

A decade of 'power posing': Where do we stand?

Tom Loncar on credibility and challenges

Could a small postural adjustment make us feel more powerful when facing stressful situations? The 'power pose' has instilled confidence for many who have tried it since its introduction in 2010. Yet its credibility continues to be questioned by researchers. Here, we examine power posing's 10-year journey to date, and the challenges that still remain.

In 2010, researchers from Columbia and Harvard Universities examined whether brief postural adjustments – 'power poses' – could produce positive psychological, behavioural and hormonal outcomes. Their experiment revealed an emphatic 'yes' on all three questions, with the everyday implications clearly apparent. Stressful interpersonal contexts, such as job interviews, presentations and important meetings, could be helped through preparatory postural adjustment.

As the decade progressed, power posing became an idea whose time had come; a hugely successful TED Talk, widespread organisational acceptance and a number of eye-catching interpretations by leading politicians. Despite this widening embrace, deeper academic questions emerged. Replication attempts did not reproduce the complete breadth of original results, and by 2016 power posing was firmly embroiled in the 'replication crisis' affecting social psychology.

But power posing would not go away. Larger quantitative examinations of its evidentiary credentials have suggested that significant benefits do remain... though with some caveats. With a recent systematic review and meta-analysis shedding further light on how postures can affect our emotions and behaviours, it is time to reflect on power posing's chequered first decade. Where it came from, where it now stands ... and where to next?

Origins

Within social psychology, research into embodiment and embodied cognition explores how our postures and bodily movements can influence our emotional states (Veenstra et al., 2017). Its lineage can be traced back to the ideomotor action ideas of 19th century philosopher and psychologist William James, who asserted that emotions arise from physiology, so that bodily expressions contributed to the consequent feeling of emotions (James, 1950). In more recent times, embodiment has provided a rich terrain for exploration. The manipulation of facial expressions, voice management, breathing and posture can induce diverse emotional feelings, including happiness, sadness, anger and fear (Laird & Lacasse, 2013).

Physical posture has provided a particularly insightful lens for examining feelings of power – and powerlessness – across both human and animal studies (Ellyson & Dovidio, 1985; Huang et al., 2011). And referencing the gamut of postural research literature, three researchers from Columbia and Harvard Universities – Dana Carney, Amy Cuddy and Andy Yap – put forward an elegantly simple question in the September 2010 issue of *Psychological Science*: Can posed displays cause a person to feel more powerful?



Power posing is born

The researchers identified two distinct nonverbal dimensions universally associated with demonstration – and absence – of power, with high-power postures based on expansiveness and openness (e.g. leaning back on a chair with arms behind the head), and low-power poses based on contractive and closed positions (e.g. sitting tensely in chair with hands held tightly in lap). (You can see the poses in the figures at tinyurl.com/dcarnpower).

Their hypotheses were ambitious; they put forward that high-power poses would lead to positive results across three measures.

- *Psychological* changes (through participants feeling more 'powerful' and 'in charge', subjectively assessed on a 4-point scale).

- *Neuroendocrinal* changes in dominance and stress hormones (with dominance hormone testosterone increasing and stress hormone cortisol decreasing, measured via saliva samples pre and post pose).
- Adaptive *behavioural* changes through increased risk-tolerance (measured through a gambling task).

In their experiment, 42 participants (26 females/16 males) were randomly assigned to each condition, and then held two postures for one minute each. The participants weren't wise to the researchers' true purpose; an elaborate cover story was used in setting up the poses in order to facilitate the ecological validity of the experiment. All participants were told the study was about the science of physiological recordings and electrode placements, with their bodies then positioned

by an experimenter into high-power or low-power poses.

Statistically significant outcomes emerged across each of the hypotheses. Hormonally, testosterone went up over baseline for the high-power group, and down for the low-power group, with cortisol going the opposite way. Behaviourally, there was a higher reward-focus in the high-power group, while psychologically, the high-power group felt more powerful and in control than their low-power counterparts. While consideration of experimental limitations was discussed, other areas for methodological circumspection were not covered at all (for example, the fact that all participants were Columbia University students was not mentioned). There was an exciting message to share: ‘That a person can, by assuming two simple 1-minute poses, embody power and instantly become more powerful has real-world, actionable implications’ (Carney et al., 2010, p.1363).

2012-2015: Power posing stands up and gets noticed

Power posing’s breakthrough into wider awareness

occurred at the TEDGlobal conference in June 2012, when Amy Cuddy branched off from her collaborators with her talk ‘Your body language may shape who you are’. Her presentation offered compelling evidence along with a moving personal narrative; a brilliant student, who had a very bad car accident resulting in significant brain injury, who then had to relearn *everything* in re-orienting herself in her academic world. With support from her doctoral advisor Susan Fiske, Cuddy learned to *fake it till she became it*, with postural awareness a key part of her success. Her talk resonated and remains the second-most watched TED Talk of all time (behind only the late Sir Ken Robinson’s iconic ‘Do schools kill creativity?’). By 2015, power posing’s reach was successfully making inroads across society, including some awkwardly fulsome interpretations by politicians at the 2015 Conservative Party conference. With Amy Cuddy’s book *Presence* also released that year, 2015 was the year where everything seemed to be coming together for power posing.

Yet a starkly contrasting narrative was also emerging...

2015: Replication issues emerge

Beneath the public embrace, serious academic questions also began to emerge. In March 2015, the first notable question was raised in *Psychological Science* by the University of Zurich’s Eva Ranehill and colleagues. Their ‘conceptual replication’ – while successfully replicating self-reported feelings of power – failed to produce significant results for the behavioural and hormonal measures. Their study featured more participants (N = 200), and provided a more even gender mix than the original study (98 females/102 males) (Ranehill et al., 2015).

The original authors were quick to respond. The very next month in the same journal they listed the numerous methodological departures made by Ranehill and colleagues, including a longer posture duration (six minutes), the extent of participant briefing, the nature of behavioural tasks and timing of saliva measurement (Carney et al., 2015). They also provided a narrative review of 33 studies which featured experiments examining nonverbal expansive postures more broadly, with a total of over 2500 participants and with statistically significant results across a range of dependent variables (in addition to feelings of power, these also included pain tolerance, feelings of pride, self-esteem and action orientation). They emphasised the need for future replication efforts to be as direct as possible and, in the spirit of openness, lead author Dana Carney made original research materials available on her academic web portal. The researchers urged this review to serve as a springboard to ‘moving forward the study of nonverbal expansiveness’ (Carney et al., 2015, p.662).

Embroiled within the replication crisis

Despite this transparency, a broader replication crisis was brewing across social psychology, where established domains of evidence that had been held in high regard were simply failing to replicate. A central reference point was The Reproducibility Project led by Brian Nosek and the Center for Open Science, a crowdsourced collaboration of 270 researchers seeking to replicate 100 published psychological studies (Nosek et al., 2015). The project, which commenced in 2011, was ready to report in August 2015. It found that only 36 per cent of these apparently rigorous studies could replicate. With further replication questions emerging in 2016 (Deuter et al., 2016; Garrison et al., 2016), power posing’s original lead author Dana Carney announced a stark personal turnaround in September of that year: ‘I do not believe that “power pose” effects are real’ (Carney, 2016).

2017: Social psychology draws a line

Amidst the discord, the journal *Comprehensive Results in Social Psychology* (CRSP) sought to draw a definitive line on the topic through a special issue

Key sources

- Carney, D.R., Cuddy, A.J.C. & Yap, A.J. (2010). Power posing: Brief nonverbal displays affect neuroendocrine levels and risk tolerance. *Psychological Science*, 21(10), 1363-1368.
- Carney, D.R., Cuddy, A.J.C. & Yap, A.J. (2015). Review and summary of research on the embodied effects of expansive (vs. contractive) nonverbal displays. *Psychological Science*, 26(5), 657-663.
- Cuddy, A.J.C., Schultz, S.J. & Fosse, N.E. (2018). P-curving a more comprehensive body of research on postural feedback reveals clear evidential value for power-posing effects: Reply to Simmons and Simonsohn (2017). *Psychological Science*, 29(4), 656-666.
- Cesario, J., Jonas, K.J. & Carney, D.R. (2017). *CRSP special issue on power poses: What was the point and what did we learn?* Taylor & Francis.
- Elkjær, E., Mikkelsen, M.B., Michalak, J. et al. (2020). Expansive and contractive postures and movement: A systematic review and meta-analysis of the effect of motor displays on affective and behavioral responses. *Perspectives on Psychological Science*. doi:10.1177/1745691620919358
- Simmons, J.P. & Simonsohn, U. (2017). Power posing: P-curving the evidence. *Psychological Science*, 28(5), 687-693.

Full list available in online/app version.

devoted entirely to power posing, comprising seven pre-registered studies (Cesario et al., 2017). Dana Carney herself reviewed all submissions and provided feedback to the researchers who submitted. Each study offered distinct examinations of behavioural and hormonal outcomes, with the aggregated evidence strongly indicating there was ‘virtually zero effect’ on these two measures (Jonas et al., 2017, p.140).

However, this was not the case for subjective feelings of power (referred to as ‘felt power’ throughout the issue). Here, an aggregated Bayesian meta-analysis applied to all observations (N = 1071) by Gronau et al. (2017) revealed significant results for the overall sample, as well as for sub-sample breakdowns based on prior power posing awareness (for example, knowledge of Cuddy’s TED Talk). In summarising CRSP’s special issue, 28 co-authors indicated that ‘it is clear that an effect on felt power was observed’ (Jonas et al., 2017, p.139), with future research best directed at disentangling what this means (for example, in research designs that account for gender, degree of extraversion and cognitive flexibility).

The p-curving wars of 2017-2018

Despite this emergent cordiality in 2017, another quantitative war was also transpiring. Parallel to CRSP’s examination, Simmons and Simonsohn (2017) submitted Carney et al.’s (2015) 33 studies to a *p*-curve analysis. *P*-curving is useful within replication contexts through showing the *distribution* of statistically significant *p*-values within a body of research. Examining the shape of *p*-values can inform whether selective publication, *p*-hacking and/or data-mining is present (Simonsohn et al., 2014). The *p*-curve for these studies was flat and therefore *lacking in empirical support* (Simmons & Simonsohn, 2017). A major caveat to this conclusion, however, became apparent; the main analysis excluded *p*-values associated with subjective feelings of power, which the authors described as manipulation-checks rather than dependent variables.

A *p*-curving response from Amy Cuddy with colleagues from Harvard’s Institute for Quantitative Social Science soon followed (Cuddy et al., 2018). They argued that subjective experience is a central tenet of social psychology, and worthy of treatment as an equally weighted dependent variable. Further to the 33 studies, 21 additional studies were identified through a systematic literature search for what they termed postural-feedback literature. Their *p*-curving analyses revealed ‘very strong’ and ‘strong’ evidentiary



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support across their analyses, including those studies specifically examining feelings of power. They suggested these findings annulled Simmons and Simonsohn’s (2017) conclusions and that researchers should be encouraged to continue investigations.

So, by 2018, a clearer and quantitatively-backed narrative was appearing for power posing. Large analyses seemed to be indicating that while original neuroendocrinal and behavioural claims could not be supported, some promise still remained in the subjective domain... with power posing capable of facilitating significant and potentially beneficial feelings of power in individuals.

2019: An elephant in the room

Despite all the attention placed upon power posing’s evidentiary credibility, a crucial elephant in the room was largely ignored until September 2019 when Iowa State University’s Marcus Credé made an important observation in the journal *Meta-Psychology* (Credé, 2019). He noted that an overwhelming number of studies included by Cuddy et al. (2018) *excluded* a control or ‘neutral pose’ condition. In other words, this evidentiary base was largely comprised of experiments located at lower levels of the hierarchy of scientific evidence.

The implication is that significant results could have been driven by a positive effect of an expansive pose, or a negative effect of a contractive pose... or a combination of both! The absence of a neutral reference point means we cannot truly know. In delving further into the few studies – four in all – that actually included a control or neutral pose, Credé observed overall effects predominantly driven by a negative effect from a contractive pose, rather than a positive effect emanating from an expansive pose.

And in 2020...

This theme was more recently expanded in June 2020 through a systematic review and meta-analysis conducted by Emma Elkjær with colleagues from Aarhus, Witten/Herdecke and Columbia Universities, published in *Perspectives on Psychological Science* (Elkjær et al., 2020). Their search identified randomised experimental studies examining whole body motor displays in healthy adults, with the aim of inducing an expansive or contractive posture (which Carney et al. (2010) referred to as the ‘cardinal study’ for their paper). Their search process identified 73 studies (underpinned by 7038 participants), of which 48 were appropriate for inclusion in their statistical

meta-analysis, with the remainder examined through narrative synthesis. Four moderating factors were explicitly taken into account: (i) the comparison conditions, including whether a neutral condition was present; (ii) the nature of experimental manipulation of bodily displays; (iii) the type of outcome assessment (e.g. affective and/or behavioural – with hormonal outcomes also included in the latter); and (iv) the contextual conditions, namely the intra and interpersonal environment of the experiment.

Pooling the data together, their meta-analysis showed two significant comparison outcomes: expansive versus contractive and contractive versus neutral, with the latter comparison more positive. The expansive versus neutral comparison, however, was not significant. The authors concluded that experimental effects are more influenced by the absence of contractive rather than the presence of expansive displays. As Credé observed earlier, the authors did note the paucity of studies with a neutral control (they identified 14 through their search). They made the following preliminary conclusion: ‘Together, these results can be taken as preliminary evidence of the impact of contractive displays on affective and behavioral responses’ (Elkjær et al., 2020, p.22).

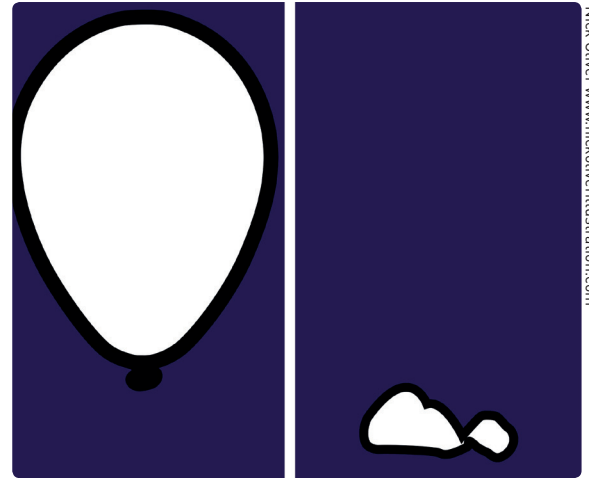
In addition to advocating for future designs to include neutral controls, two other interesting recommendations emerged from their analyses.

Firstly, cortisol was included as an outcome measure within four of the included studies, with their net inference distilling an effect size ‘trending toward significance’ (Elkjær et al., 2020, p.23). While this contrasts with the CRSP analyses, it may indeed be too early to entirely dismiss cortisol as an outcome of relevance. Given its measurement challenges and complexities, the need for improved protocols (such as collecting blood samples as opposed to saliva, and more carefully sequenced assessment points) was strongly endorsed.

Secondly, contextual factors emerged as a potentially problematic area in studies to date. For example, five of their included studies indicated that incongruent conditions, such as adopting expansive postures when experiencing personal failure, had the potential to cause quite distressing outcomes. Future experiments need to be mindful of the interpersonal and personal contexts that participants are placed in, including consideration of using personally relevant goals (rather than experimentally induced goals).

‘These findings are vindicating’

The toll on Amy Cuddy in defending postural research against often vitriolic academic attack over the years has undoubtedly been heavy (Dominus, 2017). So how did this latest meta-analysis land with power posing’s foremost proponent? In a tweet on 27 June



Puffed up or deflated? Posture may matter when it comes to subjectively experienced feelings of power

2020, she indicated: ‘At this point, anyone who claims these effects are not real cannot support that claim with science. These findings are vindicating’. With Cuddy’s next book *Bullies, Bystanders, and Bravehearts* scheduled for publication in 2021, a positive and forward-looking new chapter for the power posing narrative has potentially emerged (TED Talk Books, 2019).

“Future experiments need to be mindful of the interpersonal and personal contexts that participants are placed in”

Where next?

Ten years on, power posing has possibly – and belatedly – arrived at the future research springboard that had been hoped for in the narrative review of 2015 (Carney et al., 2015). The more nuanced springboard of 2020 has been made possible by more recent large-scale quantitative scrutiny which has suggested that *posture does matter* when it comes to subjectively experienced feelings of power... but it may be a question of mindful avoidance of any contractive postural tendencies, rather than forced expansion. Adding neutral posture controls into future research designs will elucidate this important evidentiary – and practical – question. Intra and interpersonal contexts must be more carefully addressed in experimental settings, through systematically addressing for who, how, and where postural adjustment can be most beneficial. This will elevate power posing from a potentially misinterpreted one-size-fits-all idea, to more specific and actionable understanding.

While it may be through paths quite different to those originally envisaged by Dana Carney, Amy Cuddy and Andy Yap, after an eventful ten year journey, power posing may now be ready to expand.



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