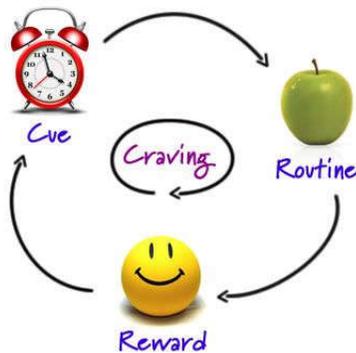


Science of Habits

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Let's talk about changing behaviours. We all have some habits we would like to break and others we would like to form. As the new year begins, 40-50% of us set resolutions to help **better our lives** (1).

Habits are routine actions or behaviours that when repeated regularly become automatic. Routines are made up of a 3 part "**habit loop**" (2):



Reminder (this is the trigger/cue that starts the behaviour)

Routine (this is the behaviour or your action in response to the trigger)

Reward (this is the benefit that you derive from the behaviour)

The most common resolution tweets this year were:

1. Work out
2. Be happy
3. Lose weight
4. Stop smoking
5. Unplug
6. Be the best at something
7. Stop drinking
8. Love self
9. Work hard
10. Don't #\$\$@ it up

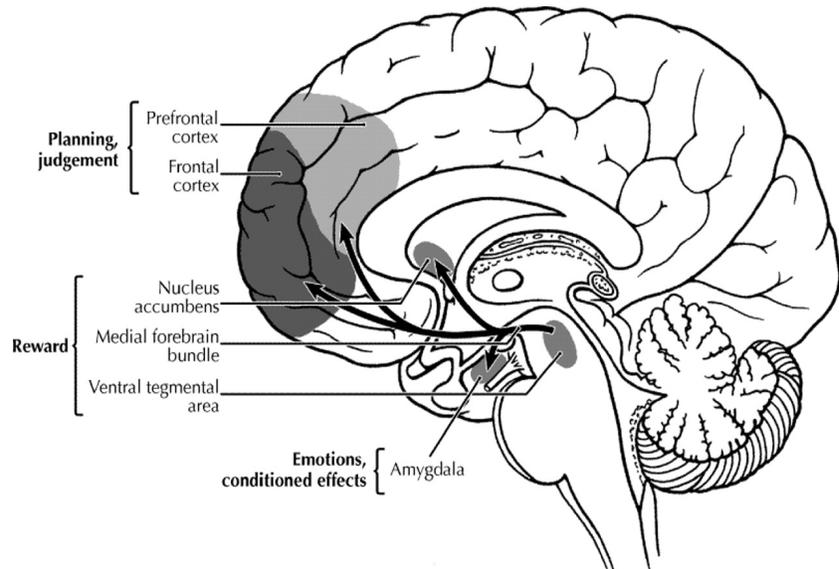
Let's talk about feeling good.

Habits are reinforced by activation of **reward centers** in the brain. The reinforcement pathway in the brain involves the central nervous system and neurotransmitters, mostly **dopamine**. The reward pathway promotes survival by rewarding behaviours necessary for life, such as finding food, water, sex, shelter etc. The activities that activate this dopamine release make us "**feel good.**" The reward system structures are in the limbic system (part of old brain largely responsible for emotions). Other important structures include the nucleus accumbens (NA), the amygdala, and the ventral tegmental area (VTA). All of these reward structures are linked by a connecting system called the medial forebrain bundle (MFB). The MFB acts as a kind of power line of neurons while dopamine is the energy of the reward system. Other neurotransmitters involved in the reward system include serotonin, GABA, endogenous opiates and endorphins.

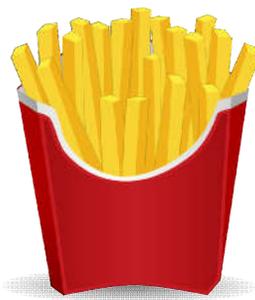
How it works

Dopamine is released in response to pleasurable stimuli. The first time we do something enjoyable the dopamine burst follows the action but with repetition it starts to get released earlier and earlier such that even anticipating the event can cause the dopamine burst. **This acts like a reward and you become motivated to repeat the behaviour.** Every time the same pathway is followed, it gets easier to travel. Our brains like easy because it frees us up to focus on other things. Neurons that repeatedly fire together wire together and that's why we sometimes refer to a habit as being "hardwired". The formation of both good and bad habits is based on similar mechanisms in the brain.

Depression predisposes us to bad habits as less circulating dopamine means



things that once gave us pleasure no longer do. When we are depressed, the things that do motivate us tend to be ones that make us feel good by causing huge surges in dopamine (e.g. junk food, drugs, risky behaviour).



Not all habits are created equally. Some bad habits are easier to form than others as

some activities release more dopamine, requiring less repetition. An example of this is smoking. Also some habits have a genetic basis. But don't think it's a done deal. It may be easier for the individual with a genetic predisposition to develop an addiction but **we know that internal and external events can alter gene expression. Our habits are not just a product of what's encoded in our genes, what we do matters!**

Where does stress come in?

Stress does not help us with bad habits as it both triggers and exacerbates them. During a stressful time our brain can turn to either good or bad habits to cope but tends to be biased towards old habits over new actions. Our oldest, “hard to break” habits tend to have been formed as ways to cope and distract from stressful events in early life (survival maps). They are harder habits to change as they have

been repeated and are ingrained routines. They might have once helped us survive and cope but with time they often become unhelpful, sometimes destructive. Changing these habits isn't as simple as just replacing them with something more positive as one needs to address the triggering stress underlying the unwanted habit.

The ability to change

The good news is that we aren't just “creatures of habit.” Our evolved brains can help us learn new patterns of relating and develop new conscious healthy patterns, that when repeated can become healthy habits. **This ability to adapt and change is what we call “neuroplasticity”.** Once thought to be exclusive

to the child's developing brain, we know that the reorganizing and forming of new connections between neurons also occurs after injury to the brain (e.g., trauma, stroke) and throughout the course of our adult lives enabling us to continuously learn new things even when we are elderly (3).

So how exactly do we exercise this “neuroplasticity?”

We must start with **befriending our brains.** Accepting that the brain is both powerful and vulnerable is important. There are certain habits that we know promote brain health and help to strengthen the neuronal pathways that enable us to reflect, consider circumstances, set intentions, create options and choose based on what is most meaningful and healthiest for us.



The **World Health Organization** has identified the **top 10 brain damaging habits**.

Interestingly, there is considerable crossover with what habits we often want to change when setting new year's resolutions:

1. Not eating breakfast
2. Overreacting
3. Smoking
4. High sugar consumption
5. Air pollution
6. Sleep deprivation
7. Covering head while sleeping
8. Working with your brain during illness
9. Talking rarely
10. Lack of stimulating thoughts

The following is a list of healthy brain habits that are backed by research:

Eat better: What you eat strongly influences your daily and future brain function. Try eating more fatty fish, nuts, berries, colourful veggies, multigrains and leafy greens (4).

Sleep more: According to researchers at Harvard Medical School's Sleep Division the average adult's basal sleep needs from age 18 to death is 7.5 to 8.5 hours per night (5, 6).

Exercise more: As little as 15 minutes a day or 90 minutes per week of moderate exercise can alter your health dramatically but research has shown that even small amounts of light physical activity are better than none (7, 8).

Reduce Stress: Our brains need to be calm for neural pathways to be open. Ways to reduce stress include sleeping, eating well, exercise, mindfulness, meditation, socializing, dancing, listening to music,

expressing gratitude, being in nature, doing things for others (9, 10).

Socialize more: Interacting, talking and sharing increases our cognitive function and research suggests that some of the cognitive boosts may be immediate. Call a friend, have dinner with family, attend church, go to art shows, join groups, volunteer, frequent community centers, sport centers and the library. And when all else fails, make conversation with the people you meet, for instance at a coffee shop, grocery store, hairdresser, or doctor's office (8, 11).

Do/learn something new: stimulating our brains at any age reduces cognitive decline. It provides opportunity for flow and mastery and in the process we just might find other things that add meaning and purpose to our lives (8, 12).

Practice mindfulness: meditation changes the brain. Regular mindfulness meditation increases mood and decreases stress. Mindfulness increases awareness which helps us identify triggers. People who make mindfulness a habit have a greater sense of purpose and experience less mental and physical illness. This also enables us to respond rather than to overreact. Studies vary but have shown that the benefits conferred by mindfulness can take as little as 10-25 minutes a day (10, 13, 14, 15).

Self-affirmation: positive self-talk and positive writing expression increases emotional and physical well-being. Positive experiences like recall and repetition of happy events and feelings increases serotonin levels which in turn helps the more evolved part of our brain required to override the autopilot mode of habits. In a study where students were

required to write about positive experiences for 3 days, lasting effects on mood and cognition were seen even at 3 months after the task (9, 10, 16, 17)!

Enlist your brain! We are the only species that can think about thinking (aka meta-cognition). Think about what you want and write it down, create reminders everywhere- think cell phone, sticky notes, and calendars (18, 19).

Accept failure: and setbacks as part of learning. Thinking of failing as a mistake is a mistake (aka meta-mistake). Research shows that a slip does not significantly interfere with forming new habits. Failure informs our learning. Think of it as a kind of accuracy mechanism for the brain, a kind of threat appraisal. Knowing where we are vulnerable helps us direct more personal resources in order to ensure that the new healthy habit won't be derailed easily in the long run (20).

Think optimistically. Don't think it's in you? Think again! **Optimism can be learned** and can fuel your motivation for change. The optimist views a set back as a temporary external event. Seeing obstacles as a challenge rather than a personal failure helps us persevere. In order to achieve anything, optimism is not merely desirable, but necessary (16, 17, 21, 22).

Take Home Message: BE GOOD TO YOUR BRAIN!

What can you do as a front line worker?

Your **advice and education** counts! It turns out that providing advice on habit formation coupled with a “small changes” approach shows promise of helping people attain and maintain healthy habits (19, 23).

Help **clarify values** and let people decide for themselves. It shouldn't come as a surprise that when a change is based on its personal value it is an easier target for change. This research lends support to the philosophy that we know ourselves best and thus what we need to be healthy and happy. As providers we can encourage people to know themselves well (9, 24).

Remember that setting **SMART goals** is a more effective way to work towards a new healthy habit. Meeting a small goal every day

builds our self-trust and confidence which we need to maintain positive behaviours and also to achieve bigger goals (25).



Learn the **ABCDE model** developed by Dr. Martin Seligman to aid in adopting positive optimistic thinking habits (22).

Remember there is no singular definitive way to form new habits but what is for certain is we need a healthy brain to do it. So in guiding others, we too need to heed our own advice!

Additional Resources

1. [Matthieu Ricard: The Habits of Happiness](#) TED talk 2004- on how we can train our minds in habits of well-being, to generate a true sense of serenity and fulfillment
2. [Andy Puddicombe: All it Takes is 10 Mindful Minutes](#) TED talk 2012- Mindfulness expert explains the value in refreshing your mind for 10 minutes a day, simply by being mindful and experiencing the present moment.
3. [Charles Duhigg: The Power of Habit](#) TEDx talk 2014- on the "habit loop" and how to change any habit in our life.
4. [NIH News in Health Newsletters : Breaking Bad Habits Why it's so Hard to Change](#), Positive Emotions and Your Health Aug 2015, Mindfulness Matters, Opportunities Abound for moving Around May2015
5. [Learned Optimism: How to Change Your Mind and Your Life](#), Martin Seligman MEP (2006) 2nd Ed NY: Vintage.

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