**AsPredicted Questions**

**1) Data collection. Have any data been collected for this study already?**

It’s complicated (to be explained in Question 8).

**2) Hypothesis. What's the main question being asked or hypothesis being tested in this study?**

**Background:**

A growing body of work is detailing how people from various cultures express (Cordaro et al., 2018) and perceive (Cowen et al., 2019) specific positive emotions. Yet a majority of these findings focus on facial expressions, when in fact emotions are expressed through several different modalities (Calvo et al., 2014). In the present research, we evaluate how different positive emotions are expressed based on self-report (see Campos et al., 2013), across ten different cultures.

The specific positive emotions were selected based on two key considerations. Firstly, we chose to sample positive emotions that varied on the theoretical dimensions of physiological arousal (the extent to which an emotion elicits a heightened physiological response; Tsai, Knutson & Fung, 2006), social engagement (the extent to which an emotion is focused on others rather than oneself; Kitayama, et al., 2006), and emotion families (an approach that classifies emotions based on their functions; Sauter, 2017). Secondly, we selected emotions that have been corroborated by past research to have some degree of identifiable expressions (Cowen & Keltner, 2020), thereby allowing us to formulate preliminary hypotheses. Table 1 lists these specific emotions.

**Table 1**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Physical Arousal | Social Engagement | Emotion Family |
| **Feeling Moved** | High | Other Focused | Savouring |
| **Gratitude** | Low | Other Focused | Prosocial |
| **Interest** | Low | Self Focused | Epistemological |
| **Triumph** | High | Self Focused | Agency-Approach |

**Hypotheses:**

We examine the degree to which each of the following predictions will hold across the ten cultural samples. We here list our hypotheses for each positive emotion. Predictions are based on previous work from other researchers, as well as initial findings we obtained from a large sample of U.S. respondents (n > 1,000), where all the below hypotheses were supported.

**H1 (feeling moved):** We expect people to report that feeling moved is most frequently expressed on the face. Described as an intense emotion that signals vulnerability (Schubert et al., 2018), feeling moved is often accompanied by tears, moist eyes, and the construction of facial muscles surrounding the eyes, likely as a precursor to crying (Fiske et al., 2016). There is also robust cross-cultural evidence suggesting that feeling moved is recognized via tears (Zickfeld et al., 2019).

**H2 (gratitude):** We predict that people will report that gratitude is most regularly expressed using words and voice. Past research suggests when indebted, people express being thankful by vocalizing their gratitude with words of appreciation (Williams & Bartlett, 2015) and by reducing the volume of their voice (Kini et al., 2016).

**H3 (interest):** We expect that people will report that interest is most frequently expressed using one’s face, words, and voice. Previous evidence has demonstrated that the constriction of the eyebrows signals a deep concentration on a specific topic, thereby being indicative of interest, together with the use of phrases and questions to display keenness (Silvia, 2008). Emerging insights also suggest that vocalizations of interest are recognized within cultural groups (Cowen et al., 2019).

**H4 (triumph):** We postulate that people would think triumph is most regularly expressed using the face, body movement, and voice. Robust lines of work have suggested that in the immediate aftermath of winning, people are likely to smile, adopt a straightened body posture with the chest protruding, and make guttural sounds signaling their victory (Tracy & Matsumoto, 2008). There is also evidence postulating that triumph expressions are well-recognized across cultures (Tracy & Robins, 2008).

**3) Dependent variable. Describe the key dependent variable(s) specifying how they will be measured.**

**Emotion definitions.** Participants were first shown a list of the four positive emotions and provided with definitions for each emotion. (1) Feeling moved: The feeling when you encounter something very beautiful, meaningful, or bittersweet. Tears well up in your eyes and you feel overcome with warm feelings. (2) Gratitude: The feeling when you think that someone has gone out of their way to do something good or nice for you. You have the urge to do something back and get closer to this person. (3) Interest: The feeling when you encounter something new and relevant that you do not immediately understand. You have the urge to find out more about it. (4) Triumph: The feeling of release and a great joy, after a successful ending of a struggle or contest.

**Self-reported expressions.** We employed an intersubjective approach (Chiu et al., 2010), to evaluate how people believe others in their culture would express specific positive emotions. Participants were thus asked to *think about* ***how*** *members of their nation in general express* each positive emotion, and were asked to select options denoting various modalities of expression: (1) *with the voice,* (2) *on the face,* (3) *using body movement*, (4) *with words*, (5) *via touch*, (6) *in other ways*. Participants could select all options that applied, and a free response box was also provided only if option 6 was selected. Participants made judgements about each of the four positive emotions separately, with the order of presenting emotions randomized.

**Translations.** Using the team translation approach (Clark et al., 2017), all the above materials were adapted from English into the native languages of each country, by two native speakers of each language respectively.

**4) Conditions. How many and which conditions will participants be assigned to?**

This study employs a repeated-measures design, where all participants answer questions pertaining to all four positive emotions.

**5) Analyses. Specify exactly which analyses you will conduct to examine the main question/hypothesis.**

**Percentage scores.** To map out self-reported modality use, we will first calculate percentage scores for the selection of each modality (per emotion, per culture) with the following method: dividing frequencies (presence counts), by the overall number of respondents within each respective national sample. These percentage scores reflect the percentage of participants in each culture that think a given emotion is expressed via a specific modality.

**Modality use.** To evaluate all four hypotheses in each culture, the following strategy will be used. Given the overlapping nature of our response options, where participants are given the chance to select all modalities that apply for any given emotion, we select a version of the Chi-square (to compare frequencies) that accounts for dependency in data. We will hence conduct separate Cochran’s Q tests (one per culture, for each emotion). We also Bonferroni correct for the multiple models computed by setting a stringent significance threshold (*p* < .001). Furthermore, we will conduct post-hoc pairwise comparisons between modalities, using McNemar Tests of Symmetry, and Bonferroni correct for multiple comparisons.

**6) Outliers and Exclusions. Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.**

All participants will be citizens of their respective nations currently residing in their countries. Any respondent who reports not being a citizen, and/or not living in that country, will be excluded. Furthermore, only completed responses that include basic demographic information (nationality, age, gender, ethnicity) will be included.

**7) Sample Size. How many observations will be collected or what will determine sample size?**

A-priori power analyses with G\*Power Version 3.1.9 (Faul, Erdfelder, Buchner & Lang, 2009) indicated that we required 143 participants from each nation to detect medium-sized effects (estimates obtained based on preliminary results from a U.S. sample) in frequency distribution models (*W* = 0.30) at 80% power. Based on feasibility estimates obtained from our participant recruitment networks, we decided to collect at least 150 responses per nation.

As part of three larger studies, at least 1500 participants overall have or will be recruited from the following 10 countries, that differed in terms of global region, predominant language, and cultural values. Participants were or will be recruited through a combination of social media snowballing and paid services such as Prolific (see Table 2).

**Table 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Region | Language | Collection Mode | Collection Stage |
| **England** | Commonwealth | English | Prolific | Complete |
| **Australia** | Commonwealth | English | Prolific | Complete |
| **Canada** | Commonwealth | English | Prolific | Awaiting Launch |
| **Germany** | Western Europe | German | Prolific | Complete |
| **Austria** | Western Europe | German | Social Media | Complete |
| **Netherlands** | Western Europe | Dutch | University Sample | In Progress |
| **Croatia** | Eastern Europe | Croatian | Social Media | Complete |
| **Russia** | Eastern Europe | Russian | Social Media | Complete |
| **China** | Asia | Mandarin Chinese | Social Media | Complete |
| **India** | Asia | Marathi | Social Media | Complete |

**8) Other. Anything else you would like to pre-register?**

**Clarifying note.** As mentioned in Table 2, data collection is completed for 8 samples, is currently in progress for one sample (the Netherlands), and is yet to be launched for one sample (Canada). At the point of this pre-registration, we have yet to analyze the data – pertinent to the research questions in this study – from any of our samples. We further acknowledge that other unrelated portions of the data have been analysed, and submitted for publication (see [10.31219/osf.io/4uaym](https://doi.org/10.31219/osf.io/4uaym)). Through this pre-registration, we hence declare our hypotheses and analyses methods in advance.

**Exploratory analyses.** Although we have not specified a-priori hypotheses for the cross-cultural analyses, we will exploratorily test for cultural differences and similarities. The following exploratory analyses will be conducted. (1) To compare frequencies across cultures for each modality per emotion: Chi-square tests and follow up two-proportion Z-tests. We will also compute 95% Confidence Intervals based on frequency scores. (2) To compare rank-order of selected modality across cultures per emotion: Kruskal-Wallis comparisons followed by Mann-Whitney U’s as follow up. (3) To examine whether some nations cluster together in terms of their self-reported expressions per emotion: Latent Class Analyses.

**9) Name. Give a title for this AsPredicted pre-registration**

Modalities of Positive Emotional Expressions in Ten Cultures

**Finally. For record keeping purposes, please tell us the type of study you are pre-registering.**

Online Survey