant factor in the solution for the adult sample. (B) Cosine similarities between the factors from the child sample (across the horizontal axis) and the factors from the adult sample (panels). Error bars are 95% bootstrapped confidence intervals. Dotted lines demarcate principled cutoffs for high similarity ($r_c \geq 0.95$, green zone) and moderate similarity ($r_c \geq 0.85$, blue zone).[11]



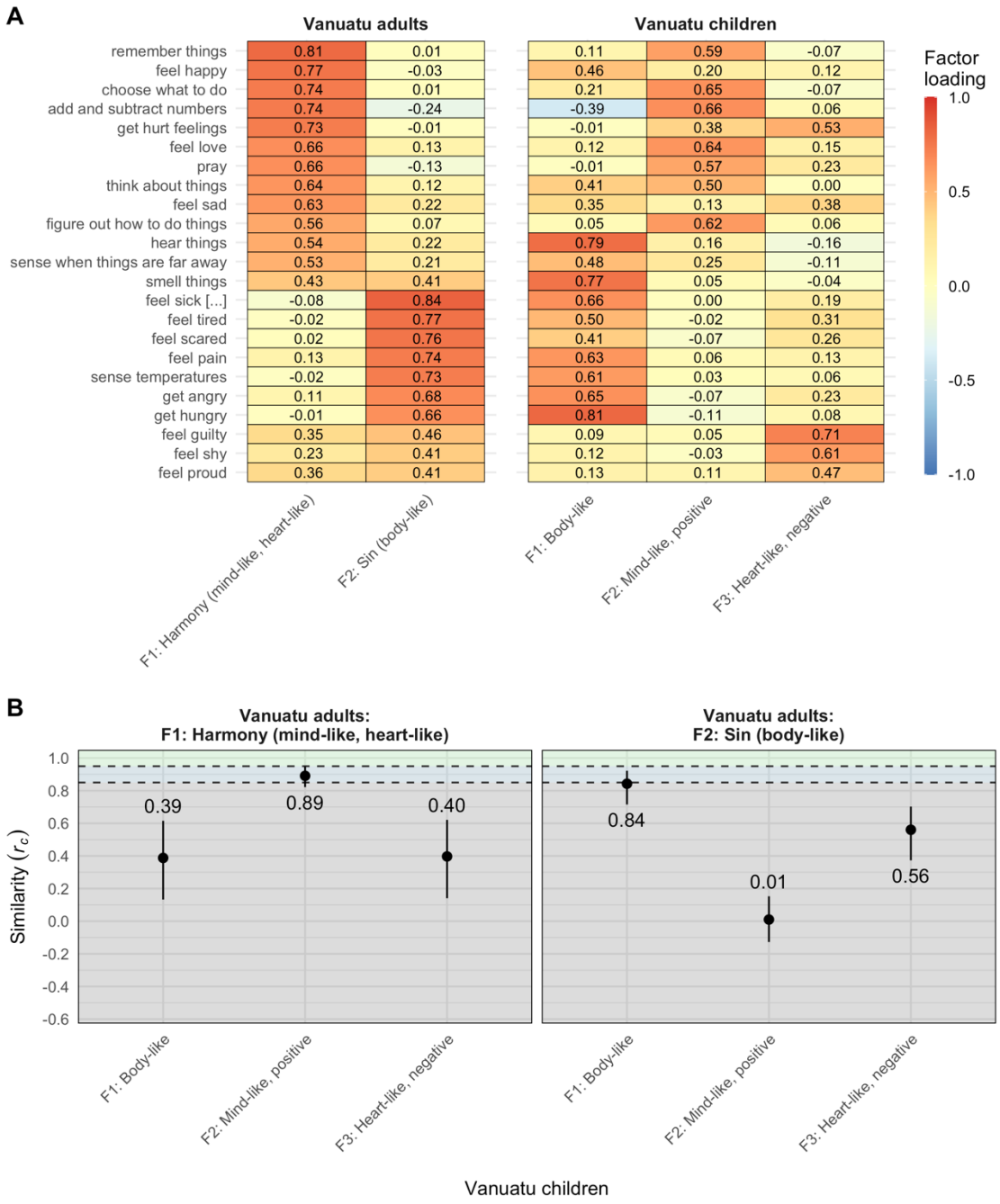
Supplementary Figure 7. Side-by-side comparison of EFA solutions for Ghanaian adults and children. (A) Factor loadings. Strong positive factor loadings (red) identify emblematic capacities for each factor. Capacities are sorted by their dominant factor in the solution for the adult sample. (B) Cosine similarities between the factors from the child sample (across the horizontal axis) and the factors from the adult sample (panels). Error bars are 95% bootstrapped confidence intervals. Dotted lines demarcate principled cutoffs for high similarity ($r_c \geq 0.95$, green zone) and moderate similarity ($r_c \geq 0.85$, blue zone).[11]



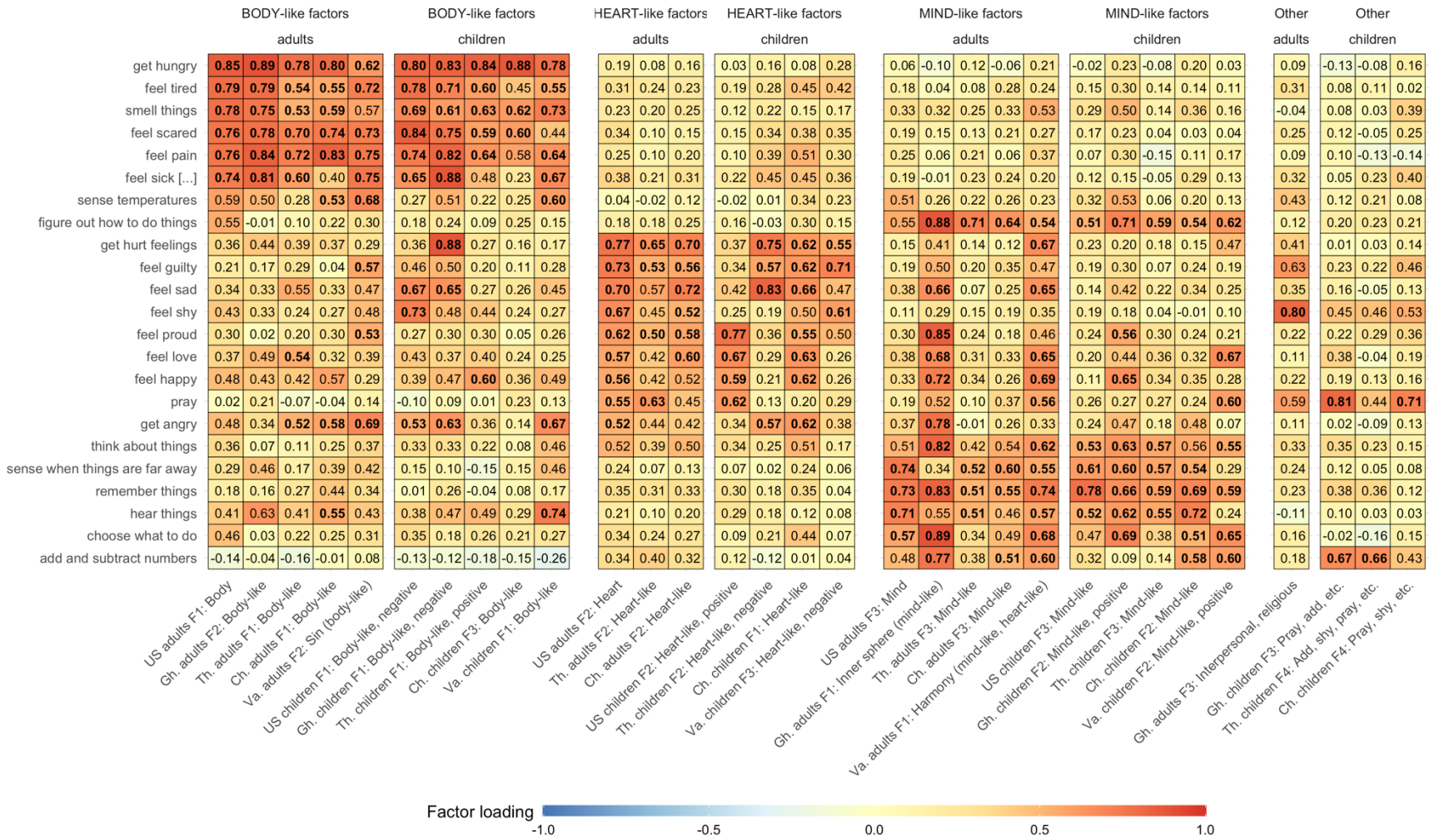
Supplementary Figure 8. Side-by-side comparison of EFA solutions for Thai adults and children. (A) Factor loadings. Strong positive factor loadings (red) identify emblematic capacities for each factor. Capacities are sorted by their dominant factor in the solution for the adult sample. (B) Cosine similarities between the factors from the child sample (across the horizontal axis) and the factors from the adult sample (panels). Error bars are 95% bootstrapped confidence intervals. Dotted lines demarcate principled cutoffs for high similarity ($r_c \geq 0.95$, green zone) and moderate similarity ($r_c \geq 0.85$, blue zone).[11]



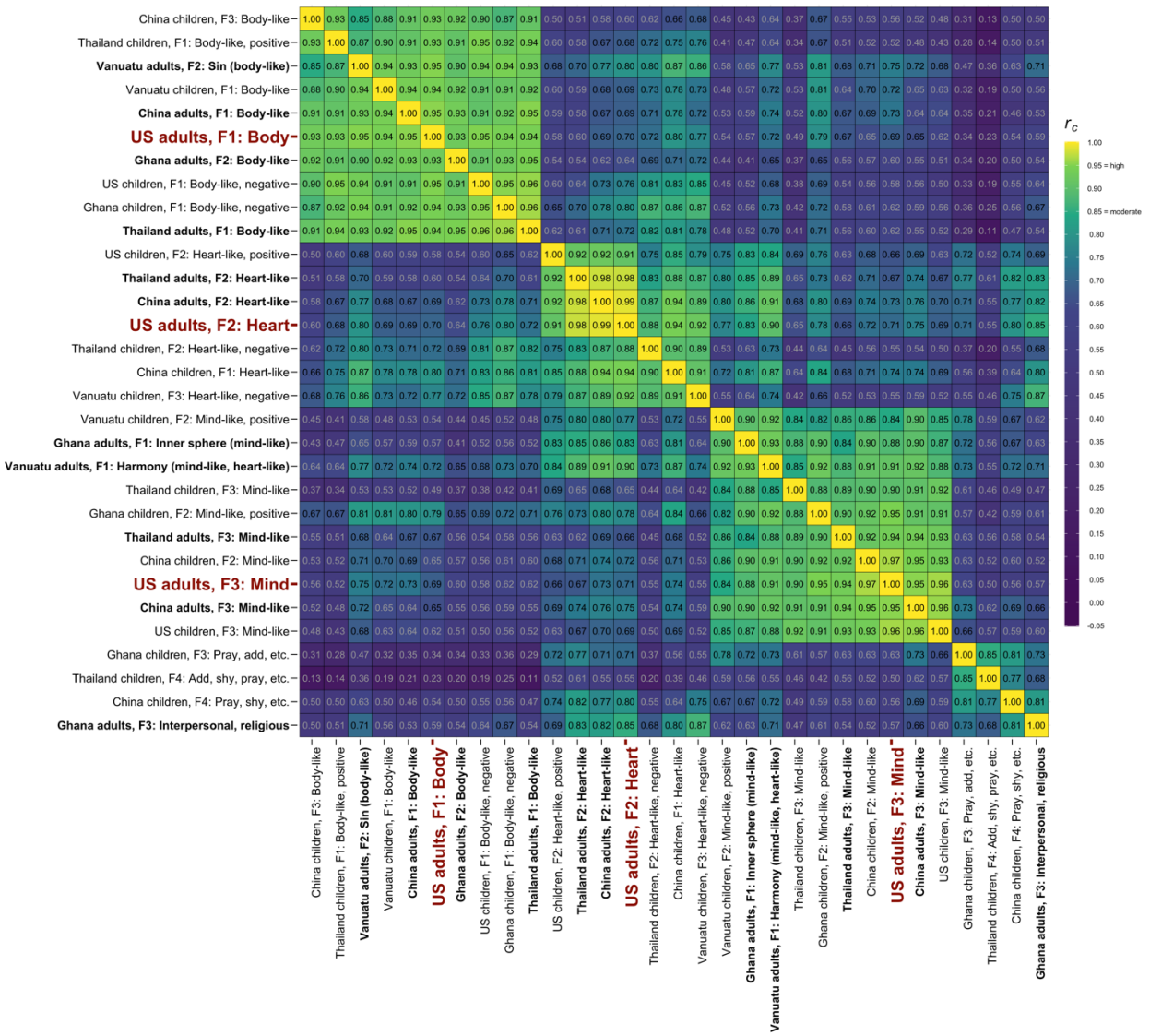
Supplementary Figure 9. Side-by-side comparison of EFA solutions for Chinese adults and children. (A) Factor loadings. Strong positive factor loadings (red) identify emblematic capacities for each factor. Capacities are sorted by their dominant factor in the solution for the adult sample. (B) Cosine similarities between the factors from the child sample (across the horizontal axis) and the factors from the adult sample (panels). Error bars are 95% bootstrapped confidence intervals. Dotted lines demarcate principled cutoffs for high similarity ($r_c \geq 0.95$, green zone) and moderate similarity ($r_c \geq 0.85$, blue zone).[11]



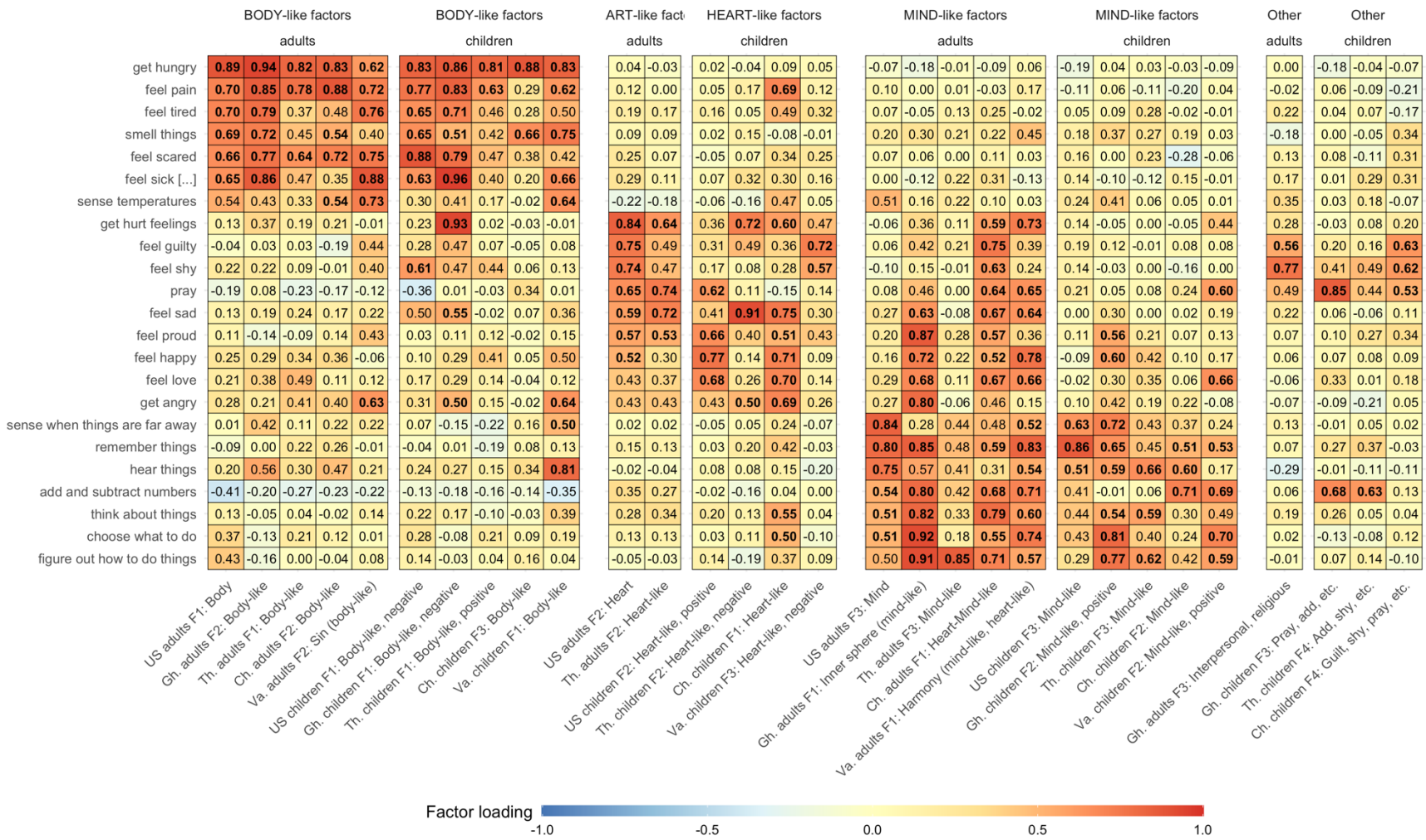
Supplementary Figure 10. Side-by-side comparison of EFA solutions for Ni-Vanuatu adults and children. (A) Factor loadings. Strong positive factor loadings (red) identify emblematic capacities for each factor. Capacities are sorted by their dominant factor in the solution for the adult sample. (B) Cosine similarities between the factors from the child sample (across the horizontal axis) and the factors from the adult sample (panels). Error bars are 95% bootstrapped confidence intervals. Dotted lines demarcate principled cutoffs for high similarity ($r_c \geq 0.95$, green zone) and moderate similarity ($r_c \geq 0.85$, blue zone).[11]



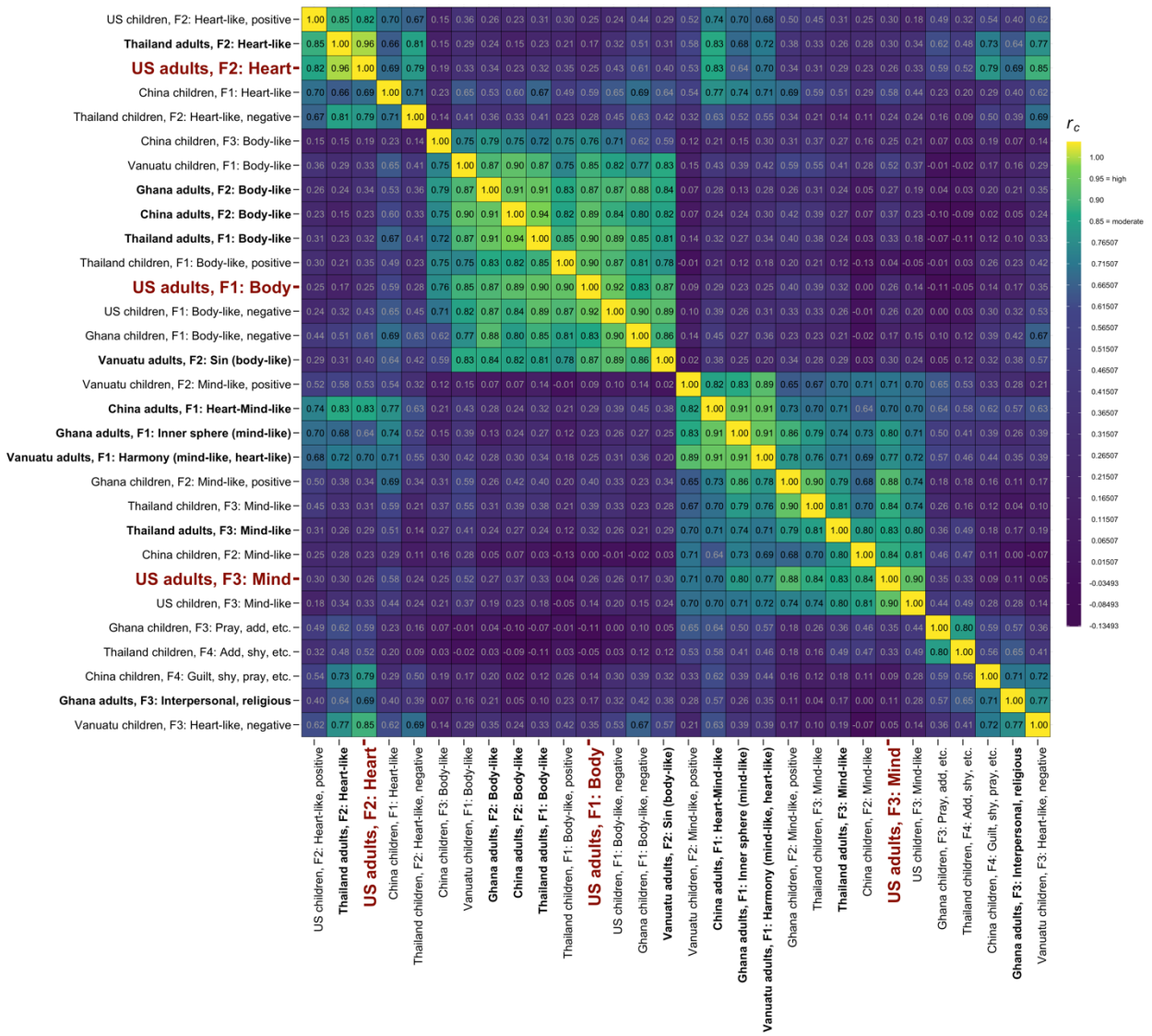
Supplementary Figure 11. Analogue to Fig. 1 (main text) for EFAs using orthogonal ("varimax") rotations rather than oblique transformations. Full results for this analysis are available at https://github.com/kgweisman/mental-life-culture-development.



Supplementary Figure 12. Analogue to Fig. 2 (main text) for EFAs using orthogonal ("varimax") rotations rather than oblique transformations. Full results for this analysis are available at https://github.com/kgweisman/mental-life-culture-development.

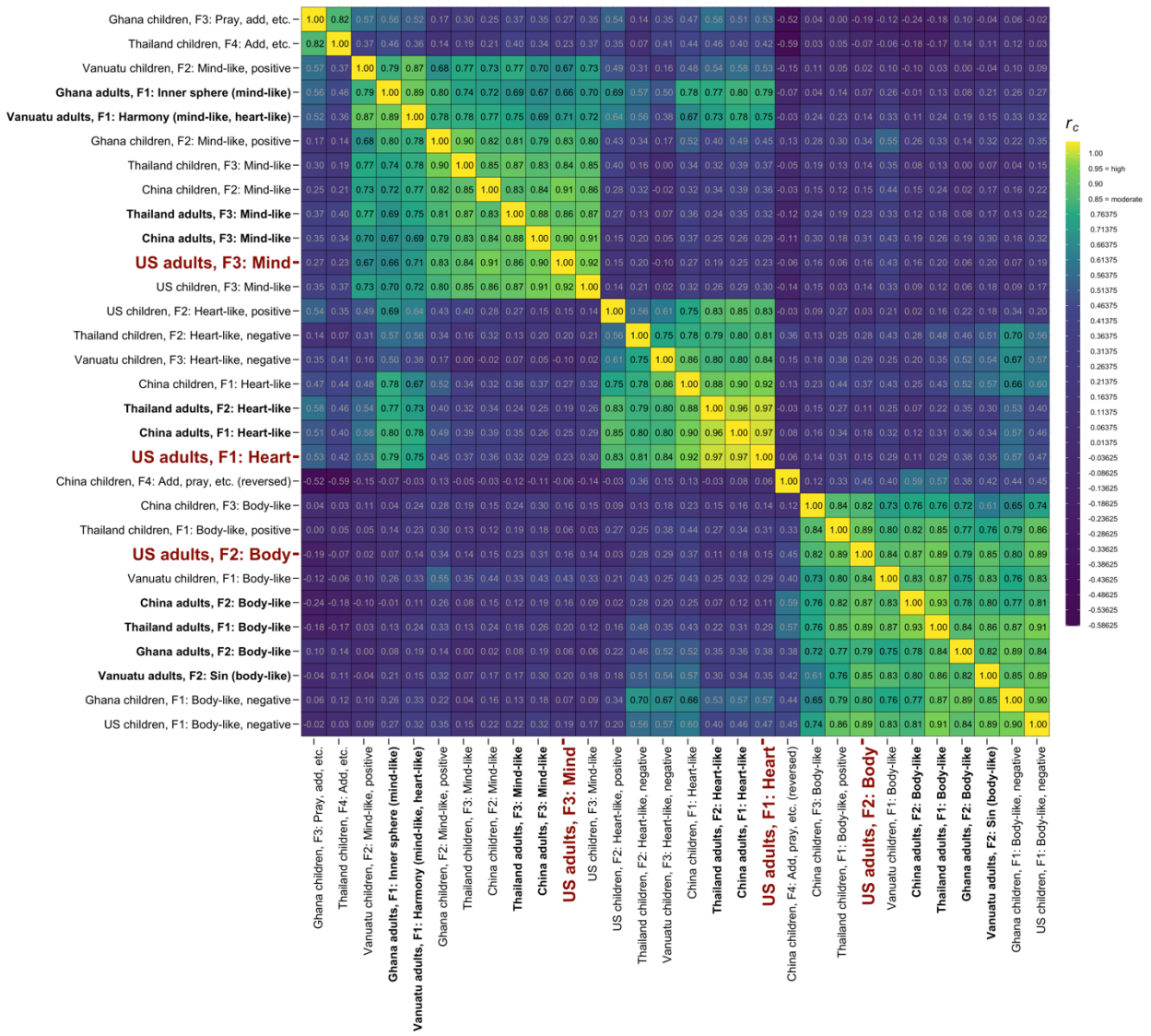


Supplementary Figure 13. Analogue to Fig. 1 (main text) for EFAs recoding responses of "kinda" as equivalent to "yes" (i.e., coded as 1) and using tetrachoric rather than Pearson correlations. Full results for this analysis are available at https://github.com/kgweisman/mental-life-culture-development.

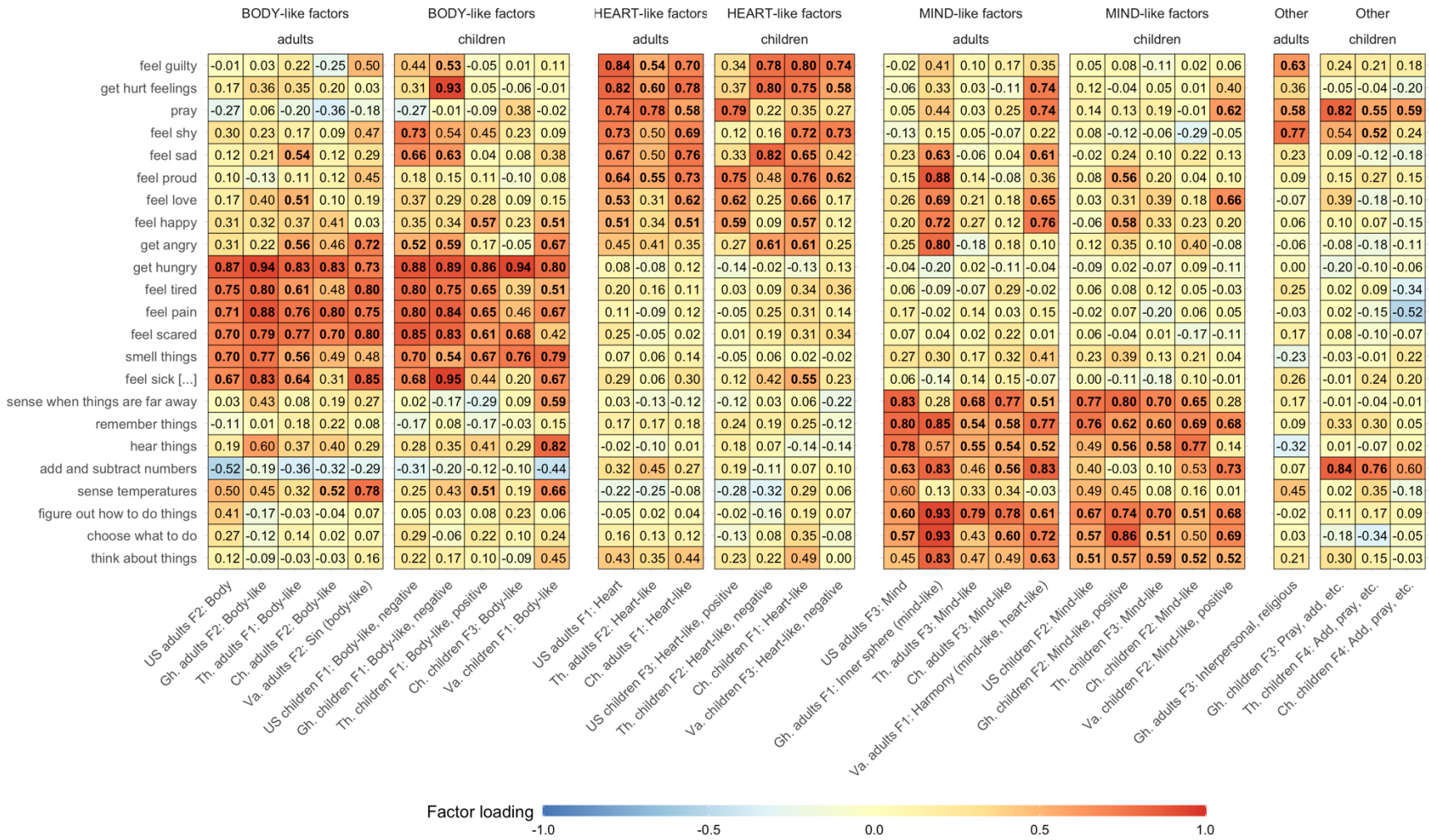


Supplementary Figure 14. Analogue to Fig. 2 (main text) for EFAs recoding responses of "kinda" as equivalent to "yes" (i.e., coded as 1) and using tetrachoric rather than Pearson correlations. Full results for this analysis are available at https://github.com/kgweisman/mental-life-culture-development.

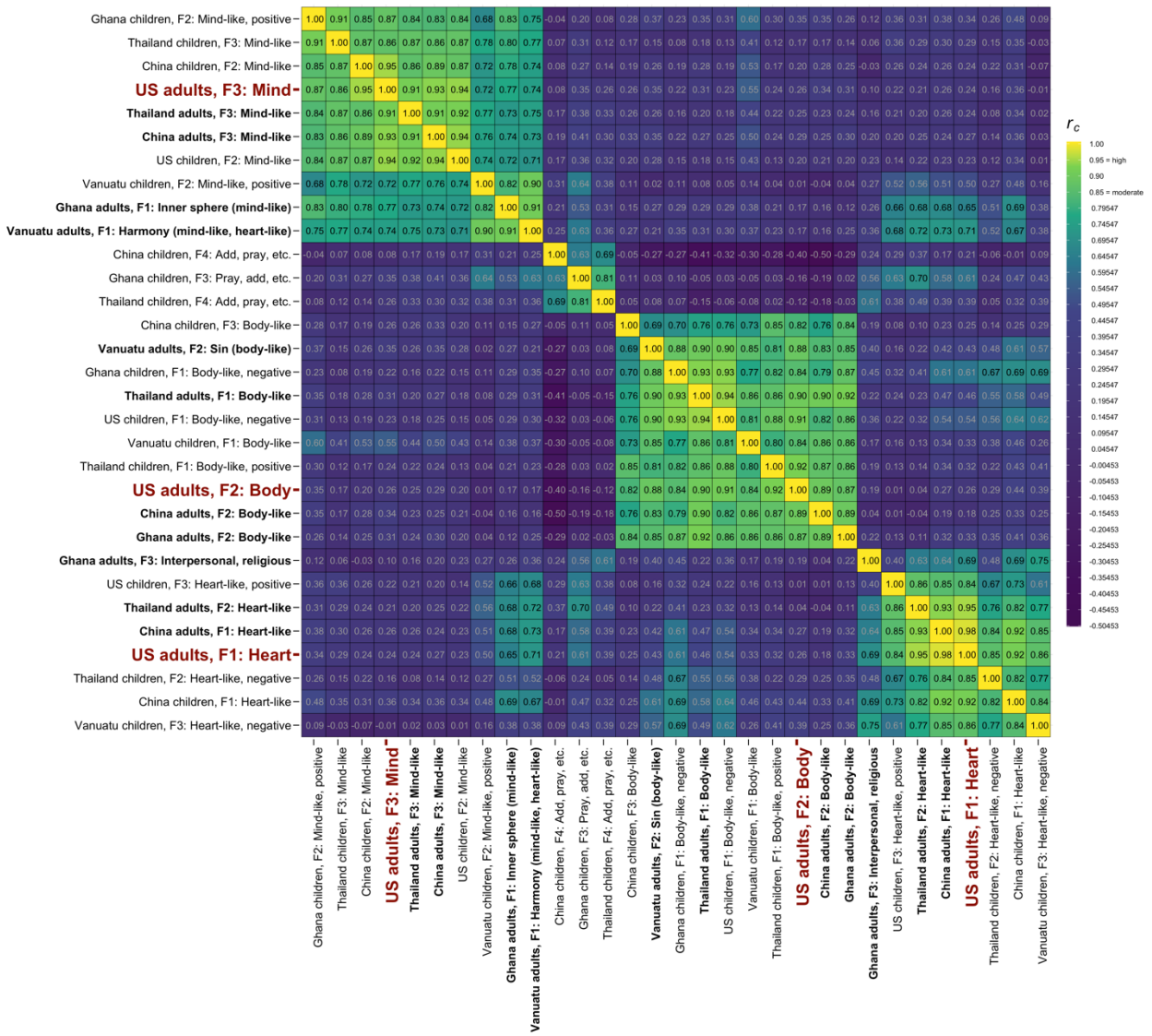
Supplementary Figure 15. Analogue to Fig. 1 (main text) for EFAs dropping participants who gave the same response on every trial. Full results for this analysis are available at https://github.com/kgweisman/mental-life-culture-development.



Supplementary Figure 16. Analogue to Fig. 2 (main text) for EFAs dropping participants who gave the same response on every trial. Full results for this analysis are available at https://github.com/kgweisman/mental-life-culture-development.



Supplementary Figure 17. Analogue to Fig. 1 (main text) for principal components analyses (PCAs) rather than EFAs. Full results for this analysis are available at https://github.com/kgweisman/mental-life-culture-development.



Supplementary Figure 18. Analogue to Fig. 2 (main text) for principal components analyses (PCAs) rather than EFAs. Full results for this analysis are available at https://github.com/kgweisman/mental-life-culture-development.

Supplementary Table 1.

Descriptions of the target entities used in the current studies. Each participant assessed one target entity. All images are available for viewing in the OSF repository associated with this project.

Label		Description	Source	Notes
US (English): Ghana (Fante): Thailand (Thai): China (Mandarin) : Vanuatu (Bislama):	*children* *mboframa* เด็ก 小孩 *ol pikinini*	A school-aged girl with medium-dark skin and dark, coarsely textured hair, standing outdoors	https://stock.adobe.com/images/child/4164957?prev_url=detail	The ethnicity/race of the child depicted in this picture was selected because it did not closely resemble the ethnic/racial majority in any of our five field sites.
US (English): Ghana (Fante): Thailand (Thai): China (Mandarin) : Vanuatu (Bislama):	*dogs* *dodom* หมา 狗 *ol dok*	A black and tan, mixed-breed dog standing on dirt against a blue sky	https://dailynewsdig.com/21-top-dog-breeds-you-need-to-0wn/	
US (English): Ghana (Fante): Thailand (Thai): China (Mandarin) : Vanuatu (Bislama):	*mice* *nkura* หนู 老鼠 *rat*	A brown rat standing on a log	https://www.shutterstock.com/image-photo/brown-rat-83480653	This image was labeled "mice" in the US, Ghana, and China, but "rats" in Thailand and Vanuatu, in order to be roughly equally familiar and neutrally-valenced across sites.
US (English): Ghana (Fante): Thailand (Thai): China (Mandarin) : Vanuatu (Bislama):	*chickens* *akoko* ไก่ 鸡 *ol jiken*	A brown, female chicken standing on dirt against a background of green grass	https://commons.wikimedia.org/wiki/File:Poltava_chicken_breed_female.jpg	
US (English): Ghana (Fante): Thailand (Thai): China (Mandarin) : Vanuatu (Bislama):	*beetles* *beetles* ด้วง – *bitel*	A small, shiny, black beetle on a green leaf	https://torange.biz/small-black-beetle-33872	"Crickets" were substituted for "beetles" in China, because cultural experts were concerned that beetles would be considered less familiar and more disgusting or scary in Shanghai than in other sites. Due to experimenter error, 2 adults and 6 children in Vanuatu answered questions about crickets rather than beetles.
US (English): Ghana (Fante): Thailand (Thai): China (Mandarin) : Vanuatu (Bislama):	– – – 蟋蟀 *kriket*	A black and brown cricket on a green leaf	https://commons.wikimedia.org/wiki/File:Southeastern_field_cricket.JPG	
US (English): Ghana (Fante): Thailand (Thai): China (Mandarin) : Vanuatu (Bislama):	*flowers* *flowers* ดอกไม้ 花 *ol flaoa*	A small cluster of tropical pink flowers surrounded by branches	https://commons.wikimedia.org/wiki/File:HK_CWB_Victoria_Park_Chinese_New_Year	

			_Flower_Fair_%E6%A1%83%E8%8A%B1_F12.jpg	
US (English): Ghana (Fante): Thailand (Thai): China (Mandarin) : Vanuatu (Bislama):	*rocks* *mboba* ก้อนหิน 石头 *ol ston*	A large, gray, rough-textured rock surrounded by green grass	https://commons.wikimedia.org/wiki/File:Cuff_Hill_logan_stone_2.JPG	
US (English): Ghana (Fante): Thailand (Thai): China (Mandarin) : Vanuatu (Bislama):	*cell phones* *phone* มือถือ 手机 *ol mobael fon*	A black LG Nexus 4 Android smartphone with colorful images on a touchscreen, resting on a wooden table	https://wallpapersafari.com/w/eOfgTS	This image was validated as familiar among ordinary adults in all field sites, including the fields with the fewest resources (Ghana and Vanuatu), prior to data collection.
US (English): Ghana (Fante): Thailand (Thai): China (Mandarin) : Vanuatu (Bislama):	*ghosts* *saman* ผี 鬼 *ol gos*	A nighttime outdoor scene featuring wisps of white fog or mist in a vaguely humanoid shape	https://www.deviantart.com/faceless117/art/Waltz-of-the-Night-205553987	
US (English): Ghana (Fante): Thailand (Thai): China (Mandarin) : Vanuatu (Bislama):	*God* *Nyankopon or Nyame* พระเจ้า 狗 *God*	A golden sun with rays extending in all direction against orange clouds at sunrise or sunset	https://stock.adobe.com/images/soleil-dans-ciel-rouge/3374544?prev_url=detail	This image was intended to be equally evocative of the divine or spiritual realm in all five sites, regardless of predominant religion (e.g., Christianity, Buddhism).

Supplementary Table 2.

The capacities used in the current studies, as presented in English (US), Fante (Ghana), Thai (Thailand), Mandarin Chinese (China), and Bislama (Vanuatu). Each participant answered questions about all 23 capacities, which took the form, "Do [targets]…?" (e.g., "Do beetles feel love?"; "Does God get hungry?"). If participants asked for clarification, or indicated uncertainty (e.g., by saying "I don't know" or by not responding), data collectors provided the optional clarification included here. This table presents items in one of the six preset random orders in which participants were asked these questions.

Notes:

1. In Ghana and Vanuatu, *feel proud* was likely interpreted as a negative state—e.g., "He is a prideful person"—rather than as a positive reflection on a relationship or personal achievement—e.g., "She is proud of her daughter," "He is proud of his good work."
2. In Vanuatu, the translation for *feel guilty* (Bislama: *save sem*) was likely closer to the English phrase "feel ashamed" (its root) than to "feel guilty," although both "guilty" and "ashamed" would be translated as *sem*.

Item text		**Optional clarification**
US:	*Do ___**figure out how to do things**?*	*Like when you learn a new fact or understand something new*
Gh.:	*Ana ___ tum hu kwan a wɔfa do yɛ adze a?*	*Tse dɛ sɛ esua adze fofor anaa ɛtse adze fofor ase a*
Th.:	__เข้าใจวิธีทำสิ่งต่างๆบ้างรึเปล่า	เวลาที่เรียนอะไรใหม่ๆ หรือทำความเข้าใจอะไรใหม่ๆ
Ch.:	___能想出怎么做一件事吗 ？	就像当你学到或理解了一个新东西
Va.:	*Wan ___ i save wokemaot hao blong mekem sam samting?*	*Olsem taem yu lanem o andastandem wan niu samting*
US:	*Do ____ **add and subtract numbers**?*	*Like when you add two numbers together or subtract one number from another*
Gh.:	*Ana ___ tum ka numbers bom na ɔtsew number so fi number mu a?*	*Tse dɛ sɛ ɛka numbers ebien bomu a anaa ɛtsew number kor fi number kor mu*
Th.:	__บวกลบเลขรึเปล่า	เช่น คิดเลขหนึ่งบวกหนึ่ง หนึ่งลบหนึ่ง
Ch.:	___会算数吗 ？（加减）	比如你把两个数字加在一起或者从 一个数中减去另一个
Va.:	*Wan ___ i save ademap ol namba?*	*Olsem taem yu plasem tu namba: olsem tu plas tu emi fo*
US:	*Do ___**feel love**?*	*Like when you really like somebody and care about them a lot*
Gh.:	*Ana ___ tse ɔdo a?*	*Tse dɛ sɛ ɛpɛ obi n'asem na ɛwɔ tsima bebriee dze ma no a*
Th.:	__มีความรักรึเปล่า	ชอบใครซักคนแล้วเป็นห่วงเค้ามากๆ
Ch.:	___会感受到爱吗 ？	比如当你非常喜欢某个人，并对他 非常关心
Va.:	*Wan ___ i save filim lav?*	*Olsem taem we laekem wan man tumas mo yu kea abaotem hem*
US:	*Do ___**get hungry**?*	*Like when you feel like you need to eat something*
Gh.:	*Ana ___ tse ɛkɔm a?*	*Tse dɛ sɛ ɛtse dɛ ɔwɔ dɛ edzi biribi a*
Th.:	__หิวบ้างรึเปล่า	รู้สึกว่าอยากกินอะไรซักอย่าง
Ch.:	___会饿吗 ？	比如当你觉得自己需要吃点东西
Va.:	*Wan ___ i save hangre?*	*Olsem taem yu harem se yu mas kakae wan samting*

US:	*Do ___ **smell things**?*	*Like when you can tell if something smells sweet, or rotten*
Gh.:	*Ana ___ hua nka a?*	*Tse dɛ sɛ ɛtse dɛ biribi bɔɔn anaa ɔyɛ huam*
Th.:	___ดมกลิ่นรึเปล่า	บอกได้ว่ากลิ่นนั้นหอมหรือเหม็น
Ch.:	___会闻到气味吗 ？	比如你说你会闻出来一个东西是很 香或者很臭
Va.:	*Wan ___ i save smelem ol samting?*	*Olsem sipos yu save talem se wan samting i smel naes o nogud*
US:	*Do ___ **sense when things are far away**?*	*Like when you see that something is far away from you*
Gh.:	*Ana ___ tum hu sɛ ndzemba wɔ ekyir a?*	*Tse dɛ sɛ ehu dɛ biribi wɔ ekyir a*
Th.:	___รับรู้สิ่งที่อยู่ไกลๆรึเปล่า	มองเห็นอะไรที่อยู่ไกลๆ
Ch.:	___会感觉到一个东西很远吗 ？	比如你看的到一个东西离你很远
Va.:	*Wan ___ i save luksave o haremsave taem we wan samting I stap longwe long hem?*	*Olsem taem yu luk wan samting we i stap longwe long yu*
US:	*Do ___**feel happy**?*	*Like when you feel good*
Gh.:	*Ana ___ n'enyiwa gye a?*	*Tse dɛ sɛ enyia atsenka papa a*
Th.:	___รู้สึกมีความสุขบ้างรึเปล่า	รู้สึกดี
Ch.:	___会感觉到开心吗 ？	比如你很高兴的时候
Va.:	*Wan___ i save harem i hapi?*	*Olsem taem yu glad mo yu harem gud*
US:	*Do ___ **get hurt feelings**?*	*Like when you feel bad because somebody insulted you or said something mean about you*
Gh.:	*Ana ___ nyia ayawdzi a?*	*Tse dɛ sɛ ɔyɛ wɔ yaw dɛ obi hyɛɛ wo ahorba anaa ɔyɛɛ biribi bɔn dze tsia wɔ*
Th.:	___รู้สึกเสียใจบ้างรึเปล่า	รู้สึกแย่เวลามีคนมาดูถูกหรือพูดไม่ดีด้วย
Ch.:	___会心里感觉到被伤害了吗 ？	比如有人骂了你或者说了你不好，让你觉得难过
Va.:	*Wan ___ i save harem nogud taem wan man i jikim hem?*	*Olsem taem yu harem nogud from wan man i tok nogud long yu o i talem wan rabis samting abaot yu*
US:	*Do ___**get angry**?*	*Like when you feel mad*
Gh.:	*Ana ___ nyia ebofu a?*	*Tse dɛ sɛ wo bofu a*
Th.:	___โกรธบ้างรึเปล่า	รู้สึกโมโห
Ch.:	___会生气吗 ？	比如你很愤怒的时候
Va.:	*Wan___ i save kros?*	*Olsem taem yu kros*
US:	*Do ___**feel sick, like when you feel like you might vomit**?*	*[No additional clarification provided]*
Gh.:	*Ana ___ yar a, tse dɛ sɛ ɛpɛ dɛ ɛfe a?*	
Th.:	___รู้สึกไม่สบายบ้างรึเปล่า เช่น อยากอ้วก	
Ch.:	___会感觉恶心，想吐吗 ？	
Va.:	*Wan___ i save harem se hem i sik, olsem taem yu harem se bae yu traot?*	
US:	*Do ___**feel pain**?*	*Like when something hurts you*
Gh.:	*Ana ___ tse yaw a?*	*Tse dɛ sɛ adze yɛ wo yaw a*
Th.:	___รู้สึกเจ็บรึเปล่า	รู้สึกเวลามีใครหรืออะไรมาทำให้เจ็บ
Ch.:	___会感觉到疼痛吗 ？	比如某个东西让你疼痛
Va.:	*Wan ___ i save harem se wan pat blong bodi blong hem i soa?*	*Olsem taem yu kasem kil long wan pat blong bodi blong yu*
US:	*Do ___ **sense temperatures**?*	*Like when you can tell if something is warm or cool*

Gh.:	*Ana ___ tum hu sɛ adze yɛ hyew ana ɔyɛ wiin a?*	*Tse dɛ sɛ etum kyere dɛ biribi yɛ hyew anaa ɔyɛ wiin*
Th.:	___รับรู้อุณหภูมิรึเปล่า	บอกได้ว่าร้อนหรือเย็น
Ch.:	___会感觉到温度吗 ？	比如你感觉得出来一个东西是热的 还是冷的
Va.:	*Wan ___ i save filim hot o kolkol?*	*olsem taem yu save talem se wan samting i wom o i kolkol*
US:	*Do ___**feel sad**?*	*Like when you feel bad or unhappy*
Gh.:	*Ana ___ ne werɛ how a?*	*Tse dɛ sɛ w'enyiwa nngye a*
Th.:	___รู้สึกเศร้าบ้างรึเปล่า	รู้สึกแย่หรือไม่มีความสุข
Ch.:	___会感觉伤心吗?	比如你感觉难过或者不开心
Va.:	*Wan ___ i save harem i no glad?*	*Olsem taem yu no glad o yu harem nogud*
US:	*Do ___**feel tired**?*	*Like when you feel sleepy*
Gh.:	*Ana ___ tse berɛ a?*	*Tse dɛ sɛ ɛpɛ dɛ ɛda a/tse dɛ sɛ w'enyiwa kom a*
Th.:	___รู้สึกเหนื่อยบ้างรึเปล่า	ง่วง อยากนอน
Ch.:	___会感觉累吗 ？	比如你感到很困的时候
Va.:	*Wan ___ i save taed?*	*Olsem taem yu filim silip*
US:	*Do ___**feel proud**?*	*Like when you feel really good about something you did*
Gh.:	*Ana ___ yɛ ahomado a?* [1]	*Tse dɛ sɛ w'enyiwa gye wɔ adze bi a ɛyɛ ho a*
Th.:	___รู้สึกภูมิใจบ้างรึเปล่า	รู้สึกดีมากหลังจากได้ทำอะไรลงไป
Ch.:	___会感觉自豪吗 ？	比如对自己做过的某件事觉得做的非常好
Va.:	*Wan___ i save praod?* [1]	*Olsem taem yu harem yu glad abaot wan samting we yu mekem*
US:	*Do ___**pray**?*	*Like when you pray*
Gh.:	*Ana ___ bɔ mpae a?*	*Tse dɛ sɛ ɛbɔ mpae*
Th.:	___อธิษฐานรึเปล่า	สวดมนต์ อธิษฐาน ขอพร
Ch.:	___会祈祷或祷告吗 ？	比如在你祈祷的时候
Va.:	*Wan ___ i save pre?*	*Olsem taem yu pre long God*
US:	*Do ___**feel shy**?*	*Like when you feel quiet or embarrassed*
Gh.:	*Ana ___fer adze a?*	*Tse dɛ sɛ ɛyɛ koom/dzii anaa w'eyim guase a*
Th.:	___รู้สึกเขินบ้างรึเปล่า	ไม่กล้าพูด อาย
Ch.:	___会感到害羞吗 ？	比如你感觉不好意思
Va.:	*Wan ___ i save fraet blong toktok?*	*Olsem taem yu stap kwaet o yu sem*
US:	*Do ___**feel scared**?*	*Like when you feel afraid*
Gh.:	*Ana ___ soro adze a?*	*Tse dɛ sɛ esoro adze a*
Th.:	___มีความรู้สึกกลัวบ้างรึเปล่า	เช่น กลัวผี กลัวโดนตี
Ch.:	___会感觉到害怕吗 ？	比如你恐惧的时候
Va.:	*Wan ___ i save fraet?*	*Olsem taem yu fraet*
US:	*Do ___**feel guilty**?*	*Like when you feel bad because you did something mean*
Gh.:	*Ana ___ tum dzi fɔ a?*	*Tse dɛ sɛ ɛyɛ adze bɔn na enyia atsenka bɔn a*
Th.:	___รู้สึกผิดบ้างรึเปล่า	รู้สึกแย่เวลาทำอะไรไม่ดีลงไป
Ch.:	___会感觉内疚吗？	比如你知道自己做了不对的事情感觉不好

Va.:	*Wan ___ i save sem?* [2]	*Olsem we yu filim taem we yu mekem wan samting we i nogud afta oli faenemaot yu*
US:	*Do ___* ***choose what to do****?*	*Like when you decide between different things*
Gh.:	*Ana ___tum si gyinayɛ a?*	*Tse dɛ sɛ isi gyinayɛ wɔ nzemba ahorow ho a*
Th.:	___เลือกว่าตัวเองจะทำอะไรบ้างรึเปล่า	ตัดสินใจเวลามีตัวเลือกหลายๆอย่าง
Ch.:	___能选择自己要做什么吗 ？	比如你在几个不同的事情中做出选择
Va.:	*Wan___ i save jusum wanem blong mekem?*	*Olsem taem we yu disaed blong jus bitwin ol difren samting*
US:	*Do ___* ***think about things****?*	*Like when you have a thought or an idea about something*
Gh.:	*Ana ___ dwen nzemba ho a?*	*Tse dɛ sɛ enyia adwen anaa adwen pɔw wɔ biribi ho*
Th.:	___คิดเกี่ยวกับสิ่งต่างๆบ้างรึเปล่า	ใช้ความคิดหรือปิ๊งไอเดีย
Ch.:	___会思考吗 ？	比如当你对某件事有一个想法或一 个主意
Va.:	*Wan ___ i save tingting long sam samting?*	*Olsem taem yu gat wan tingting*
US:	*Do ___* ***hear things****?*	*Like when you hear a noise*
Gh.:	*Ana ___ tse asem a?*	*Tse dɛ sɛ ɛtse dede a*
Th.:	___ได้ยินเสียงรึเปล่า	ได้ยินเสียงดัง
Ch.:	___能听见声音吗 ？	比如当你听到声音的时候
Va.:	*Wan ___ i save harem ol nois?*	*Olsem taem yu harem wan nois blong wan samting long sorae blong yu*
US:	*Do ___* ***remember things****?*	*Like when you remember something that happened before*
Gh.:	*Ana ___ kae ndzemba a?*	*Tse dɛ sɛ ɛkae biribi a woesi da a*
Th.:	___จดจำสิ่งต่างๆรึเปล่า	จำสิ่งที่เกิดขึ้นก่อนหน้าหรือในอดีตได้
Ch.:	___能记得事情吗 ？	比如你记得之前发生的事
Va.:	*Wan___ i save rimembarem ol samting?*	*Olsem taem yu tingbaot wan samting we i bin hapen bifo*

Supplementary Table 3.

Comparison of the capacity items included in the current studies (in English) with items from our previous studies, grouped by their strongest positive association with the BODY, HEART, and MIND factors in our original studies with US adults[1]; in some cases this varied across studies within the original publication, in which case a secondary factor is listed in parentheses. Items including an ellipsis included further explanation (e.g., "feel sick, like when you feel like you might vomit"). Between refs. 1 and 2, many items were reworded to be appropriate for children ages 7-9y; between refs. 2 and 3, half of the original 40 items were omitted to create a shorter task that was appropriate for children as young as 4 years. Between ref. 3 and the current studies, 2 items were omitted and replaced due to translation difficulties, 3 items were reworded to facilitate translation and ensure age-appropriateness across sites, and 1 item was added to meet the broader goals of the Mind and Spirit Project; these are marked with an asterisk (*) in the final column.

Factor[1]	**US adults**[1]	**US adults & children 7-9y**[2]	**US children 4-9y**[3]	**Current studies**	**Comparison**	
BODY	*getting hungry*	*get hungry*	*get hungry*	*get hungry*	directly reused (ref. 1)	
	experiencing pain	*feel pain*	*feel pain*	*feel pain*	directly reused (refs. 2-3)	
	feeling tired	*feel tired*	*feel tired*	*feel tired*	directly reused (ref. 1)	
	experiencing fear	*feel scared*	*feel scared*	*feel scared*	directly reused (refs. 2-3)	
	experiencing pleasure	*feel pleasure […]*	–	–	omitted, following ref. 3	
	having free will	*decide what to do*	–	–	omitted, following ref. 3	
	being conscious	*be aware of things*	*be aware of things*	–	**omitted** (translation)	*
	feeling safe	*feel safe*	–	–	omitted, following ref. 3	
	having desires	*have desires […]*	–	–	omitted, following ref. 3	
	feeling nauseated	*feel sick […]*	*feel sick […]*	*feel sick […]*	directly reused (refs. 2-3)	
	feeling calm	*feel calm*	–	–	omitted, following ref. 3	
(HEART)	*getting angry*	*get angry*	*get angry*	*get angry*	directly reused (ref. 1)	
	having intentions	*make plans*	–	–	omitted, following ref. 3	
(HEART)	*being self-aware*	*be aware of itself*	–	–	omitted, following ref. 3	
HEART	*feeling embarrassed*	*feel embarrassed*	*feel embarrassed*	*feel shy*	**replaced** (translation)	*
	experiencing pride	*feel proud*	*feel proud*	*feel proud*	directly reused (refs. 2-3)	
(BODY)	*feeling love*	*feel love*	*feel love*	*feel love*	directly reused (ref. 1)	
	experiencing guilt	*feel guilty*	*feel guilty*	*feel guilty*	directly reused (refs. 2-3)	

	holding beliefs	*have beliefs […]*	–	–	omitted, following ref. 3	
	feeling disrespected	*get hurt feelings*	*get hurt feelings*	*get hurt feelings*	directly reused (refs. 2-3)	
	feeling depressed	*feel sad*	*feel sad*	*feel sad*	directly reused (refs. 2-3)	
	understanding how others are feeling	*understand how somebody else is feeling*	–	–	omitted, following ref. 3	
(BODY)	*experiencing joy*	*feel joy*	–	–	omitted, following ref. 3	
(BODY)	*having a personality*	*have a personality […]*	–	–	omitted, following ref. 3	
(BODY)	*feeling happy*	*feel happy*	*feel happy*	*feel happy*	directly reused (ref. 1)	
	telling right from wrong	*know what's nice and what's mean*	–	–	omitted, following ref. 3	
	exercising self-restraint	*have self-control […]*	–	–	omitted, following ref. 3	
(BODY)	*having thoughts*	*have thoughts*	–	*think about things*	**reworded** (translation)	*
MIND	*remembering things*	*remember things*	*remember things*	*remember things*	directly reused (ref. 1)	
	recognizing someone	*recognize somebody else*	–	–	omitted, following ref. 3	
	sensing temperatures	*sense temperatures*	*sense temperatures*	*sense temperatures*	directly reused (ref. 1)	
	communicating with others	*communicate with somebody else*	–	–	omitted, following ref. 3	
	seeing things	*see things*	–	–	omitted, following ref. 3	
	perceiving depth	*sense whether something is close by or far away*	*sense whether something is close by or far away*	*sense when things are far away*	directly reused (refs. 2-3)	
	working toward a goal	*have goals […]*	–	–	omitted, following ref. 3	
	detecting sounds	*hear sounds*	–	*hear things*	**re-added** to replace *be aware…*, directly reused (ref. 2)	*
	making choices	*make choices*	*make choices*	*choose what to do*	**reworded** (translation)	*
(HEART)	*reasoning about things*	*figure out how to do things*	*figure out how to do things*	*figure out how to do things*	directly reused (refs. 2-3)	
	detecting odors	*smell things*	*smell things*	*smell things*	directly reused (refs. 2-3)	
(BODY, negative)	*doing computations*	*do math*	–	*add and subtract numbers*	**reworded** (translation, age-appropriateness)	*
–	–	–	–	*pray*	**added** to meet goals of Mind & Spirit Project	*

Supplementary Table 4.

Percentage of responses using each of the three response options in our adult and child samples from our five field sites. See Methods and Materials for translations of these response options.

Country	Age group	*no*	*kind of*	*yes*	missing data
US	adults	42%	5%	53%	<1%
	children	42%	16%	41%	<1%
Ghana	adults	74%	1%	25%	<1%
	children	54%	1%	44%	<1%
Thailand	adults	34%	19%	47%	<1%
	children	38%	26%	36%	<1%
China	adults	41%	9%	49%	<1%
	children	35%	17%	47%	<1%
Vanuatu	adults	35%	5%	59%	<1%
	children	50%	4%	46%	<1%

Supplementary Table 5.

Demographics for the adult samples from our five field sites. "N.R" indicates no response; "–" indicates that the question was not asked in this sample.

		US adults	Ghana adults	Thailand adults	China adults	Vanuatu adults
Sample size		127	150	150	136	148
Age	range	18-75y	17-68y	17-70y	18-87y	15-75y
	median	29y	32y	31y	45y	31y
	mean (sd)	33.98y (13.24y)	33.97y (11.35y)	34.45y (13.97y)	45.53y (18.20y)	33.71y (14.45y)
Gender	*female*	44%	56%	59%	53%	69%
	male	56%	44%	40%	46%	31%
	other	0%	0%	1%	0%	0%
Most common ethnicities (≥5%)		White (43%) Multiple (19%) Hispanic/Latinx (9%) N.R. (8%) East Asian (6%) South Asian (6%) Black (5%)	Fante (61%) Asante (9%) Ga (6%) Ewe (5%)	Thai (99%)	Han (92%)	–
Hometown	*urban*[1]	73%	63%	–	57%	–
	rural	23%	37%	–	43%	–
	N.R.	5%	0%	–	1%	–
Highest Education	*Graduate or professional school*	13%	1%	3%	7%	–
	B.A. or equivalent	32%	12%	39%	39%	–
	Some college	27%	0%	14%	9%	–
	Trade school	3%	19%	6%	5%	–
	H.S. or equivalent	17%	22%	3%	17%	–
	less than H.S.	1%	45%	31%	20%	–
	N.R.	7%	1%	3%	2%	–
Can afford basic necessities	*yes*	81%	49%	87%	87%	–
	somewhat	1%	14%	1%	2%	
	no	11%	37%	12%	10%	–
Social class[2]	*upper*	35%	21%	3%	21%	–
	middle	46%	39%	87%	58%	–
	lower	12%	37%	7%	16%	–
Religiosity[3]	median	1	1	0	0	–
	mean (sd)	0.60 (1.15)	0.60 (1.04)	-0.44 (0.66)	-0.17 (1.02)	

Most common religions (≥5%)	Not religious (56%) Christian (22%) N.R. (12%)	Christian (89%) Muslim (5%) Not religious (5%)	Buddhist (91%)	Not religious (62%) N.R. (17%) Buddhist (15%)	Christian (95%)

Notes:

1. Some participants in the US (but not other sites) said that they had grown up in a "suburban" setting, or in both urban and rural settings; they are included in the "urban" total here.
2. Participants responded freely to the question "What is the general class of your community?" Responses were coded by the first author (after translation). The category "upper" included responses such as "well-off," "rich," "good," "upper-middle class," and "above average." The category "middle" included responses such as "moderate," "decent," "common," "medium," "average," "normal," and "middle class." The category "lower" included responses such as "below average," "just so-so," "lower-middle class," "working class," "subsistence," and "poor."
3. Participants responded to the statement "I consider myself a religious or spiritual person" using the following 5-point scale: "strongly disagree" (coded as -2), "disagree" (-1), "neither agree nor disagree" (0), "agree" (1), and "strongly agree" (2).

Supplementary Table 6.

Demographics for the child samples from our five field sites. "N.R" indicates no response; "–" indicates that the question was not asked in this sample.

		US children	Ghana children	Thailand children	China children	Vanuatu children
Sample size		117	150	152	131	143
Age	range	5-12y	6-11y	7-12y	8-12y	6-12y
	median	9y	8y	9y	9y	9y
	mean (sd)	8.99y (1.49y)	8.42y (1.08y)	9.34y (1.08y)	9.10y (0.85y)	8.75y (1.66y)
Gender	*female*	57%	53%	55%	50%	57%
	male	43%	47%	45%	50%	43%
	other	0%	0%	0%	0%	0%
Most common ethnicities (≥5%)[1]		White (23%) East Asian (21%) N.R. (21%) Multiple (14%) Hispanic/Latinx (7%)	–	–	–	–
Most common religions (≥5%)[2]		Christian (41%) N.R. (26%) Not religious (20%) Hindu (10%)	Christian (97%)	Buddhist (88%) Christian (7%)	Not religious (94%)	Christian (96%)

Notes:

1. In the US, parents were asked to provide this information. In other sites, this question was not asked.
2. In the US, parents were asked to provide this information. In other sites, children provided this information it themselves.

Supplementary Table 7.

Summary statistics and simple, single-predictor regression analyses for raw and rescaled mean squared errors for adults in our five samples, as described in the final section of this supplement. For all regression analyses, continuous predictors were standardized and centered at the mean, and categorical predictors were effect-coded for comparison to the grand mean. For linear regressions, the outcome variable was standardized raw MSEs, and the regression coefficients here are standardized βs. For beta regressions, the outcome variable was rescaled MSEs (which were not standardized). Regressions that suggested a demographic variable was a "significant" ($p<0.05$) predictor of MSEs are highlighted in bold. For complete results, including omnibus analyses incorporating all predictors, see https://github.com/kgweisman/mental-life-culture-development.

		San Francisco Bay Area, US – adults	**Cape Coast, Ghana – adults**	**Chiang Mai, Thailand – adults**	**Shanghai, China – adults**	**Port Vila & Malekula, Vanuatu – adults**
Theoretical range[1]		[0.04, 0.54]	[0.04, 0.62]	[0.04, 0.42]	[0.05, 0.47]	[0.05, 0.53]
Raw MSEs (observed)	range	[0.05, 0.31]	[0.06, 0.34]	[0.08, 0.28]	[0.06, 0.28]	[0.06, 0.31]
	median	0.16	0.12	0.14	0.17	0.16
	mean (sd)	0.17 (0.08)	0.16 (0.10)	0.16 (0.05)	0.18 (0.06)	0.17 (0.08)
Rescaled[2] **MSEs (observed)**	range	[0.02, 0.53]	[0.04, 0.52]	[0.10, 0.62]	[0.03, 0.57]	[0.01, 0.53]
	median	0.16	0.12	0.14	0.17	0.16
	mean (sd)	0.17 (0.08)	0.16 (0.10)	0.16 (0.05)	0.18 (0.06)	0.17 (0.08)
Linear regressions, Standardized raw MSEs	age	β=0.13, p=0.152	**β=-0.20, p=0.016**	**β=0.23, p=0.004**	β-0.04, p=0.634	β=0.00, p=0.958
	gender (base: *female*)	**β=0.19, p=0.036**	β=-0.015, p=0.072	β=-0.08, p=0.369[4]	β=0.14, p=0.115	β=0.04, p=0.631
	race/ethnicity (base: local majority group)	β=0.05, p=0.571	β=-0.09, p=0.266	NA (99% Thai)	NA (97% Han)	NA (missing data)
	education (continuous)	β=-0.04, p=0.673	β=-0.10, p=0.236	**β=-0.18, p=0.025**	β=-0.14, p=0.110	NA (missing data)
	education (categorical, base: less edu.[3])	β=-0.10, p=0.384	β=-0.13, p=0.118	**β=-0.18, p=0.035**	**β=-0.17, p=0.048**	NA (missing data)
	rural/urban (base: urban)	β=-0.10, p=0.361	β=0.14, p=0.101	β=0.08, p=0.396	β=-0.02, p=0.804	**β=0.23, p=0.005**
	religion (base: none)	βs~0.00, ps>0.981	NA (89% Christian)	NA (91% Buddhist)	βs<0.33, ps>0.176	NA (100% Christian)
Beta regressions, rescaled MSEs	age	b=0.11, p=0.120	**b=-0.15, p=0.046**	**b=0.14, p=0.006**	b=-0.02, p=0.663	b=-0.01, p=0.912
	gender (base: *female*)	b=0.12, p=0.081	b=-0.11, p=0.150	β=0.03, p=0.504±4	b=0.07, p=0.227	b=0.02, p=0.736
	race/ethnicity (base: local majority group)	b=0.03, p=0.645	b=-0.07, p=0.348	NA (99% Thai)	NA (97% Han)	NA (missing data)
	education (continuous)	b=-0.03, p=0.693	b=-0.09, p=0.254	**b=-0.10, p=0.040**	b=-0.11, p=0.062	NA (missing data)
	education (median split, base: less edu.[3])	b=-0.07, p=0.433	b=-0.11, p=0.132	b=-0.10, p=0.062	**b=-0.13, p=0.021**	NA (missing data)
	rural/urban (base: urban)	b=-0.05, p=0.545	b=0.13, p=0.081	b=0.050, p=0.367	b=-0.01, p=0.93	**b=0.16, p=0.019**
	religion (base: none)	bs~0.01, ps>0.888	NA (89% Christian)	NA (91% Buddhist)	bs<0.19, ps>0.208	NA (>99% Christian)

Notes:

1. For each sample, the theoretical range was determined by calculating MSE for a hypothetical participant whose responses *matched* (scored as 1) for all pairs of capacities for which the average matching score in the group model was ≥0.67, *partially matched* (scored as 0.5) for all pairs for which the average matching score was between 0.33 and 0.67, and *did not match* (scored as 0) for all pairs for which the average matching score was ≤0.33); and the theoretical maximum determined by calculating MSE for a hypothetical participant whose responses *did not match* (scored as 0) for all pairs for which the average matching score was ≥0.5 and *matched* (scored as 1) for all pairs for which the average matching score was <0.5.
2. "Rescaled" MSEs were rescaled from the theoretical range reported in the first row to a standard range of [0, 1] using the "rescale" function in the "scales" package for R.[30]
3. For samples from the US, Thailand, and China, these analyses compared adults with at least some college experience to adults with no college experience. For the sample from Ghana, these analyses compared adults with a high school degree to adults with no high school degree.
4. These analyses excluded 2 Thai adults who did not identify as male or female. In all other samples, all adults identified as either female or male.

Data S1. (separate file)
Data from US adults.

Data S2. (separate file)
Data from Ghanaian adults.

Data S3. (separate file)
Data from Thai adults.

Data S4. (separate file)
Data from Chinese adults.

Data S5. (separate file)
Data from Ni-Vanuatu adults. Note that this dataset includes participants who assessed the mental capacities of pigs, who were not included in the current analyses.

Data S6. (separate file)
Data from US children.

Data S7. (separate file)
Data from Ghanaian children.

Data S8. (separate file)
Data from Thai children.

Data S9. (separate file)
Data from Chinese children.

Data S10. (separate file)
Data from Ni-Vanuatu children. Note that this dataset includes participants who assessed the mental capacities of pigs, who were not included in the current analyses.