Waves for Change Learning Brief

Adversity doesn't happen to children… it happens inside them.

The Waves for Change (W4C) surf therapy programme has been developed by young people, for young people, in South Africa.

The use of participatory processes, alongside supervision from mental health experts, has led to the development of an innovative intervention that is both child and youth friendly and evidence based.

This learning brief outlines key findings and recommendations from a study undertaken in partnership with Laureus Global Sport for Good Foundation and The New School University.

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WAVES FOR CHANGE

#SURFTHERAPY

What we know

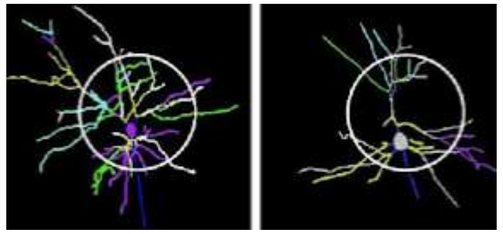
Trauma impacts wellbeing both immediately and over the long term, and is frequently experienced among youth in South Africa.

In 2018, we shared a learning brief on the initial findings of research we were conducting with Dr. Wendy D'Andrea of The New School University in New York and the global Laureus Sport for Good Foundation, using Heart Rate Variability (HRV) as a measure.

Over the years we've seen that:

In general, **W4C children experience at least 8 traumatic/adverse events per year** (e.g. seeing someone being shot, hunger or no food at home, some form of emotional or physical abuse or neglect, some form of bereavement, caregiver substance abuse, and family economic hardship), in comparison to, e.g., children in the USA that experience 5 traumatic events in their entire childhood.

When a child experiences chronic adversity or trauma, **a toxic response** occurs; which is a prolonged activation of stress response systems (i.e. physical and thought responses)



Typical neuron: **many connections**

Neuron damaged by toxic stress: **fewer connections**

Toxic stress negatively affects the hippocampus, prefrontal cortex and amygdala in the brain. These brain regions affect how the rest of the person's body responds to and regulates stress.

As such, toxic stress not only affects the brain and body (i.e. the neurology) of children, which **negatively impacts decision-making, self-regulation, fear-processing, memory and stress management**, but also positively correlates with **mental health problems, such as depression, anxiety, behavioural disorders and suicidality.**

What we wanted to learn

- If children referred to W4C experience toxic stress, why do our self-report surveys always show high scores across items like self-esteem? E.g. in almost all cases, 9 out of 10 W4C children report high levels of self-esteem, happiness and the (perceived) ability to deal with difficult situations in a positive way, when they join our programme.
- Are there other ways/measures we can use to more accurately measure items like self-esteem, stress and self-regulation at baseline (when children join W4C)? What tools can we use to compliment/triangulate self-report data?
- What do the minds and bodies of children who are referred to W4C, really look like? What is the true baseline for children attending W4C programmes on items like stress and self-esteem?
- Does surf therapy help children deal with chronic adversity/trauma, and if so, how? Are children that have been through surf therapy better able to identify and regulate their emotions?

92%
I feel good about who I am

88%
I choose friends that do the right things

91%
I know what my strengths are & what I'm good at

Study main observations

1. HRV was found to be a suitable measure for this target group and context; the most appropriate/practical tool to continue with at W4C (of the 3 tools used in the study), to compliment/triangulate self-report data; a reliable measure to understand children's bodies and minds, who experience chronic adversity/trauma and subsequent toxic stress; and the effect that surf therapy can have on their physiology

2. Surf therapy appeared to have an impact, particularly on the physiology of participants (seen through improvements in HRV), which emerged early in the intervention and was sustained throughout; surf therapy appeared to help children achieve a healthy HRV, which positively affects their ability to self-regulate.

What is HRV?

HRV is seen by researchers as a **reliable marker for resilience and behavioral flexibility**

HRV is simply a measure of the variation in time between each heartbeat; and is **controlled by the autonomic nervous system (ANS)**; which is divided into the **sympathetic and the parasympathetic nervous system (SNS and PNS).** While some SNS activity is needed for attention, big increases in SNS activity lead to flight or flight. Increases in PNS lead to relaxation, self awareness, attention and connection, however too much can lead to shutting down under stress.

The brain constantly processes information and through the ANS, sends signals to the rest of the body to either stimulate or relax different functions

HRV can be an indicator of:

- Capacity to self-regulate
- Ability to adapt to changing social or environmental demands
- Self awareness
- Sustained attention
- Social interaction
- Coping styles

FIGHT OR FLIGHT OR SHUTDOWN

RELAXATION RESPONSE

The importance of a healthy HRV

LOW ADAPTABILITY (HRV)

Low adaptability to external conditions (e.g. over-responding to threat or failing to protect oneself when in danger)

Imbalance of heart and mind

Low spirits and **depression**

Easily **exhausted**

Health issues (particularly risk for cardiac death)

HIGH ADAPTABILITY (HRV)

Greater sense of **well-being**

Better physical performance

Relaxation, good sleep, and recovery

Enhanced cognitive performance

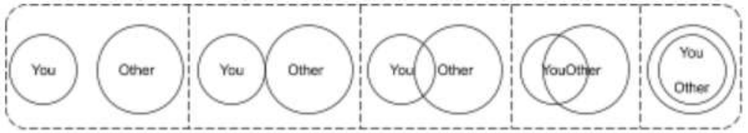
Lower risk of high blood pressure

Study design

- Multi-mode, longitudinal, quantitative pre/post test, two-group design
- Intervention group (n=130) and comparison group (n=52) (childen from a similar community than W4C children)
- Data collected at respectively 0 weeks (pre) and at either 8 or 32 weeks into the programme (post)
- Combination of 3 standardized data collection tools: self-report surveys, computer-based behavioural measure tasks (specifically chosen to triangulate self-report data), and physiology

1) Self-report surveys

Inclusion of Self in the Other scale (a visual analog scale which measures social closeness)



Perceived Stress Scale for children (that examines experienced and perceived stress)

Sensation Seeking Scale (that gauges risk-taking, thrill and adventure seeking and disinhibition)

2) Behavioural measure tasks

The Balloon Analogue Risk Task (BART) (which measures risk tolerance, appraisal, and sensation-seeking)

Brief Implicit Association Task (Brief IAT) (which measures self esteem)

Continuous Performance Task (AX-CPT) (which measures attention/inattention, cognitive control and impulses inhibition)

Facial Morph Task (which measures emotion recognition)

Pump up the balloon to get a prize

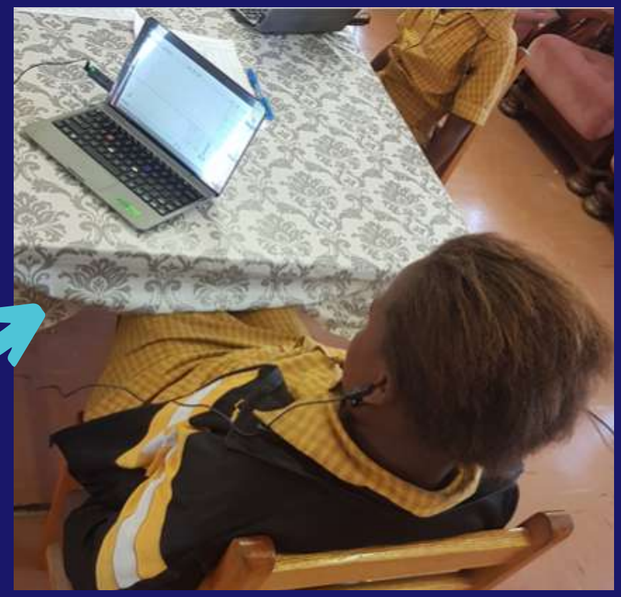
Cash out before the balloon bursts or you lose your prize

3) Physiology

Physiology was measured using HRV; which provided age-based standardized norms which are indicative of resilience and flexible response to stress

The measurement of the HRV signal comes from the heart rate (HR) signal; measured through placing a clip over their earlobe

The HRV signal can be further decomposed into two elements, called low-frequency HRV (LF-HRV) and high-frequency HRV (HF-HRV); which reflects activity of the SNS and PNS, respectively



Traditionally, the sympathetic nervous system is associated with fight-or-flight activity; high values create risk for aggression, misperception of threat, and poor attention.

However, very low values may also be problematic, depending upon the context: with low sympathetic activity, concentration and goal-directed activity become difficult.

The parasympathetic nervous system is associated with self-regulation and self-soothing behaviours.

Very low parasympathetic activity can lead to impulsive behavior through inhibitory failures; to difficulty knowing internal emotional states; to low empathy; and to inability to concentrate because of sustained low-level agitation. Conversely, exaggerated parasympathetic activity can be related to chronic over-inhibition (e.g., appearing frozen or unable to take risks even when likelihood of reward is high)

Key Findings:

In the face of adversity, our children shut down

Youth are over-regulated and shut down to deflect perceived threat (a coping mechanism, where parasympathetic activity rises to suppress sympathetic activity). Shut down especially impacts perceived levels of stress and risk taking (which may cause 'false positive' reporting of these factors on self-report measures).

Baseline physiology data (HRV) showed that:

71% of participants had high RMSSD (indicating long-term cardiac risk)

30% of participants had above normal sympathetic activity (which can be an indication of anxiety); and

49% of participants had above normal parasympathetic activity (which can be an indication of depression)

	Low	Medium	High
RMSSD	None	28%	71%
LF-HRV	10%	60%	30%
HF-HRV	None	51%	49%

What does this mean?

High sympathetic activity:

- Predisposes children to fight-or-flight reactions to threat - which, if chronically or frequently activated, can be harmful, such as causing anxiety

High parasympathetic activity:

- Suggests that children are over-regulated and prone to inhibiting or shutting down their responses - which is indicative of depression
- This data was consistent with emerging data on individuals from marginalized and oppressed groups, that suggests that chronic, resting inhibition is necessary in order to deflect threats (for example, in response to potential police violence)
- However; this chronic exaggerated parasympathetic activation comes at a cost: in addition to creating a chronic freeze state, it may pave the way for eventual "burnout" of the system

A small group of participants had very low sympathetic activity:

- Suggesting failures to respond to actual threats as well as difficulty finding motivation

Key Findings:

Self-report measures, alone, may not be accurate

Self reported data showed, children reported:

- (Perceived) low stress (particularly children with high sympathetic activity, suggesting that those most at risk are either totally unaware or acutely aware of their stress)
- Moderate risk taking
- Perceived closeness to family
- (Perceived) high self-esteem

While computer-based behavioural measure tasks showed:

- Potential inattention
- Low risk taking
- Low self-esteem (with 25% of the group reporting extremely low self-esteem and more than 50% of the participants could associate themselves with positive adjectives/images
- Most likely to recognise ‘happiness’ as an emotion; while least likely to recognise fear and anger (this may be due to the normalisation of these two emotions)

And when compared to baseline HRV data?

✓ **Computer-based behavioral measure tasks and HRV data:**

- showed some correspondence
- which suggested that these measures may perform accurately within the target population

✗ **While self-report data and HRV data:**

- largely did not converge (at least at baseline), it seemed reasonable to begin to speculate that self-report surveys are not highly accurate in this target group (as an only measure)

Key Findings:

Surf therapy works!

To gauge the effect of surf therapy, we compared data from data points 1 and 2, from all 3 measures, between the comparison and intervention groups.

Comparison group:

- Across all three types of measures used in the study, except sympathetic activity (which were described as age-related changes), there were no changes

Intervention group:

- Positive changes across all three types of measures
- Improvements in HRV (high HF-HRV and LF-HRV decreased)
- Improved self-esteem
- Improved attention (less inattention)
- Reduced impulsivity
- Positive (or 'more') risk-taking (which was considered a good finding given the low baseline risk tolerance
- Increased closeness to others
- *More* stress, which, given the extremely low stress reporting at baseline, suggests an increase in accuracy in self report data, as the intervention was implemented.

What is it about surf therapy?

Why surfing?

- A challenging activity, that inherently demands focus - possibly inducing flow states (being ‘in the zone’)
- Allows respite for participants from negative thoughts and emotions
- A mental health activity practiced in a ‘neutral’, safe space, avoiding mental-health related stigmaopportunity for positive social connections, including integration of different cultural and ethnic groups
- Opportunity where small successes can elicit significant emotional responses - boosting confidence, mastery and autonomy
- Requires learning a complicated set of new skills, to thrive in a new environment - stimulating cognitive functioning

At W4C, surf therapy is:

- An emotional and physical safe space
- Access to a new and challenging, but fun task
- Access to a caring, consistent adult; our surf mentors
- A 10-month, evidence-based coping skills, mental health curriculum
- Connection to ongoing, sustained services and opportunities

So, what did we learn about data collection and programme evaluation?

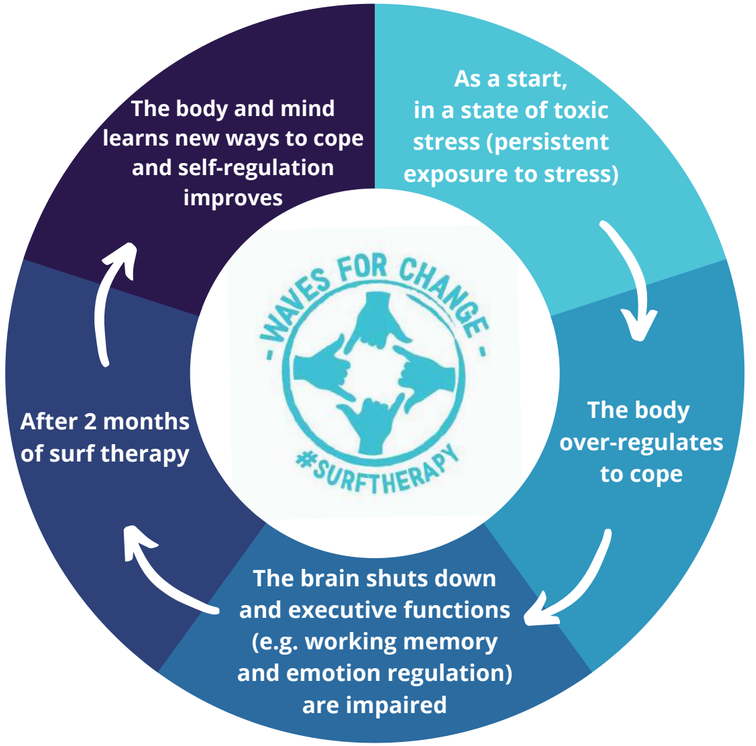
- Self-report data only, may not be reliable, as children may not be able to accurately report (particularly at baseline)
- Incorporating other measures, such as physiology (e.g. HRV), to triangulate and compliment self-report data, may strengthen the understanding of programme participants and programme impact
- Self-report data appears to begin corresponding with other measures (such as HRV and behavior measure tasks), with increased participation in an intervention and/or as children mature (i.e. baseline self-report data did not correspond with other measures, while post-test self-report data converged more with other measures and seemed to become more accurate)
- Using three types of measures were time and resource intensive
- When working with an external research partner, constant communication between research and programme teams is key

- In this study, we found HRV and computer-based tasks (specifically the risk-taking and self-esteem tasks), to be the most appropriate for our children - and **will incorporate specifically HRV as a measure in our organisational MEL framework going forward**
- **Pilot and only use data collection measures that are fit for purpose and appropriate to the target population; stress-check data collection measures and procedures, especially considering child safeguarding and programme ethics**

- Positive programme effects seem to occur after 2 months and are sustained thereafter; we believe this does not mean our 10-month programme should be shorter, but rather emphasise the importance of ongoing engagement and participation - to ‘cement’ positive changes and enable children to better manage the adverse spaces they live in

- Children referred to W4C’s minds and bodies are negatively affected by chronic exposure to adversity and trauma; for some, early signs of anxiety and depression appear to be prevalent
- Children over-regulate and/or ‘shut-down’ as coping mechanisms to deal with toxic stress
- W4C’s surf therapy helps children find a ‘happy medium’; those that ‘shut down’ are encouraged to ‘feel more’ and ‘risk more’, while those that are in constant ‘fight or flight’ learn to ‘take 5’, ‘breath’ and respond to adversity more calmly

So, what did we learn about our children and our programme?



- **Positive programme effects seem to occur after 8 weeks** and are sustained thereafter
- This is an **important finding for mental health and prevention programmes**. As noted earlier, **toxic stress changes the brain's structure**, which negatively affects critical cognitive functioning, and lead to mental health problems such as anxiety and depression
- But **through neuroplasticity, the brain can reorganize itself and form new neural connections; but this takes time**; and **mental health programmes have to be designed in a way that incorporate time for children's brains to reshape and settle after stress/trauma**
- **Only then are children 'open' for learning and to retain information**
- As such, we've learnt that our 10-month programme shouldn't be shorter, but rather **be long enough to give children time to 'become available' for learning**, and then have **ongoing engagement and participation - to 'cement' positive changes** and enable children to better manage the adverse spaces they live in

Toxic stress changes the brain's structure

But the brain can re-adjust through neuroplasticity, often as a result of positive, psychosocial experiences

What's next?

We are ready to scale... responsibly and cost-effectively

We know our programme works, from (amongst others):

- **A 2015 feasibility study:** our programme was found to be underpinned by a plausible Theory Of Change and suitable for the target population;
- **A 2017/18 quasi-experiment:** statistically significant programme outcomes were found over a 6-month period of surf therapy exposure
- **A 2019 programme sustainability study:** coping skills learnt through surf therapy (such as meditation, communication and respect), were used long after participants completed surf therapy programmes
- And of course, the results from **this HRV study**

Scaling, to meet the demand for mental health prevention and intervention programmes:

- Over the next 2 years (2021-2022), W4C will **scale our existing 5 sites to reach 2500 children annually with our surf therapy**
- However, this alone will not meet the huge demand (e.g. in S.A. South Africa, there are only 0.02 psychiatrists and 0.32 psychologists per 100,000 people)
- Extensive research and needs assessment alongside local government has shown the significant potential of our approach as a scalable, cost effective and community-led solution if shared with a network of existing child and youth programmes in communities
- W4C will therefore also **support other organisations to identify and upskill community coaches** to work with children at high risk of developing mental health disorders
- Coaches will be trained in the same **trauma informed mental health approaches that can be attached to surfing or other difficult individual pursuits,** such as yoga, hiking, cycling, circus skills and skateboarding.
- In line with the task shifting approach (similar to what's been a proven, community-based alternative to public health interventions for e.g. HIV and TB programmes), W4C will then connect these community coaches to skilled professionals for supervision, oversight and referrals. This will create **a wider network of community based interventions and significantly increase access to services to promote mental health and prevent the onset of mental disorders** for uninsured populations of children and young people living in some of the most under-served communities in the country.

Want to know more?

For more information, please contact us at info@isiqalo.org

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