



The Neuroscience of Trauma



We Can Heal From Trauma – Our Bodies Hold The Guide

The following handouts, explain trauma from a neuroscience perspective and how our bodies carry the imprint of trauma. If we want to know how trauma impacts us and how to heal, we must first understand different brain functions, how they respond to threat or danger, and how they work with the rest of our body to keep us safe.



The Reptilian Brain: Consists of the brainstem and cerebellum (lower regions of the brain). This part of the brain is responsible for survival responses including eating, sleeping, waking or arousal, heart rate and breathing.



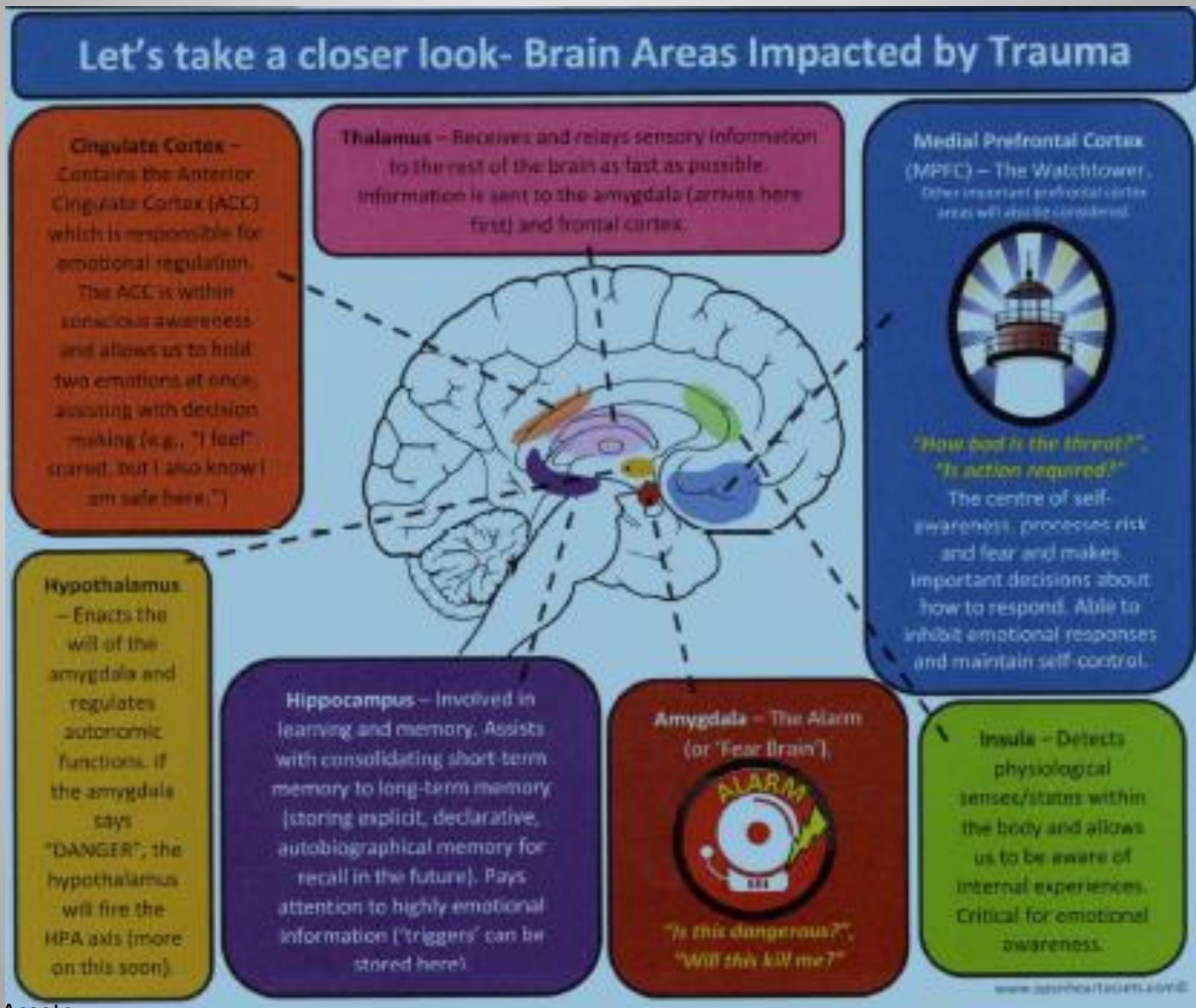
The Mammalian Brain: Consists of the limbic system (internal middle section of the brain). This part of the brain is involved in monitoring danger, non-verbal memory, and emotion (identification of pleasure, safety, threat, excitement, pain, and desire).



The Thinking Brain: Consists of the frontal cortex (outer area of the brain and surrounds the limbic system). This part of the brain is required for conscious thought and self-awareness, problem-solving, verbal expression and memory for facts and events.

The Emotional Brain consists of the Reptilian and the Mammalian Brain. These brain functions occur (almost entirely) outside of conscious awareness.

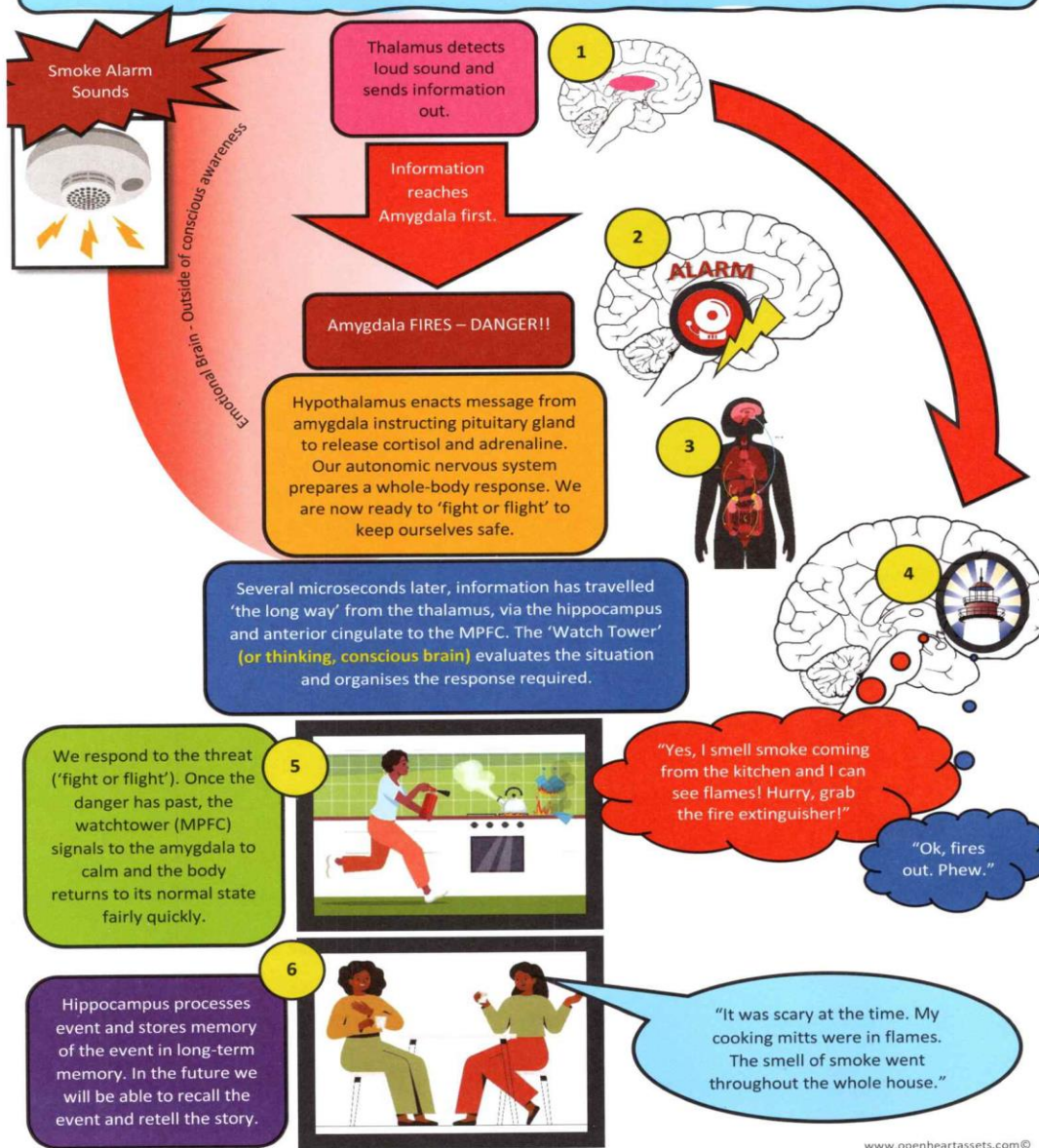
The Neuroscience Of Trauma





Our Brain and Body Work Together to Keep Us Safe?

Before considering what happens in our brain and body during a traumatic event, let us consider how our brain and body typically respond when a threat is detected. This is a simple example designed to cover some important concepts and key brain/body functions. We will consider other (more complex) reactions next.





What is Trauma?

Trauma refers to the **emotional, psychological, and physiological effects that remain** after exposure to an incident (or series of incidents) that are emotionally disturbing or life-threatening. Trauma symptoms can disrupt ones' coping abilities and impact everyday functioning.

Simple Trauma:

Typically refers to a single traumatic incident and may result in a diagnosis of PTSD.

Two Types of Trauma:

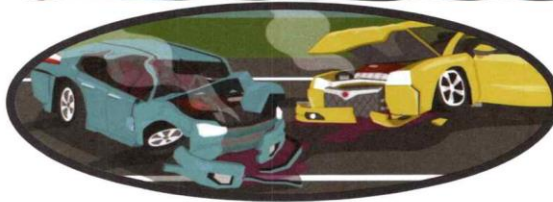
Complex Trauma:

Usually caused by long-lasting trauma that continues or repeats over months or even years. Frequently referred to as complex PTSD (CPTSD) and often results because of childhood trauma.

Although the development of simple versus complex trauma is different, the impact on ones' brain and body is similar. For ease of communication, the following examples will focus on singular traumatic events.

So What Happens When We Experience Trauma?

Above we looked at how the amygdala (or brain alarm) fires in response to a threat. This happens before we are even conscious. Our bodies automatically pump full of cortisol and adrenaline, ready to 'fight or flight'. It is not until our frontal cortex (or self-aware watch tower) signals to our unconscious emotional brain that it is safe to relax, before our bodies will begin to ease and unwind. But what if it's not safe to relax? What if we are forced to remain in a state of 'fight or flight' for a prolonged period, or worse, forced into freeze, collapse, or immobilisation due to the helplessness and terror of the situation?

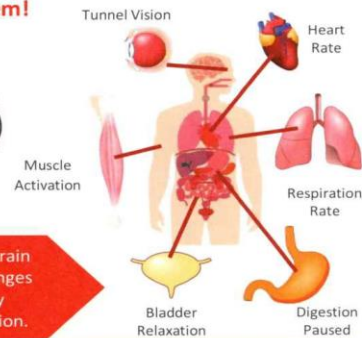


Case Study:

Two drivers are involved in a serious car accident. One driver has a passenger. The two drivers remain conscious throughout the incident. There are prominent odours of gasoline and smoke. The extent of their injuries is unknown. Emergency services arrive shortly after with sirens.

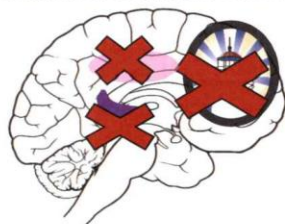
The Amygdala Hijacks the System!

When confronted with terror, our brain's alarm system (the amygdala) will hijack the brain, causing the body to secrete inordinate amounts of adrenaline and cortisol. This response overwhelms the system and communication between brain areas breaks down.



The unconscious emotional brain is in charge and activates changes in emotional arousal, body physiology, and muscular action.

Numerous Functions Shut Down.



The **frontal lobe** shuts down including the areas required to express feelings with words. The **thalamus**, responsible for integrating sensations (such as sounds, sights, and touch) into an integrated autobiographical memory goes offline. The **hippocampus**, needed for the correct storage of memory from short-term to long-term is inaccessible. Communication between various brain structures is blocked and traumatic experiences are being absorbed as incoherent fragments of sounds, visions, physical sensations, and smells.

THE WORLD WILL ASK YOU WHO YOU ARE, AND IF YOU DON'T KNOW, THE WORLD WILL TELL YOU.

CARL JUNG

The Neuroscience Of Trauma

Two Responses to Trauma?

As shown above, the emotional brain will override the system causing the activation of arousal (via the autonomic nervous system) throughout the whole body. However, not everybody will respond the same way when experiencing a traumatic event. People will either move into a survival/protection state of 'fight or flight' (mobilisation) or 'freeze' (immobilisation). **We cannot choose our response!** Interestingly, the response we typically resort to during a traumatic event is a strategy or behaviour we may have learnt during childhood (e.g., a child copes with her father's verbal abuse by blanking out her mind versus another child who learns to defend himself from his brother's attacks by fleeing or fighting back.) People who have experienced childhood trauma are more likely to 'freeze'. Let us consider these two responses in relation to the above case study.



'Fight or Flight' Mobilise (Run or Fight).

The sympathetic nervous system causes a surge of energy (heart and respiration rate increase, and blood rushes to main muscle groups).

The man in the first car, rushes out of the wreck to alert other cars that may be approaching, stopping further collisions. Cars are coming thick and fast. His passenger is trapped, heavily bleeding with his legs crushed. He is unconscious and he cannot free him despite his efforts. He fears the worst. He can smell gasoline and smoke. The man frantically calls for help from people who begin to gather. He paces and calls his friend's name, hoping to rouse him. People warn him to move away from the vehicle fearing an explosion. Some time passes before a bystander points out he is bleeding and badly injured himself. When the fire truck arrives, he screams, panicked, and directs them.



'Freeze' Immobilise or Shut Down "Don't move. It's not safe."

The reptilian brain instructs the body to freeze. The parasympathetic nervous system engages enough to slow heart and respiration rate leading to collapse, weakness, shaking, trembling and physical collapse. Nausea occurs and loss of bowel control or diarrhea.

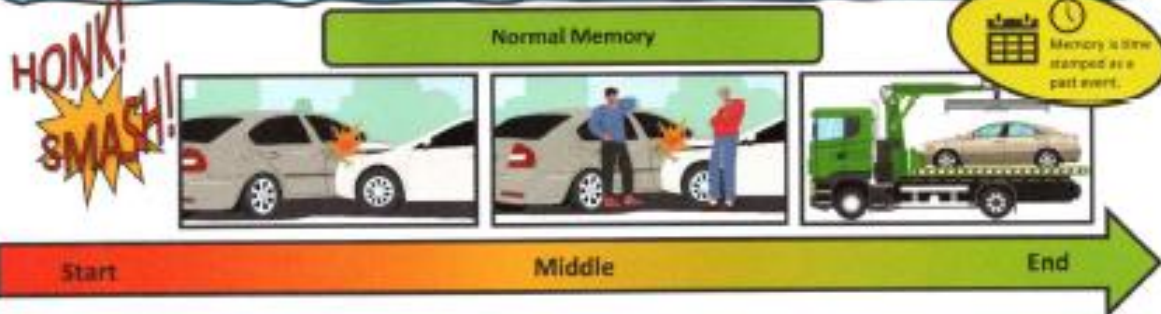
The woman in the other car stares at her steering wheel. Her senses numb. People are talking to her, but it sounds like they are far away. Things appear dream-like and strange, hazy and grey. She does not move or respond despite being conscious. The ambulance services transfer her to hospital. She remains in a dream like state, numb and dissociated. She is kept overnight under observation. Her family take her home in the morning.



Th

Normal Memory Versus Trauma Memory

A fundamental concern relating to trauma is memory, remembering too much (repeatedly hijacked by the overwhelming arousal of the incident endured) and remembering too little (fragmented memory and missing pieces). When our system is hijacked by the emotional brain, communication between different areas of the brain is interrupted, stopping the integration of sensations, thoughts, and emotions experienced during a traumatic event. This is referred to as dissociation. Let us examine the difference between normal and traumatic memory.



Our brains love to store memories of events that have high emotional arousal. Provided our systems are not overwhelmed, the hippocampus and other areas of the brain (e.g., the thalamus and dorsolateral prefrontal cortex) will coordinate to integrate various aspects of an event (such as time, place, sequence, thoughts, emotions, sounds and smells) and store it in long term memory as a coherent narrative. Normal memories have a beginning, a middle, and an end. These memories are 'time stamped' as have taken part in the past. The event is over.



When the amygdala hijacks the system and various brain functions shut down, the different sensations that enter the brain at the time of the trauma are dissociated and not properly assembled into a story. There is no beginning, middle or end. The trauma information has been blocked from reaching the hippocampus (consolidates short term memory to long term memory). The information does not pass by the dorsolateral prefrontal cortex, the area of the brain responsible for putting a 'time stamp' on a memory, allowing us to recognise that an event has past and is now over. So, what happens to the disorganised fragments of trauma that circulate in our system? The answer to this question is where trauma healing begins.

The Neuroscience Of Trauma

The Ongoing Impact of Trauma and Dissociation

When traumatic memory remains dissociated (and not integrated into a comprehensive whole), trauma victims can become unsuspectingly overcome with terrifying flashbacks. **Flashbacks** refer to the reexperiencing of traumatic sensations and emotions as if the traumatic event were recurring right now. The terror and fear experienced is equivalent to that which was experienced during the initial event. Anything that may resemble a trauma memory, such as a familiar sound or sensation can 'trigger' a flashback.

Example One: Man from First Car
Man walks down the street and **hears ambulance siren.**

Flashback

Example Two: Woman from Second Car
Woman walks down the street and **smells smoke.**

Flashback

The man is bombarded with unwanted images and sensations. His heart skyrockets and he loses his breath. His vision narrows and his muscles tense. He is overcome with terror and fear. It is happening all over again.

The woman stops. She stares into the distance, trance-like. She is unaware of what is going on around her. Her body is numb, and her mind is blank. She slowly gains awareness and continues feeling hazy and dissociated.

As demonstrated above, flashbacks can vary. When 'triggered' by a sound, sight, smell or physiological sensation, our bodies will respond as though we are right back at the traumatic event. Our flashback will resemble the survival response we had at the time. Given that our traumatic memories are 'fuzzy', triggers tend to generalise. For example, every time a war veteran sees rubbish on the road, they may automatically assume a bomb. Or someone who has been in a car crash may fear loud bangs. Potential triggers become feared and avoided.



Healing From Trauma

The primary objective of trauma treatment is learning to feel safe in your body. Once this is achieved people can begin to decode and put into words the trauma memory that was previously too overwhelming to discuss.

Learning to tolerate the imprinted physical sensations stored within various muscle groups may take time, patience, and plenty of self-compassion. Titration and pendulation techniques allow clients to experience small amounts of the event's distress at a time to release the stored energy and allow their nervous system to return to balance without overwhelming them. **It's imperative that people access the emotional response or affect that is attached to the memory (e.g., sadness, rage, fear) throughout the treatment process to fully discharge the energetic reaction to the traumatic event/s. This may require some talking therapy techniques in addition to somatic work.** Below is a summary of techniques found to be beneficial in safely accessing your body and learning to trust (and enjoy) it's internal messages and wisdom. Your body loves you! Enjoy.



Breathwork and Mindfulness; Learning to Safely Enter the Body:

To calm hyperarousal and our bodies overactive alarm system, we need to practice techniques that allow us to watch our body's physiological sensations consciously and curiously without becoming overwhelmed. Breathwork and practices like mindfulness are proven to directly train our arousal system. Learning to focus and notice what is going on inside of us teaches us that physiological sensations have a beginning, middle and end. Although uncomfortable at times, sensations cannot harm us. Building interoceptive skills (notice and feel what we are feeling) restores balance in our emotional brain and activates our 'watchtower', enhancing our rational brain's ability to calm our emotional brain.



Therapeutic Massage and Touch:

Touch helps traumatised bodies begin to locate the boundaries of their skin. Chronically shut down people can rediscover and 'wake' areas through applied pressure. Held tensions can be discovered and released, allowing room for feelings to be uncovered and expressed. For people who hold immense tension, therapeutic massage can assist them to breathe and move more freely.



Yoga, Martial Arts and Exercise:

Yoga and exercise have been shown to significantly improve our ability to regulate. Accessing our bodies and improving our heart rate variability assists with sleep and energy levels. Moreover, particularly with yoga, deeply feeling into our body with conscious breathing practices and totally surrendering into certain body positions is incredibly beneficial for those recovering from trauma who struggle to fully relax. This solidifies a vital connection and awareness to one's body.



Reciprocity, Rhythm, and Synchronicity:

Working with others towards a unified goal, playing with others, and feeling physically attuned to others, helps us feel a sense of connection and joy. People who are traumatised and shut down have lost their sense of connection. Dance, chanting, choir, or joining a basketball team can help 'spark' sensory integration. Simply throwing a ball back and forward can open a reciprocal connection between two that is non-invasive and yet surprisingly soothing and relaxing.



Connection:

Social engagement is our greatest resource to combat stress. Feeling seen by a safe and comforting other causes our autonomic nervous system to automatically relax. Having a good support network whether it be family, friends, a community support group, or a trusted professional is imperative for healing and restoring a sense of safety.



THE WORLD WILL ASK YOU WHO YOU ARE, AND IF YOU DON'T KNOW, THE WORLD WILL TELL YOU.

CARL JUNG



The Window of Tolerance



Intense Anger
Overwhelmed
Feeling Threatened
Out of Control
Sleeplessness

Hyperarousal

"Fight or Flight"

Increased Heart Rate
Reactive Outbursts
Digestive Problems
Poor Concentration
Can't Relax
Hypervigilant
Panic
Chaos
Addictions
Highly Anxious
Rage

Start to Feel Irritable

Anxious

Dysregulation

Agitated

Feel Uncomfortable



Window of Tolerance



When we are in the Window of Tolerance life feels comfortable. Our body is in an optimal state, and we can access both reason and emotion. We are calm but not tired. We are aware and alert but not anxious. We engage with our environment well.



Working with a therapist can help you **EXPAND** your Window of Tolerance so that you are less easily 'triggered' and have improved abilities to cope, soothe and self-regulate when challenged.

Grounded
Present
Relaxed
Connected
Social
Regulated
Flexible
Caring
Good Sleep
Able to Soothe
Feel Safe

Creative
Curious
Flexible
Calm
Able to Learn
Creative
Good Digestion
Open

Start Shutting Down

Feel uncomfortable

Dysregulation

Lose Track of Time

Poor Concentration

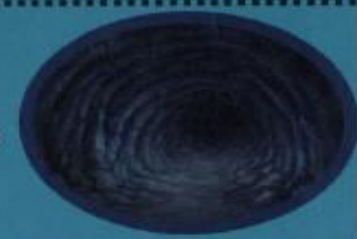
Depressed
Numb
Poor Digestion
Disconnected

Shut Down
Dissociated
Detached
No Energy

Hypoarousal

"Freeze"

Rigid
Flat
Unavailable





Behaviour & Mood Mapping



Introduction

There are three fundamental precursors to desired change - AWARENESS, AWARENESS, AWARENESS.

Behaviour and Mood Mapping is a process aimed to build awareness of one's behaviour, and mental, emotional and physiological state, day to day, over a 10-week period. It takes less than 5 minutes per day. Behaviour is what you present to the *external* world; your observable reactions and responses; Mind/Body is your *internal* experience; your emotions, thoughts, and bodily experiences. For example, if you're really angry and express it outwardly it might be say an 8/10 for Fight/Flight Behaviour; and also an 8/10 for your inner Fight/Flight Mind/Body experience. However if you hold your anger in for Behaviour, i.e. not express it outwardly you might be say 3/10 for Fight/Flight Behaviour and an 8/10 for Fight/Flight Mind/body - you have internalised your anger. The same

The mapping has the following benefits:

- This length of time challenges perseverance and commitment, and upon completion, increases self-trust in sticking to what one decides to complete
- Self-trust builds self-worth which leads to more satisfying outcomes
- Self-worth is an antidote to mental, emotional and physiological disturbance and mental health conditions, e.g. depression and anxiety, in both acute and chronic forms
- It leads to a stronger sense of well-being, as the extended tracking assists you to embrace and better manage disturbance rather than aim to avoid or conquer; both amplify the disturbance
- The map is based on a construct called "The Window of Tolerance".

Behaviour & Mood Mapping



What Zone Are You In?

Blue Zone	Green Zone	Orange Zone	Red Zone
SAD HURT SICK TIRED	HAPPY FOCUSED CALM EXCITED	SURPRISED CONFUSED WORRIED SILLY	ANGRY RAGING TERRIFIED ANNOYED
<p>What can I do?</p> <p>REST</p> <p>Take a break </p> <p>Ask for help </p> <p>Talk to someone </p> <p>Jump up and down 5 x </p> <p>I can also.....?</p>	<p>What can I do?</p> <p>GO</p> <p>Think happy thoughts </p> <p>Finish my work </p> <p>Help others </p> <p>Share ideas </p> <p>I can also.....?</p>	<p>What can I do?</p> <p>SLOW DOWN</p> <p>Take deep breaths </p> <p>Talk to someone </p> <p>Go for a short walk </p> <p>Count to ten </p> <p>I can also.....?</p>	<p>What can I do?</p> <p>STOP</p> <p>Take a time out </p> <p>Run a lap </p> <p>Squeeze a stress ball </p> <p>Drink water </p> <p>I can also.....?</p>



Behaviour & Mood Mapping



Window of Tolerance Mapping Exercise

Instructions: Review the Window of Tolerance handout and familiarise yourself with the various descriptions.
 Each day for 10 weeks map the distribution of your focus on each of the areas.
 Map them for your behavioural (outer) reactions) and mind/body (inner) feelings, thoughts and bodily reactions.
 Rank your experience from 0 to 10 each of the three categories below: Fight/Flight, Self-Regulation, Freeze.
 0 = not at all 5 = to a moderate extent 10 = all of the time
 Make comments about pertinent situations and triggers where it assists your understanding.

Week 1 - Day	Category	Fight/Flight	Self-Regulation	Freeze	Observations, Insights, learnings
1	Behaviour				
	Mind/Body				
2	Behaviour				
	Mind/Body				
3	Behaviour				
	Mind/Body				
4	Behaviour				
	Mind/Body				
5	Behaviour				
	Mind/Body				
6	Behaviour				
	Mind/Body				
7	Behaviour				
	Mind/Body				
Week 2 - Day	Category	Fight/Flight	Self-Regulation	Freeze	Observations, Insights, learnings
1	Behaviour				
	Mind/Body				



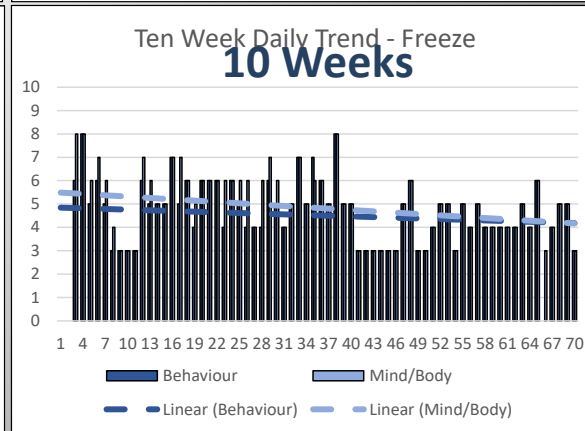
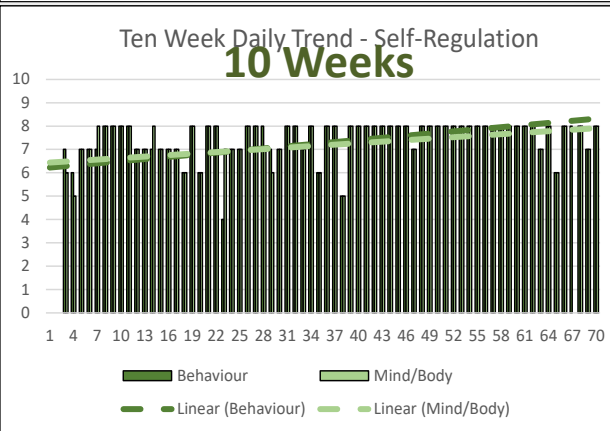
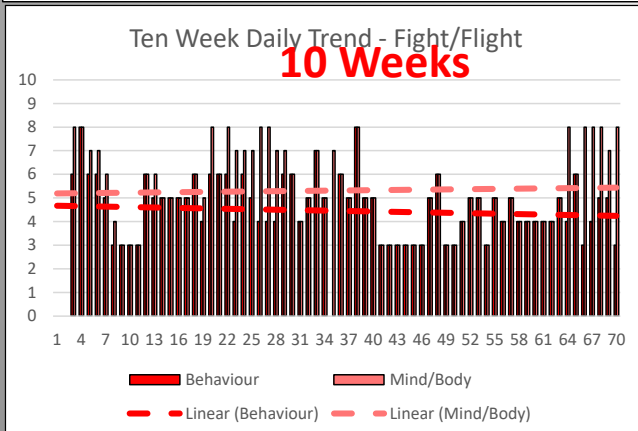
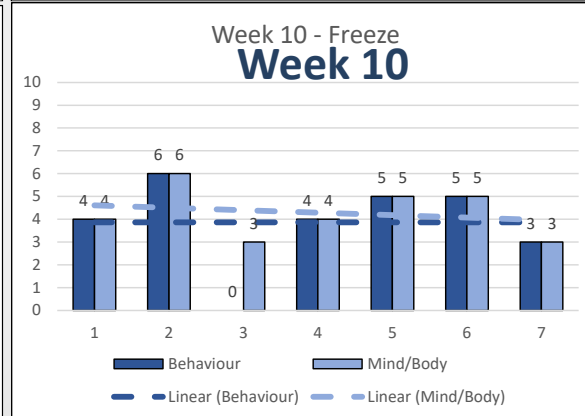
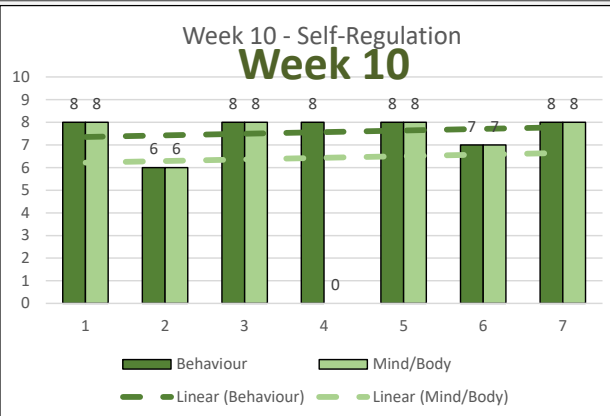
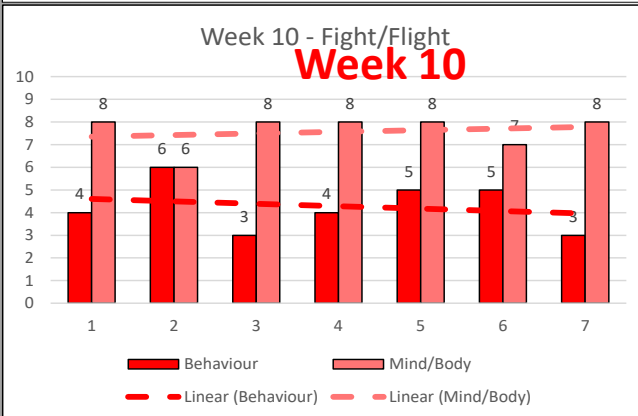
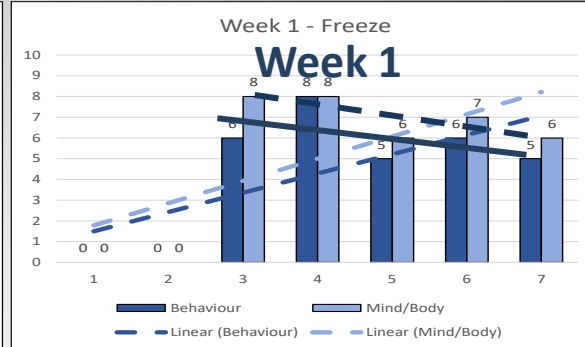
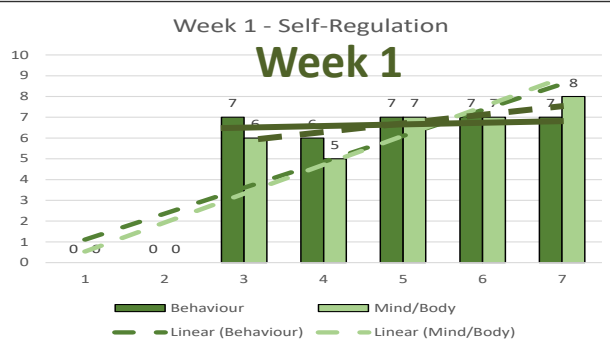
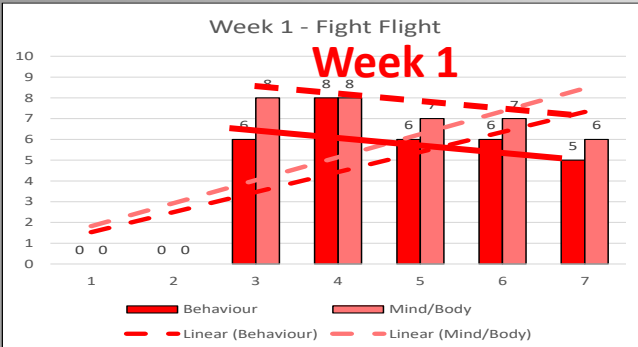
Behaviour & Mood Mapping - Example 1



Fight/Flight

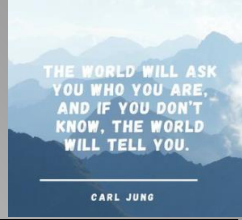
Self-Regulation

Freeze





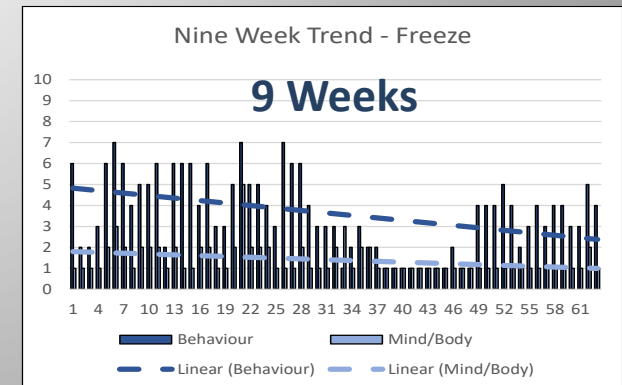
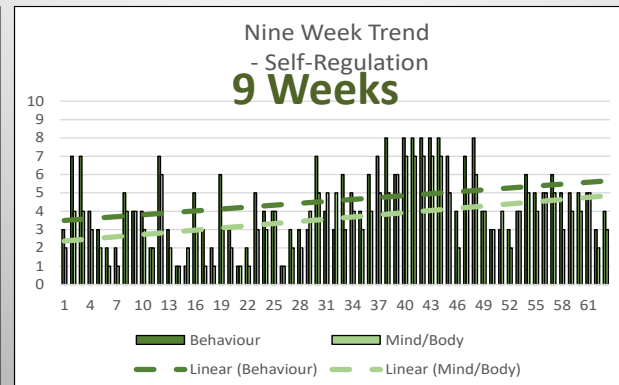
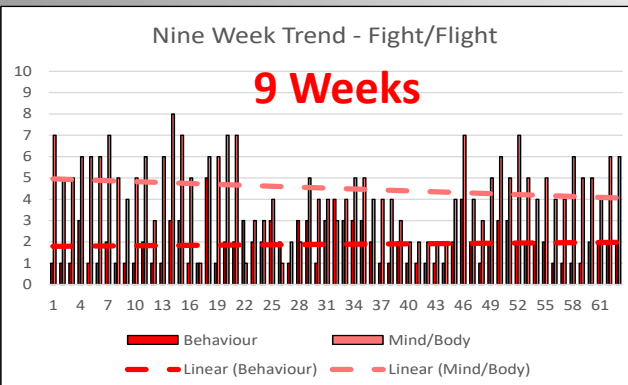
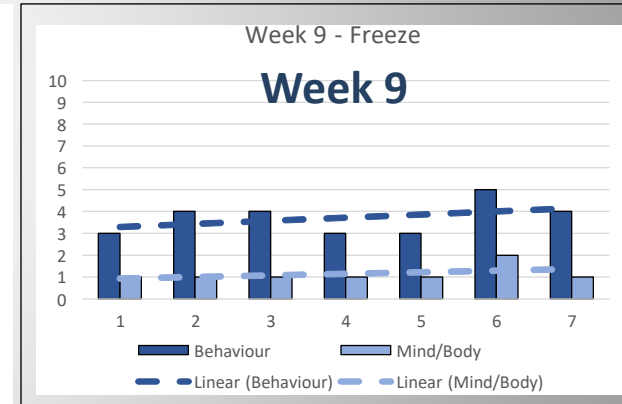
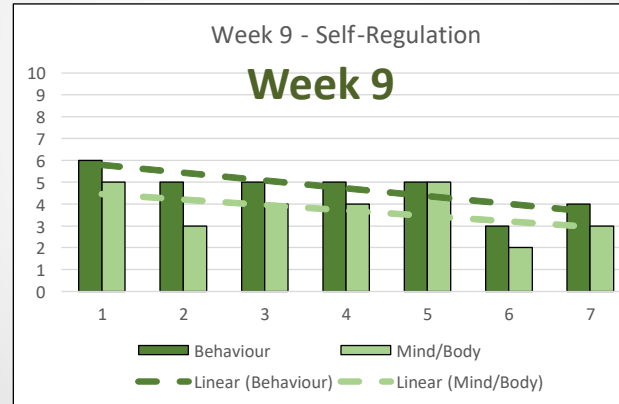
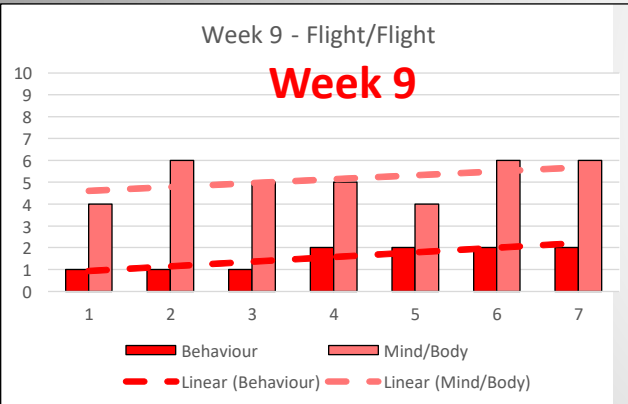
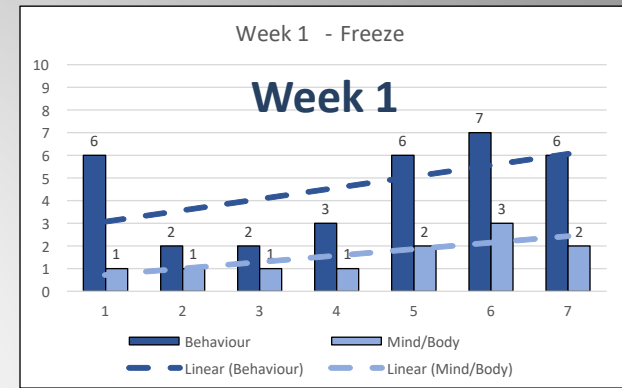
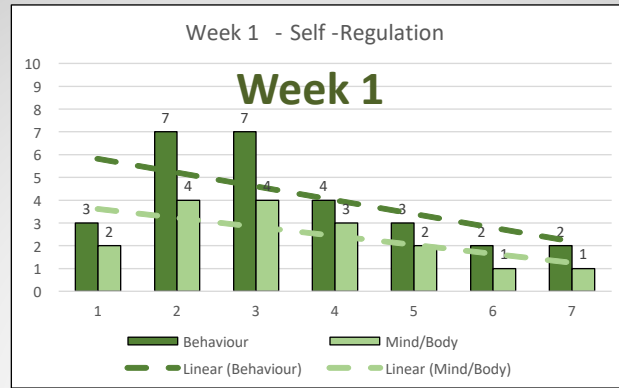
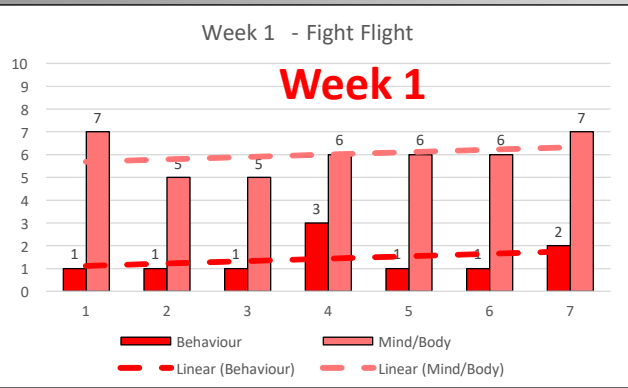
Behaviour & Mood Mapping - Example 2



Fight/Flight

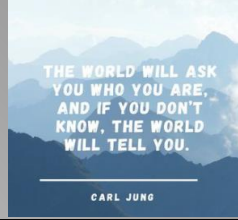
Self-Regulation

Freeze





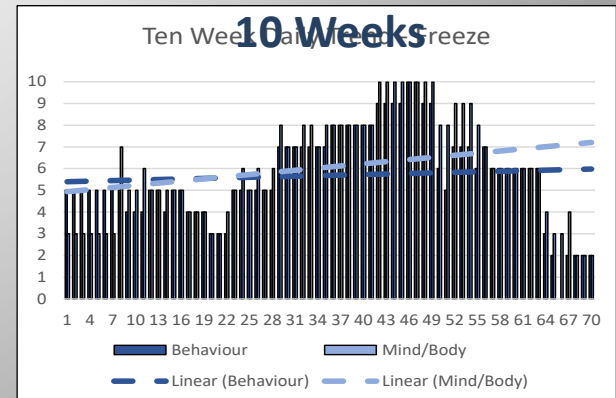
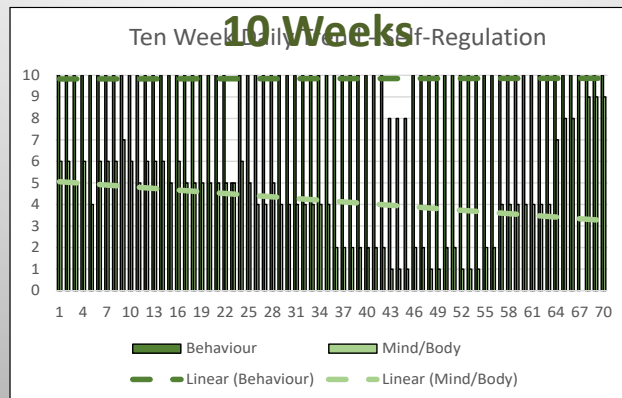
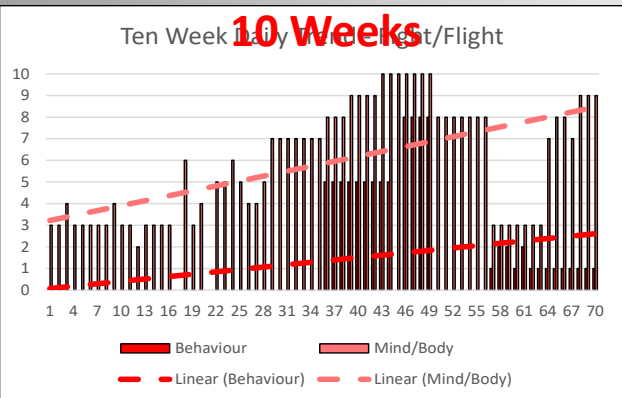
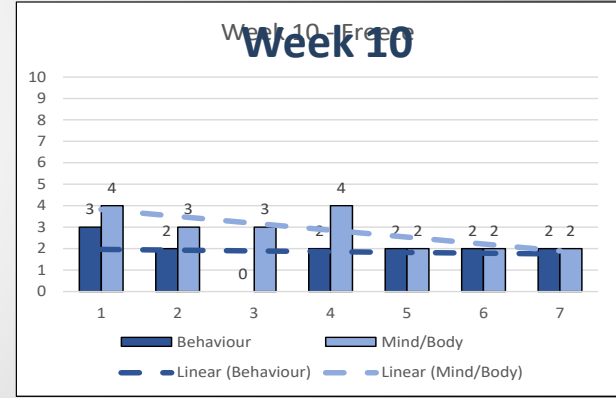
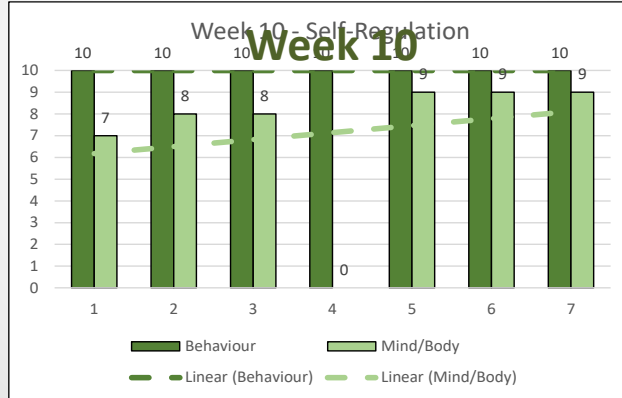
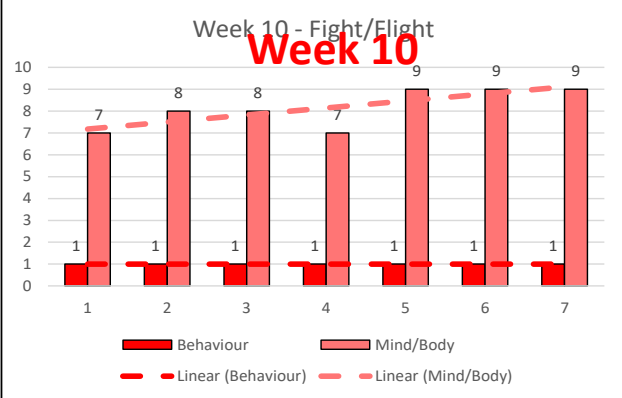
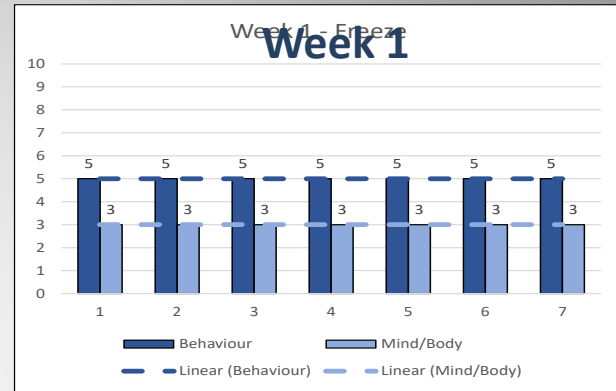
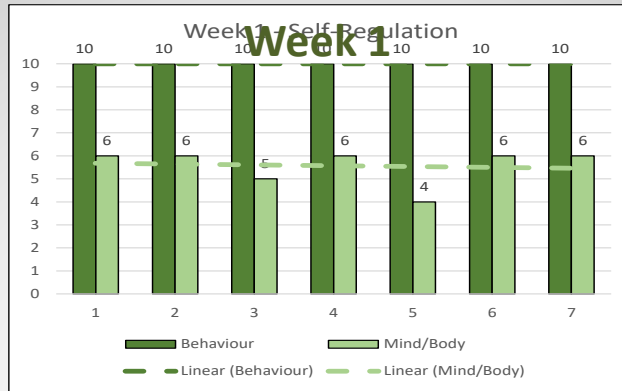
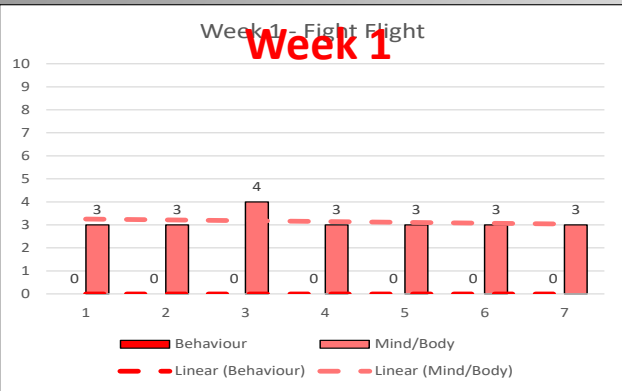
Behaviour & Mood Mapping - Example 3



Fight/Flight

Self-Regulation

Freeze





Behaviour & Mood Mapping - Example 3



Fight/Flight

Self-Regulation

Freeze

Mapping has proven to be an invaluable process. My behaviour has always been very 'in control', 'calm', organised and professional. For a long time, I equated my behaviour with how I was feeling - which through this process I have discovered are actually two different things for me. My internal experience can be very different to my external behaviours - an adaptation to the dynamics within my world in early life and since.

The mood mapping has given me a lot of power to understand myself and my patterns and has made me feel much healthier and aware. For example, I have always felt very fatigued - I even had a sleep apnoea test! What I have learnt is that for a very long time, likely a substantial part of my lifetime, I have been in a dorsal vagal state, or in some level of "shutdown". I would have NEVER realised this without doing this process. Many physical symptoms that have previously worried me no longer get my attention because I can see them for what they are - a reflection of my state of being.

So now, rather than responding to fatigue by seeking more rest – I can recognise this state and engage in activities to bring me out of hypoarousal or soothe me from hyperarousal. I continue to build more exercise into my week, give myself a blast of cold shower water, crunch on ice or jump up and down/shake out or do star jumps. Despite some unresolvable challenging ongoing stressors in my life, I now have far greater control and far greater compassion for whatever arousal state I am in. I now even notice how a thought can take me from energetic and motivated to wanting to shut out the world!

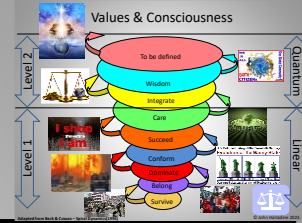
Paradoxically, I have also felt the value of the protective and positive aspects of these dysregulated domains. They are patterns that are trying to protect me – and there are times when that can be really useful (for me, feeling exhausted is certainly preferable to feeling a state of sheer panic). They're just not great places to stay.

As a result of this process, I am kinder to myself – noticing where I am, rather than berating myself for feeling how I feel. It has helped me recognise that some days, getting through family and work life, has felt monumental for legitimate reasons and I can pat myself on the back for what I have continued to achieve. I would not have had this perspective had I not completed mapping.

I would definitely recommend persisting with this – there is great value in the process that you may uncover along the way. It does not take much time at all - just a willingness to be interested in yourself.



LIFTING CONSCIOUSNESS - SEVEN GUIDING PRINCIPLES



- Being aware of what you are aware of (meta-awareness) at deep levels of our consciousness, is a cornerstone for healing and growth
- Suspending judgements on ourselves and others, and not being controlled by our fears, leads us to discover compassion, empathy and forgiveness, which opens us to possibility
- Fully owning our strengths, a willingness to embrace our defences and limitations, and becoming life-long learners paves the way to sustain positive change in our lives
- Creating emotional safety first with ourselves and then with others, is a precursor to wellbeing and sustainable healthy relationships
- Unconditional acceptance of what is, is a foundation stone for a contented and fulfilled life
- Adopting these principles enables us to connect with ourselves, others and the world, live life with grace and ease, and to the best of our ability
- Continuing to build our ability to fully commit to these principles leads to love, joy, contentment and fulfillment



Change begins and ends with me,
and it doesn't matter what
happens to me in life; what
matters is what I do with it!