

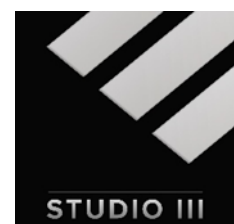


The Role of Exercise in Stress Reduction

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Published online February 2024

Studio 3 Clinical Services and Training Systems



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Providing care and support to people in the caring professions is often fraught with stressful interactions. The stress-induced cascade of hormonal and molecular responses can, if left unchecked, serve to disorientate you to the world, culminating in a negative view of future interactions and, more nefariously, the individual themselves. Over time, the feelings of helplessness and fatigue entrench themselves and burnout becomes imminent. The purpose of this article is to make a case for exercise as a means by which we can re-orientate ourselves to the world: that the biological processes initiated by exercise can fundamentally alter the cellular, neurological, and sensory landscape, leading to a more resilient individual able to cope with, and bounce back from, stressful episodes.

A Stress Case Study

Sarah has been working in a supported living service for 22 years, 15 of which have been with the same individual called David. David is a kind, personable soul who has an intellectual disability, and due to a life of hardship and abuse, suffers from complex PTSD. For Sarah, working with David can be a volatile experience given his traumatic past, which can rapidly manifest in the form of verbal and physical aggression. While Sarah's 15 years of experience with David has, to some extent, desensitised her to his proclivity for aggression – it's just "David being David" – underneath the façade, Sarah is struggling to cope. But like the fabled frog who, sitting in a pot of steadily heating water doesn't realise it's boiling before it's too late, Sarah also didn't realise the effect that working in an unpredictable environment was having on her mental and

physical health. Until, that is, on a rainy Tuesday morning, when pulling up to David's house she was met by a torrent of rage and, to her surprise and later to the surprise of her superiors, broke down in tears and decided she was done. That afternoon the GP signed her off work with stress.

Stress is a term that, in contemporary use, refers to prolonged psychological strain. The term brings up images of hunched over office workers busily typing under a mountain of paperwork, or more extreme, listening to babies crying for hours on end. Ultimately, it is agreed that stress is something to be avoided at all costs. Its original conception though, by Dr. Hans Selye in the mid-20th century, was to simply denote the physiological response to 'noxious stimuli,' namely temperature, toxins, and muscular exertion, free from any judgement of 'good' or 'bad.' Dr Selye found that the application of such stimuli would set off a cascade of general physiological reactions that was largely proportional to the amount of stimulus used; little stimulus = little response; large stimulus = large response. Over the following decades, researchers tinkered with the types (psychological, physical, environmental), amounts, frequency, and duration of stimuli, which revealed that our response to stress is highly adaptive so long as the exposure to the stimulus was appropriately managed. Too much exposure would lead to ill health and eventually death, whereas frequent exposures to a small-medium stimulus, or exposure to a large stimulus with appropriate rest, would result in adaptation such that the exposure to similar amounts of stimuli the next time around would result in less of a response (i.e., the body was more resilient).

With this understanding, Sarah's eventual breakdown comes as less of surprise and more an inevitability. Using Dr Selye's and his posthumous colleagues' work, we

can reasonably speculate about what was happening to Sarah physiologically over the 15 years of working in a 'stressful' environment:

1. The initial exposure to aggressive behaviour would initiate what Dr. Selye would call an 'alarm reaction,' a reaction that sets off a cascade of 'stress hormones' coordinated by the hypothalamus, pituitary gland, and adrenal glands, to the resulting release of cortisol and adrenaline – both of which serve to mobilise the body to respond to the stressor by fighting or running away. The physiological symptoms of this cascade are an increase in heart and breathing rate, dampening of pain receptors, the production of sweat, and increased vigilance around the perceived sources of stress.
2. The proceeding weeks and months of working with a complex and unpredictable individual such as David would do little to truly stem this stress response with each encounter. In fact, the rumination about past and future encounters with David could well have formed an insidious and continuous release of cortisol and adrenaline to the point where Sarah's natural circadian rhythms become disorganised. For example, more time spent wide awake at night while becoming increasingly tired during the mornings and day time, appetite begins to flatten out across the day, and Sarah may have to increasingly rely on external stimulants (coffee, redbull) to maintain productivity. A vicious cycle of too frequent and intense a stress response begetting too little recovery time, repeated daily, would mean Sarah was essentially bathing in stress hormones for much of her time.

3. To buttress Sarah from the ill effects of the stress, her body would initiate what Selye would term the 'resistance' stage: a flooding of the body with immune and inflammatory cells that would attempt to reduce any cellular damage Sarah may be suffering. The tragic irony of long exposure to stress-inducing situations though is that the very defences your body uses to protect you initially, ultimately exacerbate the problem further as the frequent continuous influx of inflammatory cells becomes problematic, further compounding the damage that is already present.
4. Years of continuously going through this cycle brings about the final stage of Selye's model, 'exhaustion,' At this point, general physical and psychological/cognitive health begin to decline more rapidly. More trips to the GP, more time off sick, lack of energy for meaningful relationships and pursuits, more arguments at home, and a general sense of dread or resentment over the prospect of interacting with the perceived sources of stress - in this case, David.

'Malignant alienation' is a term often used to describe the feelings of disliking a client who you've been charged with supporting and has been discussed at length elsewhere (Naismith & O'Shea, 2022). From a physiological perspective, we can understand the forces driving such alienation when we consider the impact of the stress response on our perceptions of the world around us.

For instance, let's try and imagine what the world looks like for Sarah with each interaction with David. Before the initial meeting with David when Sarah reads his clinical profile, the warnings of aggression and unpredictability would stand out

amongst the other descriptive statements, such is our evolutionary hard wiring to heavily attend to the negative and dangerous aspects of our environment. Understandably the feelings of nervousness and anxiety start to rise, and cortisol starts to seep into the system. That first drive up to David's house does little to stem the flow, in fact a call from her supervisor saying he'll be late but for Sarah to go on ahead and introduce herself sends her anxiety into a rapid climb. David, being the kindly and personable man he is, welcomes her in and sits with her to talk. With a sense of relief, Sarah starts to settle into the conversation but never truly relaxes, the thoughts of 'unpredictable' and 'aggression' simmering in the back of her head. Flickers of annoyance from David at misunderstood statements capture her in such a way that she begins to pay more and more attention to the words she's using and how they may be interpreted. The result is that by the time Sarah gets back to her car, the 20-minute conversation feels like a 2-hour marathon, and she feels an understandable sense of relief and pride in surviving it. For the rest of the day, there's a euphoric spring in her step that steadily gives way to a complete crash as bedtime rolls around. Of course, in the morning, those feelings of elation start to erode as the prospect of the first full shift with David begins to draw closer and the cycle begins again.

This pattern continues over the months and years, with every iteration of the cycle begetting more cortisol, more vigilance over her interactions, such that the anxiety becomes increasingly entrenched. The first plate thrown, the first shout and punch, all serve to increase the space that the 'idea of David' takes up in Sarah's waking thoughts. The joy of Friday slips into increasing dread over the weekend as Monday morning draws closer. Days are counted down to Holidays and long weekends, but can never be fully enjoyed in the moment, because the thought that she'll have to go back is always there. As the resistance and exhaustion phases start

to truly settle in, social engagements and hobbies begin to ebb away: the prospect of doing something after a shift just seems too tiring, and every spare moment is needed to relax. This is the particularly insidious nature of stress and the moments that malignant alienation begin to emerge – as Sarah’s attention is increasingly taken up with thoughts of David, the ‘idea of David’ begins to mutate into something more terrible that leaves little room for anything else. A reciprocal narrowing of Sarah and her world begins with the ‘idea of David’ at the centre of it. Over time, the idea that this is in some way a controlled and personal attack, however false, seems increasingly justified.

What power then does exercise have in helping mitigate this cycle of stress?

When considered through the lens of Selye’s work, exercise is a stress like any other, prone to the same physiological highs and lows. But at its most fundamental level, exercise differs in the nature of its application; a directed and targeted source of stress that is phasic and multi-modal rather than chronic and singular. What does this mean? It means that unlike the forms of stress that we would consider more damaging, such as the psychological stress Sarah is suffering, which is sustained, corroding, and singularly focussed, exercise is a largely infrequent (relatively speaking), often high dose form of stress that comes in many forms and that we recognise as needing rest and recovery from. This phasic ‘dosing’ of stress in the form of movement and physical exertion has multiple advantages across different scales and dimensions.

At an acute physiological level, the relative high dose of stress, as muscular exertion, temporarily floods the brain with ‘endorphins’ – the word being a contraction of ‘endogenous’ and ‘morphine’, i.e. an internal, potent, pain killer – which stems the

sensations of pain and instead replaces it with an often pleasurable, clear-headed feeling. It goes without saying what benefits Sarah may derive from frequent exposures to natural pain relief throughout the week.

At a more chronic physiological level, as Sarah begins her exercise regime, the frequent exertion provides a productive use for the cortisol currently flooding her system. As part of a 'fight or flight' response, cortisol's primary role is to initiate the release of glucose into the blood stream for the muscles and brain to use as fuel to offset fatigue. The consequence of this for Sarah is that over time, her cortisol levels begin to subside and re-establish their regular diurnal rhythms, particularly as Sarah's fitness increases and training gets tougher, which will help sleep to come more readily. With the frequent release of endorphins coinciding with the purging of cortisol, the vigilance with which Sarah attends to her environment begins to soften. The world is beginning to open again.

While exercise is a very specific form of stress, some of its most advantageous consequences come in the form of initiating very generalised, system-wide responses. Its phasic and multi-modal nature is why exercise proves a useful, and more enjoyable, method to reap these benefits. As discussed, Selye's work hinted that when sufficient recovery is given between exposures, the body adapts to the point of becoming resilient to the previous level of stress-stimulus. This process begins at a cellular level.

Take a muscle cell for instance, that in being forced to exert begins to break down. The 'resistance phase' begins in response to the presence of damage and releases a cascade of cellular interventions in the form of 'chaperone proteins' that serve to repair and strengthen the cell against future injury. What is particularly useful about these proteins is their ubiquitous presence across the body and ability to interact

with different cell-types. What this means is that while the stress of exercise may be specific to groups of muscles, it carries generalised responses that can serve to repair damage and strengthen elsewhere in the body as those proteins enter the blood stream. One area where this is most beneficial is the brain. Indeed, a useful feature of such proteins is, unlike other substances and molecules, their ability to cross the blood-brain barrier and carry their reparations out on previously damaged neurons, such as ones exposed to too much cortisol, while promoting the formation of new neuronal networks. Such repair and generation go a long way to stemming the cognitive decline Sarah was at risk of, particularly as she gets older. In fact, exercise is one of the few interventions we have that has been shown to offset cognitive decline to the extent that our 'fluid' intelligence can to some extent remain intact as we reach our older years, reducing the risk of diseases such as dementia and Alzheimer's.

This exercise-induced boost in immune functioning yields favourable psychological effects. An interesting line of evidence for this is captured in the psychological profiles of athletes undergoing training regimes for competition. A sweet spot seems to exist along the lines that Selye described, where increasing exercise and exertion was accompanied by appropriate rest and recovery. If this sweet spot was maintained, researchers found that positive affect would blossom in the athletes, manifesting in increased motivation for more training and workloads, confidence, desire to compete, ability to deal with setbacks, along with general feelings of wellness - effectively, the athletes were becoming more resilient. One might argue that this is unique population who thrives off of stress, however similar relationships have been shown across general populations, even in animals such as mice; where groups of mice with better immune systems were more resilient (in this case, more likely to go out and get cheese in the presence of a cat).

For Sarah then, embarking on her exercise regime, the world is hopefully feeling increasingly less hostile and closed off. In fact, the obstacles and difficulties she feels, particularly around her interactions with David, may start seeming more like appropriate challenges that she is motivated to overcome and think through. For these psychological responses to exercise are not epiphenomenal, as in stemming from the physical changes with no causal input themselves, but in fact feedback back into the system that is Sarah the individual, propagating more interactions with her environment that further boost her physicality, and in turn offer more potential for interaction themselves in a reciprocally dynamic way.

Indeed, at increasingly abstract levels from the physiological, exercise generates an emerging and expanding environment across spatial and temporal domains. How could this be? Imagine when Sarah first stepped into the gym after years of sedentary living. At this stage her fitness has likely significantly limited her physical horizons. A walk to the shops would result in breathlessness and discomfort, to the extent any other more engaging pursuits or activities in life would be subconsciously, and often consciously, deemed too much effort. Coinciding with the stress she was experiencing from work, Sarah and her environment had reciprocally narrowed to the point where her world constituted: her flat, her car, Tesco's, David's house, and occasionally her parents' house at the weekend. As Sarah begins to train and her muscular strength and cardiovascular fitness improve, what coincides with, or is perhaps the causal agent for, the positive psychological affect discussed, is the subconscious felt sense of being strong. At this level, things no longer start to feel like 'too much effort,' and with every unit increase in strength or fitness, physical expression begins to open up in exponential ways. As an example, acquiring the physical ability to jog 5km without stopping doesn't just result in more time spent

jogging 5km, but often results in: joining races, new ways to interact with friends, jogging in different locations which begets discovering new places, going for hikes, walking to more places, having the energy to do hobbies after work and more. All of these in turn open up their own individual worlds of potential interactions. Again as an example, someone who discovers hiking may turn it into a reason to travel, a reason to have more picnics on hill tops with friends, take children, nieces and nephews sledging etc. This of course further boosts and maintains the physical capabilities and energy of the individual for further activities. Before long, Sarah's calendar is bulging with activities to look forward to.

For Sarah, the intervention of exercise, for all the reasons outlined, directly counters her reciprocally narrowing world, and instead drives the cycle back into a world in which she, along with her environment, is reciprocally expanding. As a result, 'the idea of David' steadily reduces as her attentional horizon increases with new opportunities for interaction. Expanding alongside this is her identity as someone who is more than the 40 hours per week she puts in as a care worker, but in fact now encompasses a broad range of identities which emerge alongside new activities. As a result, her sense of self-worth is heavily buttressed across multiple dimensions, and the bad days at work no longer shake her sense of self to the point of seeing David's behaviour as a personalised attack. In time, the malignant alienation dissipates.

For more resources on stress reduction and coping, visit www.studio3.org/atlass.

References

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