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Shades of Expansiveness: Postural Expression of Dominance, High-Arousal Positive Affect, and Warmth

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General folder for this project including pre-registrations, materials, codebooks, and datasets is available on OSF: https://osf.io/347rb/

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Abstract

In addition to the face, bodily posture plays an important role in communicating affective states. Postural expansion - how much space the body takes - has been much studied as expressing and signaling dominance and pride. The present research aimed to expand research on the range of affect dimensions and affect-laden personality characteristics that are expressed via expansiveness, investigating specific forms of expansiveness and their interactions with other postural elements (e.g., arm position). Using an innovative expression-production method, Study 1 (N = 146) characterized full-body expressions of dominance, joy, hope, and awe; results indicated joy is communicated most expansively and suggested a signature arm position for most feelings. Studies 2-3 (Ns = 352, 183) revealed that other postural features interact with expansiveness to signal dominance (arms akimbo, head raised, stability), as distinct from high arousal positive affect (arms high up, head raised), and warmth (arms high up, head raised, instability). Together, this research adds needed data on full-body expressions of positive affect states and provides systematic analysis of different affective messages and varieties of postural expansiveness.

Keywords: nonverbal, embodiment, dominance, positive emotion, posture

Shades of Expansiveness: Postural Expression of Dominance, High-Arousal Positive Affect, and Warmth

Although the bulk of research on nonverbal expression of affect and emotion has emphasized the face, bodily posture also plays an important and independent role in communicating people's affective states (Aviezer et al., 2012; Dael et al., 2012; Mauss & Robinson, 2009). As in facial expression research, most studies of postural expression have focused on differentiating positive from negative affect, and/or identifying prototypical expressions of specific negative emotions (Witkower & Tracy, 2019a). In one important exception, a rich body of research has examined affective feelings and inferences associated with postural expansion versus contraction, defined as positioning the body in a way that takes up more or less physical space (Huang et al., 2011). Throughout this work runs a strong thread linking postural expansion/contraction to the affective dimension of dominance, as reflected in both feelings and inferences of dominance, structural power, high social status, and the distinct emotion of pride (e.g., Cuddy et al., 2018; Park et al., 2013; Tracy & Robins, 2004; Tracy et al., 2013). The work on postural expression of dominance and pride has been groundbreaking in documenting a specific, socially consequential dimension of affect that can be communicated through bodily posture.

There are hints in the literature, however, that expansion may communicate aspects of affect beyond dominance. For example, the high-arousal positive emotion of joy may also be expressed through expansive posture (Witkower & Tracy, 2019a). Despite these hints, research has not yet systematically examined the broader range of affective states that can be communicated through postural expansion, nor the ways in which specific forms of expansiveness and interactions of expansiveness with other postural elements signal different affective states, and/or affect-laden personality characteristics. Here we present three experiments – one using an innovative expression-production method, and two examining inferences drawn from various postural configurations – making a step to address these gaps. Study 1 participants used a small, fully-jointed mannequin to freely pose expressions of dominance, joy, hope, and awe; these poses were photographed and coded for multiple indices of expansiveness/constricticton as well as head position, arm position, and other postural

features. Participants in Studies 2-3 rated dimensions of affect and/or affect-laden interpersonal characteristics (valence, arousal, dominance, extraversion, warmth, competence) expressed in either Study 1 photos in which the emotions posed systematically varied (Study 2), or a new set of photos in which the mannequin's specific postural elements systematically varied (Study 3). Across studies, results differentiate the specific type of expansiveness that communicates dominance from varieties of expansiveness that convey other dimensions of affect.

Postural Expression of Affect and Emotion

Although posture has received far less attention than the face in affective science, it does have a substantial history in research on emotion (Witkower & Tracy, 2019a). Early studies aimed to test William James' (1884) proposal that enacting the expression of some emotion state would generate the corresponding feeling (i.e., the *facial feedback hypothesis*). In these studies, participants were surreptitiously instructed to pose purported postures of specific emotions such as sadness, fear, anger, or happiness, and the feeling states that followed were assessed (e.g., Duclos et al., 1989; Flack et al., 1999; see meta-analysis by Coles et al., 2019). Such studies revealed emotion-specific effects in which subjective experience of each target emotion was reported at higher intensity in the predicted condition as compared to the other conditions, suggesting postural configurations linked to these distinct emotion constructs.

Later research has focused more on documenting the actual production and/or recognition of postures for specific negative emotions and generic happiness. These studies suggest characteristic features of postures for some specific emotions, and support the proposal that people can reliably infer others' emotion states from posture. Martinez and colleagues (2016) video-recorded full-body expressive poses by six actors of fear, anger, sadness, disgust, happiness, and surprise; a subsequent set of participants were then asked to identify the intended emotion. Recognition rates based on the body alone were consistently significantly greater than chance, though effect sizes were modest (unbiased hit rates < .30). Other studies have found considerably higher recognition rates for postural expressions of anger and sadness, in particular (e.g., Coulson, 2004; Dael et al., 2012; Martinez et al., 2016; Visch et al., 2014). In one study, a computational model of neural activity

trained to discriminate the bodily postures of multiple emotions reached a recognition rate of 82%, barely shy of the human participants' rate. Some studies suggest that purely posture-based inferences about another's affect valence or specific emotion may be even more accurate than inferences based on facial expression alone, especially when the poses are naturally-occurring rather than instructed by the experimenter (e.g., Abramson et al., 2017; Aviezer et al., 2012).

As in the face, however, the meaning of any one element of posture is not static; it may vary depending on other elements with which it is combined. In a study illustrating this complexity, Dael and colleagues (2012) recorded actors' posed postures for 12 distinct emotions; coded 49 distinct elements of those postures; and then used principal components analysis followed by cluster analysis to identify sets of postural elements that characterized each emotion. Only hot anger, amusement, and pleasure could be linked to a single, prototypical, full-body expression; other expressive elements and emotions mapped to each other in more diverse ways.

Postural Expansion as a Dominance Signal

Research linking postural expansion to emotion and social status has proceeded largely independent of the research described above, though its origins are also deep. The link between expansiveness and the specific/discrete emotion of pride was first noted by Charles Darwin in *The Expression of the Emotions in Man and Animals* (1872): "A proud man exhibits his sense of superiority over others by holding his head and body erect. He…makes himself appear as large as possible; so that metaphorically he is said to be swollen or puffed up with pride" (p. 263). Modern research also documents postural expansion as a central feature of the nonverbal expression of pride, which includes arms raised or akimbo and expansion of the chest, as well as a slight smile and upward tilt of the head (Tracy & Robins, 2004). This posture is both displayed by victorious athletes and recognized as an expression of pride across a wide range of cultures (e.g., Tracy & Matsumoto, 2008; Tracy & Robins, 2003, 2008).

Another body of research links postural expansion to the communication of dominance as a relational/interpersonal characteristic. According to the ecological approach to social perception (Gibson, 1966), nonverbal expression provides information about an individual's likely social affordances – what one can

expect in a relationship with that person. Beyond immediate emotion states and intentions, perceivers draw inferences about a target's likely dispositional characteristics based on their nonverbal cues (Secord, 1958; Zebrowitz, 2011). Meta-analysis results indicate that postural expansion is one of few nonverbal cues that reliably predicts self- and other-rated personality dominance, as well as higher rank within one's organization (Hall et al., 2005). Much additional research shows that the pride display described above evokes implicit as well as explicit inferences that the individual displaying this posture has high social status (e.g., Shariff & Tracy, 2009; Shariff et al., 2012; Tracy et al., 2013). This connection is not limited to humans; expanded posture is used to assert relational dominance among non-human primates as well (de Waal, 1982).

In the present research we emphasize dimension(s) of affective experience that may be communicated and inferred through postural expansion. These may include valence/pleasantness, arousal/activation, and dominance as established axes of subjective feeling (e.g., PAD model, Mehrabian & Russell, 1974; see also Fontaine, Scherer, Roesch, & Ellsworth, 2007), as well as interpersonal warmth – a core dimension of interpersonal perception with clear affective tone (Fiske, Cuddy, & Glick, 2007). Effects of expansive posture on subjective feelings of power and self-confidence have received support across multiple independent labs (e.g., Cuddy et al., 2018; Park et al., 2013; Ranehill et al., 2015; Roberts & Arefi-Afshar, 2007; Stepper & Strack, 1993). However, results from the few studies that included a control condition (i.e., posture that is neither expansive nor constrictive) suggest that it may be the absence of postural constriction rather than expansion per se that is driving these effects (Elkjaer et al., 2022).

What Else Might Expansiveness Express?

There are ample signs in the literature that dominance is not the *only* dimension of affect communicated through postural expansion. Expansion may also be characteristic of posture in high-arousal positive affect, in particular. A review by Witkower and Tracy (2019) found that joy/happiness poses were also characterized by postural expansion, along with energetic and upward movement (e.g., arms and torso) and jumping. Coulson (2004) examined participants' forced-choice classification of 176 computer-generated mannequin poses into emotion categories; those with upright posture, chest expanded, and arms lifted and held straight in a "Y" shape

were most readily identified as happiness. In Dael and colleagues' (2012) cluster analysis of posed expressions of various emotions based on postural elements, the pride and elated joy poses emerged as a cluster defined primarily by rapid, expansive arm movements. Other research suggests that "postural openness" of the torso and arms can communicate intimacy, closeness, and positive engagement (e.g., Burgoon, 1991; Patterson, 1983), suggesting affective warmth rather than dominance.

Is it possible to differentiate specific varieties of postural expansiveness that communicate dominance, high-arousal positive affect, and warmth? Prior research has not, to our knowledge, systematically addressed specific forms of expansiveness or combinations of expansiveness with other postural elements that distinguish these affective dimensions from each other. Unpacking this space was the aim of the present program of research.

The Current Studies

The current studies combine an innovative expression-production protocol with expression-interpretation measures to examine particular varieties of expansiveness, asking when expansiveness communicates dominance versus alternative states. In Study 1[1], participants used a plastic mannequin to freely pose full-body postural expressions of dominance, joy, hope, and awe. The poses were photographed at a standard distance and coded for multiple indices of expansiveness, specific arm position, head position, and postural stability, allowing us to tentatively characterize postural configurations for each state. Results suggest that distinct varieties of expansiveness may differentiate dominance from high-arousal positive affect, in particular. In Study 2, participants rated photos of poses from each of the four conditions in Study 1 on dominance, positive affect, and negative affect, asking whether inferences generalize across all expansive postures. In Study 3 participants rated the dominance, valence/pleasantness, arousal, extraversion, warmth, and competence expressed by a new set of mannequin poses with all possible combinations of arm position, head

[1] Study 1 used archival data from a study examining postural expressions of several specific emotions and other distinct affective states, rather than dimensions of affect; however, joy represents high-arousal positive affect, and hope and awe represent low-arousal positive affect states.

position, and stability, holding expansiveness constant. Across studies, results suggest specific configurations of expansiveness that differentiate dominance from high-arousal positive affect and affective warmth.

Study 1

Study 1 repurposed data from a larger project aimed at characterizing full body postures expressing states relevant to religious worship (some data already published here: Van Cappellen & Edwards, 2021; pre-registration for the overall project available here: https://osf.io/atr4w). Lay people from the community were asked to represent the full body postures they would assume to express various affective feeling states (including some specific emotions) by positioning accordingly a small, adjustable mannequin. Standardized photos taken of these poses were then coded to characterize full-body postures of awe, joy, hope, and dominance.

Method

Participants

Adult participants were recruited through a community participant pool in the Durham, North Carolina area; they participated in this 30-minute study for $6. As pre-registered, we targeted 150 participants and ended up collecting data from 146 participants (69.9% female, M_{Age} = 27.59, SD_{Age} = 11.12). The sample was ethnically diverse: 45.2% of participants identified as Caucasian, 30.8% as Asian, 17.8% as African American, 0.7% as American Indian or Alaska Native (0.7%), and 5.5% as another ethnicity. Participants were Christian (45.2%), Spiritual but not religious (15.1%), Agnostic (13%), Atheist (6.8%), Hindu (5.5%), Other (4.8%), Buddhist (4.1%), Jewish (4.1%), and Muslim (1.4%).

Procedure

As described in detail in Van Cappellen and Edwards (2021), participants were given a small mannequin (5.9 inches tall, see Figure 1) and instructed: “For this study, I will name various feelings. Please imagine the posture you would assume to represent that feeling and then adjust the mannequin into that same posture. Really think about the placement of your head, hands, back, torso, legs, feet, and toes and try to be as exact as possible when adjusting the mannequin.” The researcher then named a series of feeling terms, one at a time and in a

random order. For each feeling term, the researcher asked the participant *what posture they would adopt to represent* [term]. A stand could be used to support the mannequin if the pose was not stable enough to stand alone. The trials used in the present research are four positive-valence feeling terms that were presented without religious context: awe, joy, hopeful, and dominance.[2] When participants were done positioning the mannequin for each trial, it was adjusted to a standardized location, and the researcher took two photographs with a camera set on the table at a standardized distance from the mannequin: a front-facing photo (such that the hips were placed on a line perpendicular to the camera's lens) and a side-facing photo (such that the hips were placed on a line parallel to the camera's lens). Thus, the mannequin was the same size, in the same location, and seen from the same visual angle in every photograph. Finally, information regarding demographics and individual differences was collected. This procedure was approved by the authors' institutional review board.

Measures

Postural Expansiveness. Using the photographs, we measured five distinct aspects of expansiveness. Each front-facing photograph was analyzed using ImageJ, an open image processing program (Schneider et al., 2012), to obtain exact measurements in pixels of overall horizontal and vertical expansiveness. All expansiveness measures were converted to cm using the formula 100 image pixels = 5 cm on the mannequin. Vertical expansiveness was defined as the total height (observed range: 2.95 – 17.80 cm), and horizontal expansiveness as the total width (observed range: 3.45 – 15.50 cm) of space taken up by any part of the posed mannequin. Total overall expansiveness was calculated as width x height (observed range: 19.03 – 215.98 cm). Last, the first and last authors used the Preview Mac application to measure horizontal distance between fingertips from one hand to another in pixels, which were converted to cm using the formula above (observed range: 3.90 - 13.75 cm). The same procedure was used to measure the horizontal distance between toes from

[2] See pre-registered codebook and script for complete list of terms, https://osf.io/xnkv7/ and Van Cappellen & Edwards, 2021 for results on postures related to prayer orientations, which were measured after the terms we present here.

one foot to the other (toe-to-toe expansiveness, observed range: 1.65 - 13.50 cm). To establish reliability for the human-coded expansiveness measures, both coders completed 60 photos evenly distributed across the four feeling conditions and throughout the data set. The two-way mixed absolute single-coder ICCs were .999 for finger-to-finger expansiveness, and .980 for toe-to-toe expansiveness. The remaining photos were coded by either the first or last author.

Other Postural Elements. The mannequin's posture was coded for four additional, distinct postural elements: arm position, head position, posture stability, and whether the posture was on the floor. This observational coding system was developed a posteriori to account for the full range of positions observed in the original dataset. Coding for head and arm positions overlaps with other coding systems such as that used by Dael and colleagues (2012), but was more nuanced for arm positions and added coding for stability and whether the posture was on the floor. Coders only viewed the front-facing photo when coding these elements. See codebook for more detailed instructions: https://osf.io/643c2/. All coding of the additional postural elements in these four feeling conditions was done by the first and second authors, blind to feeling condition; reliabilities from a subsample of 60 poses are presented below.

Head Position. Three possible head positions were coded relying solely on the vertical axis: straight (default); strong angle up; and angle down. Percent agreement between coders was 90.0%.

***Arm Position*.** Twelve distinct, mutually-exclusive arm positions were coded: Relaxed (down and close to the sides); Forward-Close (not wider than the trunk); Forward-Open (wider than the trunk); Extended Side (both arms extended to the side in the three to nine o'clock range, with the head as 12 o'clock); Y-Shape (both extended to the side in the one to three and nine to eleven o'clock range); High (both extended in the eleven to one o'clock range); Raised Elbows Bent (at a 90 degree angle); Akimbo (one or both hands on hips); Hand(s) to Head (touching or covering the head or face); Folded; Prayer; Hand(s) to Heart (one or both hands placed over the heart); or Other/Mixed (which also included asymmetrical poses that could not fit under a clear category). Percent agreement in the reliability subsample was 81.6%. Our coding system overlaps to some extent with that of Dael and colleagues (2012), who coded for arm at side, in front, behind back, in pocket(s) (not applicable

here), at waist, at back of head/neck, and arms crossed. The coding system used in the present study includes most of these as well as additional codes, providing a more exhaustive representation of arm positions present in this dataset. Dael and colleagues (2012) also coded for symmetry in arm positions, which was not systematically coded in this dataset.

Because some arm position categories were extremely rare among the four feeling conditions presented here, we used the following (pre-registered) formal criteria to decide which codes to consolidate into an "other" category: a Chi-Square test with all four conditions was run to identify any code showing an expected count of less than 5. Based on this analysis, "Raised Elbows Bent," "Folded," and "Hand to Heart" were recoded as "Other." No other categories contained an expected count less than 5.

Stability. Postures were coded as being either stable or unstable (i.e., if the posture could not be held without falling over simply by using muscles, or if the posture looked like it was in motion). Percent agreement in the reliability subsample was 93.3%.

On the Floor. Postures were coded as on the floor (i.e., kneeling, sitting, or lying on the flooring) or not on the floor. Sitting in a (imaginary) chair or a standing posture were not considered as on the floor. Percent agreement in the reliability subsample was 100.0%.

Results

Postural Expansiveness

Differences among feeling conditions on the postural expansiveness measures were analyzed using a series of one-way repeated measure analyses of variance (ANOVAs), followed by pairwise comparisons with Sidak corrections using SPSS 28. See Table 1 for complete results, and Figure 2 for a graph of means and standard errors. Omnibus effects of Feeling condition were significant for all five indices of expansiveness: Horizontal (F [2.64, 382.72] = 73.68, $p < .001$, $\eta_p^2 = .337$); Vertical (F [2.57, 372.66] = 32.94, $p < .001$, $\eta_p^2 = .185$); Overall (F [2.71, 392.49] = 104.72, $p < .001$, $\eta_p^2 = .419$); Finger-to-Finger (F [2.70, 390.99] = 57.42, $p < .001$, $\eta_p^2 = .284$); and Toe-to-Toe (F [2.01, 291.06] = 12.60, $p < .001$, $\eta_p^2 = .080$).

Postures of joy were significantly more expansive horizontally, vertically, and in total space than those for all other feeling conditions. Postures of hope were the least expansive on these three dimensions, differing significantly from all other conditions for Overall and Horizontal Expansiveness and from Dominance and Joy (but not Awe) on Vertical Expansiveness. Postures of Dominance and Awe were in the middle, and did not significantly differ from each other. Postures of Joy and Dominance had the greatest Toe-to-Toe Expansiveness, not differing from each other, but significantly greater than postures of Awe and Hopefulness, which also did not differ from each other. In contrast, postures of Joy had the *least* Finger-to-Finger Expansiveness – significantly less than all other conditions – as they were often represented with arms reaching up and hands relatively close to each other. Postures of Awe and Dominance showed the greatest Finger-to-Finger Expansiveness, not differing from each other but significantly different from Hopefulness in the middle.

[Insert Table 1 and Figure 2 approximately here]

Other Postural Elements

Cochran's Q analyses, followed by pairwise comparisons with Bonferonni corrections to adjust for escalating familywise Type I error, were used to compare frequencies of each code across the four feeling conditions. A Cochran's Q test is similar to a chi-square test, but appropriate for a within-subjects design. Omnibus effects of Feeling condition were significant at the $p < .005$ level for all postural elements except the Forward-Open and Extended Side arm positions. See Table 1 for complete results; we highlight noteworthy findings here.

With regard to head position, the straight-forward-directed position was the most common in all conditions. Dominance postures were significantly less likely to have the head up/lifted than any of the other three conditions, which did not differ from each other. In contrast, Dominance postures were significantly more likely than Awe and Hope postures to have the head level, head directed to the camera. Heads angled downward were rare in all conditions.

With the exception of Hope, each feeling posture displayed a clear signature arm position. Among Dominance postures the Akimbo arm position was by far the most common (42.27%), significantly and greatly

exceeding the appearance of this position in any other condition. Among Joy postures, Y-shaped arms (48.62%) and High arms (17.12%) were most common, in each case significantly more so than in all other conditions. Among Awe postures, the Hands-to-Head arm position was easily the most common (42.47%), again significantly exceeding all other conditions. Hopeful postures did not have a distinct arm position; the most frequent code was the category "other."

Being seated on the floor was rare in all conditions, and although some pairwise contrasts were significant this element did not characterize any particular condition. Finally, Joy postures were more likely to be unstable, as if in movement (23.29%) than postures for any other feeling.

Discussion

Analyses of a large sample of mannequin-posed postures for Dominance, Joy, Hope, and Awe revealed distinct typical poses for three of the four conditions. In general, expansiveness was greatest among postures for Joy (a high-arousal positive affect state; Neumann & Waldstein, 2001; Watson & Clark, 1994), which took up the most horizontal, vertical, and overall space. The exception was Finger-to-Finger Expansiveness, for which Dominance and Awe (a low-arousal positive affect state; Gordon et al., 2017; Shiota et al., 2011) showed the greatest distance and Joy the least. Toe-to-Toe Expansiveness was greater in both Dominance and Joy than the other two conditions. Although a head directed straight forward to the camera was typical for all, and few mannequins in any condition were placed on the floor, striking differences were seen in arm positions and in postural stability.

Examples of prototypical poses for Dominance, Joy, and Awe are presented in Figure 1, combining the most characteristic elements of poses in each condition. Dominance poses did not necessarily take up the most space, but were stable with legs planted firmly and well apart, head directed straight forward, and arms akimbo – a configuration highly similar to the pride display described by Tracy and colleagues (e.g., Shariff & Tracy, 2009; Tracy & Robins, 2004; Tracy & Matsumoto, 2008; Tracy et al., 2013). Joy poses took up a great deal of space and were most likely to be unstable or as if in movement, with arms raised high above the head in a "Y" shape or straight in the air. Awe poses were stable, often with hands raised to the head. We did not identify a

prototypical pose for hope, but note that prayer hands were most frequently represented under hope postures, perhaps physically expressing the ties between hope and religion (Athimuthu & Van Cappellen, 2021; Ciarrocchi et al., 2008). The contexts in which hope typically arises, and the motivation to communicate and share hope, may represent important factors to consider when trying to characterize its full-body expression.

These findings not only show that postural expansion is present in affective states beyond dominance, but also suggest specific varieties of expansion that characterize different dimensions of affect. The combination of horizontal expansion of the arms and legs with assertive stability (e.g., in stance and arms akimbo) is the key feature of dominant posture. In contrast, joyful postures are the most expansive of those in Study 1, largely because the arms are thrown up and out, and the body is taking up space through motion, reflecting an activated, higher-arousal positivity. Awe postures were comparable to Dominance poses on expansion, but this was mostly seen in the arms, with the hands raised to the head, held forward and wide apart in an open gesture, or held out to the sides.

Study 2

Whereas Study 1 allowed participants to encode postural expressions of dominance, joy, hope, and awe, Study 2 invited participants to decode the resulting expressions in terms of dominance and affect valence, asking whether perceivers differentiate varieties of expansiveness communicating dominance from those communicating positivity (noting that among mainstream U.S. participants such as ours, the high-arousal version of positive affect is typically presumed and preferred; Tsai, Knutson, & Fung, 2006; Watson, Clark, & Tellegen, 1988). Participants viewed photos of Study 1 mannequin poses representing each of the four feeling conditions, without being told which feeling was intended by each, and rated them for dominance, positive affect, and negative affect. Analyses asked whether participants interpreted all forms of expansiveness as comparably dominant, or whether participants would pick up on the distinctions identified in Study 1. We predicted that, despite lower overall expansiveness, Dominance postures from Study 1 would be perceived as most dominant, with Joy poses as most positive and least negative in terms of valence.

Method

Participants

Participants were recruited from Amazon's Mechanical Turk (MTurk; N = 480). MTurkers needed to be U.S. citizens, to reside in the United States at the time of the study, and to have a 97% approval rate. Those who completed the study were paid $3.50 USD. Unfortunately, no demographic information was collected for this sample. Research has shown that a typical MTurk sample is composed of 57% females, 37% in their 30's, another 17% in their 40's (Litman & Robinson, 2020). The racial and ethnic composition of people on MTurk tracks fairly closely to the U.S. population, with the exception of African Americans who are slightly underrepresented (79.9% White, 11% Asian, 9.1% Black, 20.4% Hispanic).

Procedures

Participants completed the study entirely online, rating photographed mannequin poses from Study 1. Participants were presented with front- and side-facing images of each mannequin, but were not informed of the target feeling the posture was intended to represent. In order to avoid burnout, each participant only rated 35 postures randomly selected from the entire Study 1 dataset (a total of 3468 postures), one at a time and in a random order. In a first round of data collection, two to nine MTurkers rated each posture (we were targeting five coders per posture, however with the nature of the programming and MTurk data collection, this led to receiving an approximate range)[3]. In a second round of data collection, we secured at least five coders per posture (ranging from five to nine coders per posture). This procedure did not require approval from the authors' institutional review board.

Measures

For each posture, participants were asked to rate how much overall space the mannequin is taking up (0 = *as little as possible* to 100 = *as much as possible*), how much vertical space the mannequin is taking up (0 = *as little as possible* to 100 = *as much as possible*), and how expansive the mannequin is (-50 = *very constrictive* to 50 = *very expansive*). In addition, participants rated "in [their] own opinion, how submissive/dominant is this

[3] Data on perceived overall space, expansiveness, and vertical space for Joy and Dominance were published in the OSM of Van Cappellen and Edwards (2022) but were based on a smaller sample of data, collected in the first round.

posture?" (from -50 = *very submissive* to 50 = *very dominant*) and "does this posture represent the following state/moods:" positive state/mood and negative state/mood (from 0 = *not at all* to *100 = extremely*).

All participants' ratings for an aspect of each photographed posture were averaged to a single score. Thus, photographed posture rather than study participant is the unit of analysis. Postures for other feeling conditions (not representing our terms of interest) were included in the study, but are not relevant to the present research question, and results are described elsewhere (see Van Cappellen & Edwards, 2021 as well as full codebook and data collection preregistration here: https://osf.io/fujc2/).

Results

Data were analyzed using a generalized linear mixed model approach with a maximal random-effect structure (random effects for participant and item) following recommendations by Barr et al. (2013). In R, we used the *lmer()* function from the lmerTest package to fit the model, *anova()* function from the stats package to derive a p-value and F-statistic for the main effect of conditions, and *glht()* function from the multcomp package to examine pairwise contrasts between feeling conditions using Holm correction.

Results for subjective evaluation of the space taken by each posture (horizontal, vertical, and total) were virtually the same as for the objective measurements presented in Study 1, and details are therefore provided only in the Online Supplemental Material (OSM). As in Study 1, Joy postures were perceived as taking up the most space (significantly more so than all other conditions), Hopeful postures the least, with Dominance and Awe postures in between.

Perceived dominance differed among conditions overall, F (3, 496.98) = 47.08, $p < .001$. Perceived dominance in the postures representing Dominance (M = 18.96, SD =21.53) and Joy (M = 17.20, SD = 22.06), though not differing significantly from each other, were rated as significantly more dominant than awe (M = 5.53, SD = 22.91) and hope (M = 5.05, SD = 25.92), which also did not significantly differ. All significant differences were at $p <.001$.

Perceived positive mood differed among conditions overall as well, F (3, 436.9) = 38.06, $p < .001$. Postures of Joy (M = 70.23, SD = 25.83) were perceived as being significantly more positive than postures in all

other conditions: Dominance (M = 59.06, SD = 28.40), Hope (M = 56.44, SD = 27.03), and Awe (M = 54.41, SD = 29.08), and only Dominance also significantly differed from Awe, p = .042. Finally, perceived negative mood also differed among conditions overall, F (3, 394.28) = 15.28, p < .001. Postures of Joy (M = 23.89, SD =29.03) were perceived as being significantly less negative than postures in all other conditions: Hope (M = 29.58, SD = 28.14), Awe (M = 31.15, SD = 29.62), and Dominance (M = 31.46, SD = 29.96), none of which differed from each other. All significant differences were at p <.001.

Discussion

Consistent with their objective form, postures of joy from Study 1were perceived as more expansive than those of any other feeling, yet perceived dominance was highest in the dominance condition, with joy close (and not significantly) behind. Despite being just as objectively expansive as dominance postures, awe postures were perceived as significantly less dominant. This suggests that, consistent with Study 1, it is a particular variety of postural expansion that is perceived as dominance, rather than expansiveness per se. Consistent with predictions, the highly expansive postures of joy were perceived as expressing more positive and less negative affect than postures in any other condition. This suggests that overall expansiveness, particularly in the vertical dimension and through motion (which was often suggested by Joy postures in Study 1) may convey activated positivity rather than dominance.

Study 2 relied on Study 1 participants' poses to capture the flavor of postures of dominance and other pleasant affective states. Although these have the benefit of authenticity, they limit experimental control over key features. Also, participants' inferences about affect in Study 2 were limited to dominance and valence. Study 3 addressed these limitations by using new stimulus mannequin poses with systematically manipulated postural features, and examining how these postures were interpreted in terms of a broader range of affective dimensions.

Study 3

Study 3 expanded upon Study 2 in multiple ways. First, rather than using postures generated by participants in Study 1 as stimuli, we generated new mannequin poses that maintain constant horizontal

expansiveness and toe-to-toe expansiveness while systematically varying other features of posture: arm position (i.e., akimbo, high up in 11-1 position, or hands to head), head (i.e., straight or up), and stability (i.e., stable or unstable). The arm positions were selected because they distinguished among dominance (arms akimbo), joy (arms reaching high up), and awe (hands to head) in Study 1. Second, in addition to the affective dimensions of valence and dominance from Study 2, participants rated the affective dimension of arousal (the third dimension of the PAD model; Mehrabian & Russell, 1974), as well as the traits of extraversion (which is characterized by high-arousal positive affect; Smillie, DeYoung, & Hall, 2015), warmth, and competence (Fiske, 2018). This approach builds on research finding that emotional expressions are interpreted as conveying personality traits; for example, Knutson (1996) found that individuals displaying facial expressions of happiness were perceived as high on both dominance and affiliation.

The following hypotheses were pre-registered on OSF, along with an analysis plan (see https://osf.io/cswdy/): We hypothesized that dominance ratings would be predicted by main effects (and possibly interactions) of arms akimbo and stability. We hypothesized that affect positivity, arousal, and extraversion would each be predicted by interactions such that these ratings are highest among postures with arms reaching up, head raised upward, and instability. We did not preregister predictions regarding the postural predictors that convey warmth and competence, and these analyses remained exploratory.

Method

Participants

Adult participants (N = 183; 61.7% female; M_{age} = 31.52, SD_{age} = 13.09) were recruited through a community participant pool in the Durham, North Carolina area. Participants were compensated $7 USD for participating in a 30-minute study in the lab. Participants identified as White/Caucasian (56.8%), Asian (24%), Black/African American (14.2%), or other (4.9%), and 8.7% identified as Hispanic or Latino. Further, participants identified as Christian (37.7%), Agnostic (15.3%), spiritual but not religious (12.6%), nothing in particular (9.8%), Atheist (8.7%), Hindu (6.6%), Jewish (1.6%), Muslim (1.1%), Buddhist (1.1%), or other (5.5%).

Procedure and Materials

Participants were presented with 16 images of a mannequin one at a time, in a random order (see examples in Figure 1). We followed the same strict protocol for taking these photographs as in Study 1, such that the mannequin in each photo was located at the same distance from and orientation to the camera. Four images included a pose including prayer hands, not relevant to the present research question and not included in the current analyses. In the remaining 12 images the mannequin's posture was manipulated by altering three elements of the body: arms (akimbo, high up, or hands to head), head (straight or up), and stability (stable or unstable). Each possible combination of arms, head, and stability was presented, thus creating a 3x2x2 within-subject design across postures. All postures were equally horizontally expansive, taking the same amount of horizontal space. For each posture, participants were asked to "rate the mannequin (as if they were a person) on how you would perceive this person. Please note the differences in the posture of the mannequin (head orientation, movement, arms)." Participants then rated the mannequin on dominance (-50 = *very submissive* to 50 = *very dominant*), valence (-50 = *very negative* to 50 = *very positive*), arousal (-50 = *very calm* to 50 = *very energetic*), warmth (-50 = *very cold* to 50 = *very warm*), extraversion (-50 = *very reserved* to 50 = *very outgoing*), and competence (-50 = *very incompetent* to 50 = *very competent*). This procedure was approved by the authors' institutional review board.

Results

See Table 2 for Means and Standard Deviations of all variables among the entire sample (note that due to missing data exact means may vary slightly for each test). Some of our dependent variables were correlated to each other (see Table S2 in OSM). We therefore ran a three-way repeated measures MANOVA with three independent variables –arms, head, and stability– and six dependent variables – Dominance, Valence, Arousal, Extraversion, Warmth, Competence. Note that due to missing values, this analysis was run among 75 participants with complete data on all photos and all dependent variables. On the combined variables, there was a statistically significant main effect of arm position, $F(12, 63) = 14.9$, $p < .001$, Wilks' $\Lambda = .261$, partial $\eta^2 = .739$; of head position, $F(6, 69) = 4.82$, $p < .001$, Wilks' $\Lambda = .705$, partial $\eta^2 = .295$; and of stability, $F(6, 69) =$

11.84, $p < .001$, Wilks' $\Lambda = .493$, partial $\eta^2 = .507$; as well as statistically significant interactions between arm and head position, $F(12, 63) = 3.85$, $p < .001$, Wilks' $\Lambda = .577$, partial $\eta^2 = .423$; as well as arm and stability, $F(12, 63) = 2.5$, $p = .009$, Wilks' $\Lambda = .882$, partial $\eta^2 = .118$. The interaction between head and stability as well as the 3-way interaction were not statistically significant.

We pursued our analyses by investigating each dependent variable on its own using a three-way repeated measures ANOVA (these analyses relied on a larger sample). Pairwise comparisons for effects of arm positions used Sidak correction for multiple testing.

Dominance

Results showed a large main effect for arm position, $F(2, 254) = 84.95$, $p < .001$, $\eta_p^2 = .401$. Specifically, arms akimbo were perceived as displaying significantly more dominance than arms high, which were also perceived as significantly more dominant than hands to head. There were also large main effects for stability, $F(1, 127) = 85.45$, $p < .001$, $\eta_p^2 = .402$, and head position, $F(1, 127) = 17.20$, $p < .001$, $\eta_p^2 = .119$, indicating that postures that are stable and head up were perceived as more dominant.

These main effects were qualified by a significant but small 3-way interaction, $F(2, 254) = 3.91$, $p = .021$, $\eta_p^2 = .030$, as well as by an arm by head interaction, $F(2, 254) = 5.44$, $p = .005$, $\eta_p^2 = .041$ (indicating that only when hands are to the head, the direction of the head does not change perceptions of dominance), and a more substantial arm by stability interaction, $F(2, 254) = 12.86$, $p < .001$, $\eta_p^2 = .092$. We decomposed the latter by testing the effects of stability at each level of arm position and then the effects of arm position at each level of stability, averaging across levels of the head. Unstable postures were perceived as less dominant than stable postures across all three arm positions, but the magnitude of the effect is strongest for arm akimbo: when arms were akimbo ($F(1, 176) = 98.04$, $p < .001$, $\eta_p^2 = .358$); when arms were high up ($F(1, 170) = 28.68$, $p < .001$, $\eta_p^2 = .144$); and when hands are to the head ($F(1, 165) = 21.14$, $p < .001$, $\eta_p^2 = .114$).

These analyses also revealed a statistically significant difference among arm positions in stable, $F(2, 330) = 114.26$, $p < .001$, $\eta_p^2 = .409$, as well as in unstable postures, although the latter effect was smaller, $F(2, 330) = 52.55$, $p < .001$, $\eta_p^2 = .242$. For stable postures, arms akimbo were perceived as more dominant than

arms high (*Mean difference* = 12.47, 95% CI [7.63, 17.31]), and hands to head (*Mean difference* = 28.48, 95% CI [24.35, 32.62]). For unstable postures, pairwise comparisons showed the same results; arms akimbo were perceived as more dominant than arms high (*Mean difference* = 5.24, 95% CI [0.52, 9.96]) as well as to hands to head (*Mean difference* = 18.59, 95% CI [14.20, 22.98]).

An additional analysis revealed that, given the combination of arms akimbo and stability (rated as most dominant in the analyses above), displaying the head oriented upward resulted in still greater perception of dominance relative to the head directed straight (F (1, 169) = 10.19, p = .002, η_p^2 = .057).

Valence

Results showed a large main effect for arm position, F(2, 250) = 104.96, p < .001, η_p^2 = .456, such that arms high were perceived as displaying more positive valence than arms akimbo, which were also perceived as significantly more positive than hands to head. There was also a small to medium main effect of head position, F(1, 125) = 4.38, p = .038, η_p^2 = .034, such that that postures with the head up were perceived as displaying more positive valence than those with the head down. There was no main effect for stability, F(1, 125) = 0.43, p = .515, η_p^2 = .003, and no interactions were significant.

Arousal

Results showed only a main effect for arm position, F(2, 270) = 44.27, p < .001, η_p^2 = .247, such that arms high were perceived as displaying significantly higher arousal than arms akimbo, which were also perceived as significantly higher-arousal than hands to head.

Extraversion

Results showed a large main effect for arm position, F(2, 252) = 81.49, p < .001, η_p^2 = .393, such that arms-high postures were perceived as more extraverted than postures with arms akimbo (*Mean difference* = 11.13, 95% CI [7.01, 15.25]) or hands to head (*Mean difference* = 22.93, 95% CI [18.80, 27.05]), which did not differ from each other. This main effect was qualified by an arm x head position interaction, F(2, 252) = 4.07, p = .018, η_p^2 = .031. Probing this interaction (averaging across levels of stability) revealed that postures with the head up were perceived as more extraverted than the head straight when arms were high up (F(1, 171) = 4.45, p

= .036, η_p^2 = .025, but not when arms were akimbo (F(1, 171) = 2.22, p = .138, η_p^2 = .013, or hands to head (F(1, 166) = 2.13, p = .146, η_p^2 = .013. In addition, arms-high postures were perceived as more extraverted than those with arms akimbo both when the head was straight (*Mean difference* = 7.01, 95% CI [3.00, 11.02]) and when the head was up (*Mean difference* = 19.47, 95% CI [15.34, 23.60]). The main effects of head position, F(1, 126) = 0.24, p = .625, η_p^2 = .002, and stability, F(1, 126) = 2.54, p = .114, η_p^2 = .020, were not significant, nor were any other interactions.

Warmth

Results showed a large main effect for arm position, F(2, 220) = 53.51, p < .001, η_p^2 = .327, in which arms high were perceived as warmer than the two other arm positions, which did not differ from each other. There was also a main effect for stability, F(1, 110) = 23.63, p < .001, η_p^2 = .177, indicating that unstable postures were perceived as warmer than stable postures. The main effect of head position was not significant, F(1, 110) = 2.33, p = .130, η_p^2 = .021.

These main effects were qualified by an arm x head position interaction, F(2, 220) = 4.97, p = .008, η_p^2 = .043, as well as an arm x stability interaction, F(2, 220) = 4.15, p = .017, η_p^2 = .036. Probing the arm x head interaction (averaging across levels of stability) revealed that head-up postures were perceived as warmer than those with the head straight when arms were akimbo (F(1, 171) = 10.68, p < .001, η_p^2 = .059, or high (F(1, 171) = 4.31, p = .039, η_p^2 = .025, but not when in a hands to head position (F(1, 160) = 0.48, p = .491, η_p^2 = .003. In addition, postures with arms high were perceived as warmer than those with arms akimbo (*Mean difference* = 14.97, 95% CI [11.23, 18.72]) or hands to head (*Mean difference* = 9.60, 95% CI [5.84, 13.35]) when the head was straight, as well as when the head was up (akimbo, *Mean difference* = 13.71, 95% CI [10.43, 16.99], hands to head *Mean difference* = 13.44, 95% CI [10.01, 16.87]).

Probing the arm x stability interaction (averaging across head positions) revealed that unstable postures were perceived as warmer than stable postures when arms were akimbo (F(1, 168) = 20.72, p < .001, η_p^2 = .110, and when arms were high (F(1, 171) = 22.59, p < .001, η_p^2 = .117, but not when in a hands to head position (F(1, 159) = 1.44, p = .232, η_p^2 = .009. In addition, postures with arms high were perceived as warmer than

those with arms akimbo (*Mean difference* = 15.12, 95% CI [11.19, 19.05]) or hand to head (*Mean difference* = 9.66, 95% CI [6.08, 13.24]) when the posture was stable, as well as when the posture was unstable (versus akimbo, *Mean difference* = 13.23, 95% CI [9.91, 16.56]; versus hands-to-head *Mean difference* = 13.45, 95% CI [10.05, 16.85]).

Competence

Results showed a large main effect for arm position, $F(2, 206) = 53.72$, $p < .001$, $\eta_p^2 = .343$, such that postures with arms akimbo and arms high were each perceived as more competent than those with hands to head, but did not differ from each other. There was also a main effect for stability, $F(1, 103) = 27.92$, $p < .001$, $\eta_p^2 = .213$, indicating that stable postures were perceived as more competent than unstable postures. These main effects were qualified by an arm x stability interaction, $F(2, 206) = 8.93$, $p < .001$, $\eta_p^2 = .080$. Probing this interaction (averaging across head positions) revealed that unstable postures were perceived as more competent than stable postures when arms were akimbo ($F(1, 153) = 32.67$, $p < .001$, $\eta_p^2 = .176$, and when arms were high up ($F(1, 145) = 7.22$, $p = .008$, $\eta_p^2 = .047$, but not in a hands to head position ($F(1, 143) = 0.14$, $p = .712$, $\eta_p^2 = .001$. In addition, postures with arms akimbo were perceived as more competent than arms high (*Mean difference* = 3.36, 95% CI [0.50, 6.22]) and than hands to head (*Mean difference* = 16.79, 95% CI [12.74, 20.84]) when the posture was stable; when the posture was unstable arms akimbo were *not* perceived as more competent than arms high (*Mean difference* = -1.04, 95% CI [-4.37, 2.29]) but were perceived as more competent than hands to head (*Mean difference* = 9.68, 95% CI [5.79, 13.56]). The main effect of head position was not significant, $F(1, 103) = 0.16$, $p = .688$, $\eta_p^2 = .002$, nor were any interactions involving head position.

Discussion

As hypothesized, a significant three-way interaction showed that postures combining arms akimbo, stability, and a slightly raised head were perceived as conveying the greatest dominance. This postural configuration maps closely to one identified by Tracy and Robins (2004) and used in much subsequent research on the nonverbal expression of pride. This particular variety of expansive posture was also perceived as relatively high in competence.

The postural predictors of strong positive valence, arousal, and extraversion also came close to hypotheses, with combined arms high and head raised (but not necessarily postural instability) leading to the strongest inferences. This is consistent with the proposal that high-arousal positive affect, rather than dominance, is communicated by the vertical dimension of expansiveness. Adding instability to this postural package appears to nudge inferences toward interpersonal warmth, the third aspect of affect linked to postural expansion in prior research (e.g., Burgoon, 1991; Patterson, 1983).

General Discussion

Across the literature on nonverbal communication, there is a strong theme in which postural expansiveness signals dominance, pride, and power (e.g., Cuddy et al., 2018; Park et al., 2013; Shariff et al., 2012; Tracy & Robins, 2008). However, other research suggests that postural expansiveness can also communicate high-arousal positive affect (Dael et al., 2012; Witkower & Tracy, 2019a) and interpersonal warmth (e.g., Burgoon, 1991; Patterson, 1983). In the present research we aimed to differentiate the affective messages communicated through postural expansiveness by (a) examining distinct forms of expansiveness (i.e., horizontal, vertical, overall space, toe-to-toe, finger-to-finger) while considering their interactions with other postural elements (e.g., head position, arm position); and (b) expanding the range of inferred affect dimensions and affect-laden personality characteristics (e.g., extraversion, warmth) assessed within the same study.

Across three studies we found that overall expansiveness, especially vertical elements such as arms raised high above the head and head lifted, primarily communicates high-arousal positive affect and its dispositional counterpart, Extraversion (Smillie et al., 2015). Adding instability to this configuration – suggesting that the figure is in motion – increases likelihood that the posture is perceived as expressing interpersonal warmth. We further found that a stable, solid, moderately expansive posture with arms akimbo and head somewhat raised is most distinctly perceived as expressing dominance. This posture is consistent with the prototypical expression of pride, and particularly one of the two pride displays described by Tracy and colleagues in their rich body of work (cf. pride expression A, e.g., Shariff & Tracy, 2009; Tracy & Robins, 2004; Tracy & Matsumoto, 2008; Tracy et al., 2013). Other dominant/powerful postures examined in prior

research also combine moderate expansiveness with postural stability, e.g., sitting upright with one's hands spread wide on a desk (Park et al., 2013).

Across studies, results further suggest that arm position plays a particularly important role in differentiating postures associated with distinct affective dimensions and positive emotion states. As noted earlier, mannequin-posed postures created for and recognized as expressing joy typically had arms raised above the head, either straight up or in a Y-shaped configuration. Postures of awe were objectively as expansive as those of dominance, but displayed a signature arm position with the hand(s) touching the head, perhaps reflecting the appraisal of extraordinariness and distinct cognitive activity associated with awe (Shiota et al., 2007; Danvers & Shiota, 2017). In contrast, effects of head position were generally smaller than the effects of arm position. It's not clear from the present data whether this is due to the lesser visibility of head-position changes as compared to arm-position changes on our mannequin, or whether head position has less impact in real life.

Strengths, Limitations, and Future Research

One strength of the present research is the inclusion of a fairly large sample of lay participants in the Study 1 expression-production study, rather than the professional or trained actors used in many prior studies (Wallbott, 1998). Also, the expression-production method employed - positioning a small mannequin – was highly innovative and effective, allowing participants to depict postures they might have hesitated to enact themselves in a laboratory setting. Moreover, because the same mannequin was used in all sessions, physical expansiveness could be assessed in a standardized way regardless of the actual participant's size, body shape, gender, etc.. Studies 2 and 3 each used large samples, diverse as to gender, age, and region of the U.S.. Most important, the inclusion of several systematically manipulated postural elements in the posed stimuli, as well as ratings for a variety of affect states and affective traits, made it possible to tease apart different inferences based on postural expansion, especially in Study 3.

The present studies also present several limitations, each with implications for future research. First, the current results are restricted to the cultural context of community-based and MTurk samples in the United

States. In particular, the Study 1 sample for the encoding of expressions in Study 1 was majority white, and living in a specific region of the U.S.. Although work by Tracy and colleagues (2008) already suggests strong cross-cultural consistency in the expression and interpretation of pride, our findings linking varieties of expansiveness to distinct affective messages may or may not generalize to other cultural contexts. This will be an important question for future research.

Second, the present studies were limited to analysis of postural displays included in the Study 1 archival data, originally designed to address research questions about posture during prayer (Van Cappellen & Edwards, 2021). This data set included the affective dimension of "dominance" as well as the specific emotions joy, awe, and hope, rather than focusing exclusively on either approach. As a result, the postures in Study 1 may have failed to include elements that would further differentiate affective states, including subtle variants of dominance itself. For example, recently-published research suggests that the postural signal of dominance (as seen in the present studies) differs in subtle ways from that associated with prestige, defined as social rank attained through knowledge and expertise (Witkower et al., 2020). Future research linking the posture of prestige to affective states could prove quite interesting.

Third, our results are restricted to features of a static body; even postural instability was inferred in Study 1, based on implausibility of a posed posture being sustained without motion. Differentiation among varieties of expansion may exist in qualities of movement (e.g., speed, fluidity) as well as posture per se. Future research using video records capturing movement and observational coding systems including such qualities may document additional aspects of movement missing in this research (Dael, et al., 2012; Witkower et al., 2020). Similarly, given our mannequin's blank, featureless face, we are unable to investigate implications of interactions between bodily and facial expression (Witkower & Tracy, 2019b).

Finally, as in much previous research on nonverbal expression, our mannequin posture stimuli were presented to Study 2 and 3 participants without any information about the context in which the postures were adopted. Features of the situation in which the posture is displayed (e.g., location, eliciting situation), of the person displaying the posture (e.g., culture, gender), and of the potential target of nonverbal communication

(e.g., social rank), can all be expected to modulate norms for appropriate ways to express emotions through the body, as well as affective meaning inferred from a given posture (e.g., Adams et al., 2015; Hwang & Matsumoto, 2013; Kayyal et al., 2015). Implications of gender for the expression of dominance, relative to other expansive states, will be of particular interest (Burgoon, 1991; Hess et al., 2000). A dynamic interactive framework can be particularly useful in understanding how these multiple factors come into play, positing that the perception of emotions and personality traits from nonverbal expressions emerges from an integrated system relying on domain-general cognitive properties. The process of interpreting an expression is fast but gradual, and incorporates both the objective features (studied here) and the features the perceiver brings into the perceptual process (social cognitive factors such as stereotypes, attitudes, goals; Freeman et al., 2020). All these individual and contextual factors will be important to study in future research.

In sum, this work provided novel data on configurations of expansiveness that signal dominance (stable posture, arms akimbo and head slightly raised) versus high-arousal positive affect (posture of vertical expansiveness combining arms reaching high up and head oriented up), and feelings of warmth (a posture of vertical expansiveness that appears in motion).

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Table 1

Expansiveness and Postural Elements Coded From Mannequin Poses for Dominance, Joy, Hopeful, and Awe (Study 1)

	Dominance	Joy	Hopeful	Awe	Omnibus Effect
Expansiveness	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	
Overall	96.76 (22.26)$_b$	139.02 (38.33)$_c$	79.31 (29.53)$_a$	95.03 (33.91)$_b$	$F = 104.72$, $p < .001$
Horizontal	6.51 (1.36)$_b$	8.85 (2.41)$_c$	5.73 (1.74)$_a$	6.61 (2.19)$_b$	$F = 73.68$, $p < .001$
Vertical	14.81 (.64)$_b$	15.78 (1.85)$_c$	13.79 (2.54)$_a$	14.37 (1.88)$_{a, b}$	$F = 32.94$, $p < .001$
Finger-to-Finger	6.31 (1.47)$_c$	4.02 (2.08)$_a$	5.43 (1.61)$_b$	6.48 (2.19)$_c$	$F = 57.42$, $p < .001$
Toe-to-Toe	3.71 (1.17)$_b$	4.02 (2.08)$_b$	3.32 (.94)$_a$	3.36 (.94)$_a$	$F = 12.60$, $p < .001$
Head Positions	**%**	**%**	**%**	**%**	
Straight	67.81$_b$	56.84$_{a, b}$	47.95$_a$	50.68$_a$	$Q = 14.34$, $p = .002$
Up	22.6$_a$	42.47$_b$	45.21$_b$	45.89$_b$	$Q = 24.31$, $p < .001$
Down	9.6$_b$	.68$_a$	6.85$_{a, b}$	3.42$_{a, b}$	$Q = 14.20$, $p = .003$
Arm Position					
Relaxed	6.85$_{a, b}$	2.05$_a$	13.01$_b$	8.22$_{a, b}$	$Q = 13.45$, $p = .004$
Forward-Close	1.37$_a$	1.37$_a$	8.9$_b$	3.42$_{a, b}$	$Q = 15.19$, $p = .002$
Forward-Open	3.42$_a$	5.48$_a$	5.48$_a$	9.59$_a$	$Q = 5.18$, $p = .159$
Extended Side	9.59$_a$	3.42$_a$	5.48$_a$	6.16$_a$	$Q = 5.04$, $p = .169$
Y-Shape	2.05$_a$	48.63$_b$	3.42$_a$	8.9$_a$	$Q = 150.14$, $p < .001$
High	.68$_a$	17.12$_b$	3.42$_a$	1.37$_a$	$Q = 49.39$, $p < .001$
Akimbo	42.47$_b$	0$_a$	6.16$_a$	2.05$_a$	$Q = 143.83$, $p < .001$
Hand(s) to Head	2.05$_a$	2.74$_a$	6.85$_a$	42.47$_b$	$Q = 131.99$, $p < .001$
Prayer	0$_a$	.68$_a$	12.33$_b$	.68$_a$	$Q = 45.20$, $p < .001$

Other	$31.51_{b, c}$	$18.49_{a, b}$	34.93_{c}	17.12_{a}	$Q = 19.59$, $p < .001$
On the Floor					
No	100_{c}	$97.26_{b, c}$	84.93_{a}	$91.1_{a, b}$	
Yes	0_{a}	$2.74_{a, b}$	15.07_{c}	$8.9_{b, c}$	$Q = 33.64$, $p < .001$
Instability					
Stable	97.95_{b}	76.71_{a}	97.95_{b}	97.26_{b}	
Unstable	2.05_{a}	23.29_{b}	2.05_{a}	2.74_{a}	$Q = 69.44$, $p < .001$

Note. $N = 146$. Expansiveness values are in cm; other postural element values are percentages of all postures in that condition. Q = Cochran's Q, $df = 3$. See main text for additional detail on omnibus tests. Differing subscript letters indicate significant pairwise differences after Sidak (expansiveness) or Bonferroni (other elements) correction for escalating familywise Type I error.

Table 2

Means and Standard Deviations of Perceived Characteristics for each Posture (Study 3)

Arms	Head	Instability	Dominance *M* (*SD*)	Valence *M* (*SD*)	Arousal *M* (*SD*)	Warmth *M* (*SD*)	Extraversion *M* (*SD*)	Competence *M* (*SD*)
Akimbo	Straight	Stable	**27.54 (16.95)**	9.54 (23.57)	8.22 (23.72)	-6.51 (20.17)	8.68 (22.43)	**19.91 (18.89)**
Akimbo	Straight	Unstable	11.70 (21.55)	10.38 (18.12)	7.70 (21.24)	1.60 (18.83)	7.93 (21.02)	12.46 (17.33)
Akimbo	Up	Stable	22.72 (20.72)	15.02 (22.24)	10.34 (24.17)	-1.19 (20.44)	13.44 (21.67)	18.56 (18.44)
Akimbo	Up	Unstable	7.43 (25.09)	11.75 (22.2)	8.34 (24.38)	5.08 (19.68)	7.23 (20.92)	11.04 (18.56)
High	Straight	Stable	17.95 (23.29)	17.88 (22.72)	**20.52 (23.12)**	9.33 (20.51)	**21.09 (19.75)**	15.53 (18.98)
High	Straight	Unstable	6.11 (24.84)	20.85 (20.52)	19.42 (23.62)	16.05 (18.31)	18.99 (20.89)	13.69 (18.18)
High	Up	Stable	6.97 (26.67)	21.93 (20.02)	16.12 (23.6)	13.56 (18.95)	17.53 (19.91)	16.37 (18.08)
High	Up	Unstable	1.20 (27.21)	**22.27 (19.62)**	19.21 (24.23)	**17.33 (16.39)**	17.56 (21.11)	11.78 (18.53)
Hands to head	Straight	Stable	-3.39 (18.3)	-3.89 (16.81)	2.31 (19.1)	2.94 (16.8)	-2.24 (20.13)	2.18 (17.43)
Hands to head	Straight	Unstable	-10.28 (19.81)	-3.85 (20.25)	2.28 (19.86)	2.97 (17.27)	-4.83 (20.78)	0.73 (17.76)
Hands to head	Up	Stable	-4.37 (18.79)	-3.94 (19.03)	2.64 (19.34)	0.72 (17.54)	-2.83 (18.07)	2.66 (18.52)
Hands to head	Up	Unstable	-9.99 (20.27)	-2.70 (20.37)	6.09 (21.89)	3.47 (18.08)	-1.76 (19.87)	1.81 (18.86)

Note. Highest mean for each characteristic is in bold.

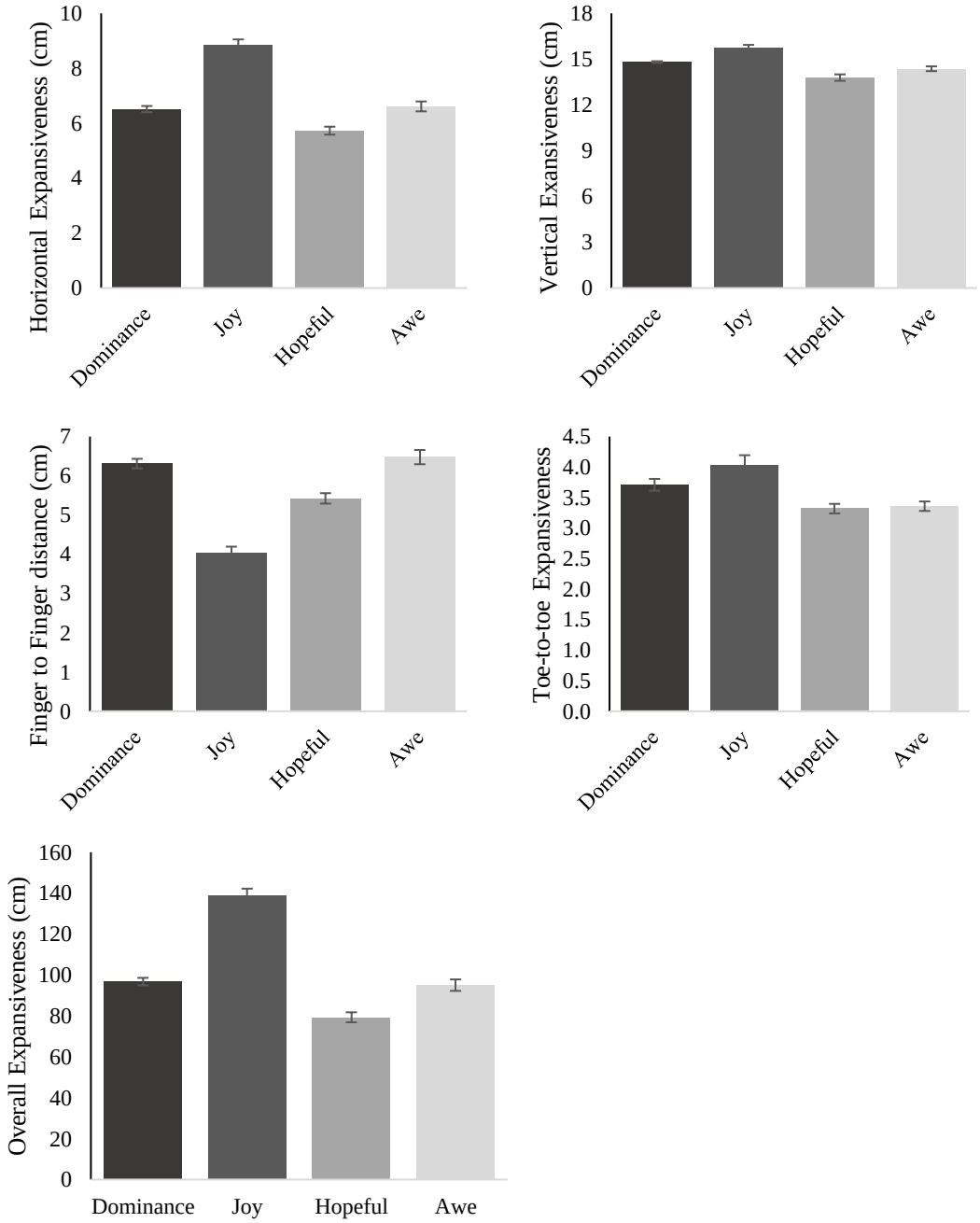
Figure 1

Examples of Mannequin Poses and Photographs

Note. Mannequin used in Study 1 and examples of postures presented in Studies 2-3. In Study 3, most dominance and competence perceived from posture A, most arousal and extraversion perceived from posture B, and most warmth and positive valence perceived from posture C. Posture D shows most frequent arm position to represent awe, i.e., hands to head.

Figure 2

Postural Expansiveness Results from Study 1



Note. Horizontal (top left), Vertical (top right), Finger-to-finger (middle left) and Toe-to-toe (middle right) and Overall (bottom left) levels of expansiveness for awe, joy, hopeful, and dominance in Study 1.