

Kaleidoscope

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Gloria Gaynor was an early proponent of resilience, winning many converts with her reflections on ‘how you did me wrong I grew strong, and I learned how to get along’. Tapping into this – resilience, not ’70s disco – to improve mental health outcomes is a growing concept, but does evidence support this sensible, if sometimes loosely defined, idea? Dray *et al*¹ provide a timely systematic review of 57 randomised controlled trials of universal resilience-focused interventions targeting children and adolescents in school settings. Meta-analysis showed that, compared with control conditions, interventions were effective in reducing depressive symptoms, internalising and externalising problems, and general distress, but not anxiety, hyperactivity or conduct problems. However, there was variation between age groups and duration of intervention. Not all data were amenable to meta-analysis – the inability to divide results by gender being noteworthy – but these findings support the principle of general resilience-focused preventive programmes in this cohort.

Future work may need to be more tailored in elucidating the specific resilience intervention and clinical/sociodemographic factors that optimise outcomes. Braithwaite *et al* tackle these latter aspects,² systematically reviewing modifiable factors that increase vulnerability to, or protect against, depression following childhood maltreatment. Such adverse experiences are clearly a risk factor for the development of depression, but it is striking that many who suffer these traumas do not develop mental illness. Evaluating 22 studies that covered over 12 000 individuals, the authors also note how study differences made cross-comparison difficult. Nevertheless, with these caveats, interpersonal relationships, cognitive vulnerabilities, and behavioural difficulties may be modifiable predictors of depression. This important field remains underdeveloped and better prospective work is required.

Stress can cause psychotic experiences (PEs); what about the example of being victimised by the police? This is a delicate but serious topic: undoubtedly the vast majority of police do a great and frequently selfless job, but they commonly interface with individuals in their most challenging environments and situations. DeVlyder and colleagues³ take data from the survey of police-public encounters ($N=1615$) that covered a general population across four US cities. Those who reported police victimisation – physical, sexual or psychological harms or neglect – were significantly more likely to report sub-diagnostic-threshold psychotic experiences, even after adjusting for confounders of demographics, co-occurring distress that might impact recall, and crime-involvement reverse causation (PEs leading to criminal behaviour). There was a linear dose–response relationship and the authors invoke the social defeat hypothesis. However, the cross-sectional nature means causality cannot be determined, and a linked editorial notes substance use and post-traumatic stress disorder (PTSD) as competing explanations. The call for better police training, especially in disadvantaged neighbourhoods, would seem appropriate whatever the cause. US policing clearly differs from that in the UK – the paper contrasts police killings of respectively 1100 and 1 in the two countries across a 1-year period.

Writing in *the BJPsych* 16 years ago, Harrison spoke of ‘striking heterogeneity’ in 15- and 25-year outcomes in schizophrenia.⁴ Have things improved? Kotov *et al*⁵ report on a 20-year

follow-up of 373 individuals from the time of a first in-patient admission with psychosis; as part of the study all were evaluated six times over this period. 175 had a diagnosis of schizophrenia/schizoaffective disorder by the end-point, and in this group global assessment of functioning (GAF) and negative and positive symptoms of psychosis all worsened significantly. Indeed, 74% of those with schizophrenia were described as having been continuously ill. Those with psychotic mood disorders showed an initial GAF improvement, but this declined after year 7. ‘Disorganisation’ ratings also worsened in all groups through to year 20, and alterations to GAF were largely driven by apathy–asociality: controlling for aging and medication use ruled out these potential confounders as causal. Disheartening data when we look to instil hope, though the American authors note how ‘treatment as usual’ outcomes may be better in countries such as the UK that have universal healthcare and where active psychosocial and vocational rehabilitation are practised.

It would clearly help to better understand the mechanism underlying hallucinations, perhaps the holy grail of modern cognitive science. A contemporary theory of perception emphasises the Bayesian notion that the brain computes the probability of a percept (given some stimulus) as a function of the current bottom-up sensory evidence (or likelihood) for the stimulus (given the percept) multiplied by the top-down prior probability of the percept (roughly, the existing belief for a given percept). So, if one strongly expects to hear a voice (i.e. the prior of the percept is exceptionally strong), then no matter what the current sensory evidence (e.g. the likelihood) one perceives a voice. Powers *et al*⁶ examine a similar theory in the context of Pavlovian conditioned hallucinations – where an auditory stimulus (a 1 kHz tone) is presented simultaneously with a checkerboard visual stimulus, and then, after training, participants report the presence of the auditory stimulus in trials where only the visual stimulus was present. Participants were from four groups ($n=15$ each): those that experience daily auditory hallucinations (or not) and those with a diagnosed psychotic disorder (or healthy controls). All four groups were susceptible to induced hallucinations by conditioning, but those with daily hallucinations reported more conditioned hallucinations (regardless of having a diagnosis or being healthy). Functional magnetic resonance imaging (fMRI) demonstrated that conditioned hallucinations activated brain regions consistent with other studies on hallucinations. They fitted participants’ behavioural data with a multi-level computational model comprising ‘units’ that represent a low level auditory/visual stimulus belief layer, an intermediate level modelling associations between auditory and visual stimuli, and a further level which models the volatility of these associations. These ‘beliefs’ were modelled so they evolved in time in response to the current experimental event. This ‘stack’ then fed into a further level which weighted current sensory evidence against the prior belief so that they could be given equal weight or one preferred over the other. In those with a higher propensity for daily hallucinations (irrespective of formal diagnosis) the low-level stimulus and intermediate association layer beliefs were stronger. Further, at the volatility level, those with a diagnosis of psychosis showed less evolution of belief over time compared with controls. Finally, in those experiencing daily hallucinations irrespective of diagnosis, the ‘weighting’ layer was biased toward the prior belief (rather than current sensory evidence) – consistent with the literature on hallucinatory phenomena being explained by a ‘strong prior’ theory.

Science thrives on debate. Recently, Jeremy Hunt (BA, Philosophy, Politics and Economics) admonished Stephen Hawking (Lucasian Professor of Mathematics) on his understanding of statistics,

specifically those underpinning the so-called hospital ‘weekend effect’ in the controversial paper by Freemantle *et al.*⁷ That paper uses the word ‘significantly’ only once (and then when discussing previous findings), and they use the term ‘modestly statistically different’ to describe the Friday and Saturday increase in the point-estimate of hazard ratio (for death within 30 days) with respect to Wednesday admissions. These statistically different effects are reported as confidence intervals that appropriately do not include 1.0 and are reported alongside *P*-values of the order 0.001; what about the replicability? Benjamin *et al.*⁸ continue the reproducibility debate addressing the notorious academic zombie that is the *P*-value. Beyond publication bias (see above), multiple testing (also, see above) and underpowered studies, they propose lowering the threshold for testing null hypotheses to 0.005 (one order of magnitude lower than the Fisherian tradition of 0.05). Their argument proceeds by proposing that results where $P < 0.05$ should be described as ‘suggestive’, whereas ‘significant’ should be reserved for results where $P < 0.005$. Using arguments derived from Bayes factor tests (that include an estimate of the prior odds of a true effect), Benjamin *et al.* show that rejecting the null hypothesis at $P < 0.05$ with a prior odds of 1:10 of a true effect leads to a false-positive rate of 33% (far above the received wisdom of ‘1 in 20’ false-positives touted with $P < 0.05$).

Teaching is part of all our lives, so what makes a good teacher? We all regularly give and receive feedback on this – does this help determine quality? Uttl *et al.*⁹ meta-analysed almost 100 studies on the student evaluation of teaching (SET) standardised ratings commonly used in US universities, and similar to the Likert-style forms used in the UK and elsewhere. As well as providing a means for professional reflection and appraisal, they have somewhat controversially been used as a proxy of teaching effectiveness in decisions on hiring, promotion and so forth. In this, the largest study of its kind, the authors found no significant correlation between SET scores and student performance. Whatever students are basing their feedback decisions upon, it does not appear to be how much they have learnt, and the authors propose SETs may be measuring students’ perceptions of the appropriateness of their workload for their received grades. The potential follow-on is that this produces an iterative loop of ‘grade inflation and work deflation’ in higher education. We can’t just blame students: we’re reminded of a paper in the *BJP* *Psych Bulletin* last year by Gilberthorpe *et al.*¹⁰ that showed consultants commonly leave banal, target-free comments on trainees’ workplace-based assessments.

Finally, what leads to success in life? In terms of educational and occupational achievement, is it primarily brains and hard work, or more a pinch of luck and a large dollop of who you know? Of course all of these matter, but how relevant is each? It is an area typically rife with more speculation than science, perhaps most commonly when gossiping that it wasn’t a colleague’s grey matter or work ethic that got them where they are today. Malcolm Gladwell’s pop psychology book *Outliers* popularised the so-called ‘10 000 hour rule’, that one could become world-class in any field with that amount of ‘deliberate practice’ – that’s 20 hours a week for 10 years, if you’re suddenly inspired to become Britain’s leading light on disco divas – but that journalistic consideration has been criticised for being anecdote led. Wai & Rindermann¹¹ of the Talent Identification Program at Duke University explore the science, looking at a sample of almost 12 000 that included chief executives, judges, politicians, millionaires and billionaires, and business leaders. Over half of them were in the top 1% intellectually when young – so brains definitely help. However, an ‘elite’ education in a top school and network connections were also key; the authors note the famous stories of creative successful college drop-outs

like Bill Gates and Mark Zuckerberg are rare exceptions, and the large majority in positions of influence and power graduated, very many from the top schools. The best colleges produce the best career networks, providing these already gifted and achieving individuals even greater access to further success. Different occupations pulled upon varying degrees of intellectual giftedness – it might interest you to know, for example, that politicians were in the ‘less bright’ set of social achievers, though we are not necessarily trying to link this to the aforementioned Hunt–Hawking debate. The authors make worthy recommendations that governmental policy should try harder to redress the iniquitous aspects of a posh education and old school ties by investing in the most intellectually bright from disadvantaged backgrounds. Of course, this leads to the seeming paradox of appealing to those in power, who frequently come from the better backgrounds.

Perhaps a better way is to redefine what ‘success’ means. Hedonia is pleasure, but eudaemonia is self-realisation and the proposed key to a ‘good’ life. These two phenomena have been conceptually distinguished since the ancient Greeks, though they didn’t have fMRI scanners, and differential neural correlates have been lacking. Luo *et al.*¹² found that a eudaemonic hedonic balance (EHB) was encoded in the default mode network (DMN). EHB – having a focus on self-reflection rather than attaining pleasure – was positively correlated with functional connectivity of the bilateral ventral medial prefrontal cortex (vmPFC) within the anterior default mode network, and the bilateral precuneus within the posterior DMN. Measurement of the good life and what matters to us as humans, or as Gloria might have concluded, ‘I’ve got all my life to live, I’ve got all my love to give’. We *know* you’re singing the last line; go on now, go.

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