

An Overview of BreakThrough!

Many of us share a history of concerns with our health and body image, often accompanied with feelings of sadness, frustration, and at times, despair. In considering this course, please know you're not alone! If we take a moment to reflect, we all know people who're struggling with physical and mental health challenges that affect their sense of well-being. If you feel a nagging apprehension that you've not been doing enough to ensure your health - rest assured! This BreakThrough! course explores the reasons **why we eat what we do, and how our thoughts, emotions, and life experience influence our behavior.**

BreakThrough! was developed to meet the need for an innovative, yet practical and value-based program to help participants recover from mental and metabolic health challenges. Chapter topics include depression, anxiety, trauma, addiction, family dynamics, relationships, the workplace, and other relevant issues. This course may be presented in group or individual settings, in-person or virtual learning environments. Sessions blend education, participant interaction, and skill building, through introspective exercises. Each session incorporates goals and objectives particular to that chapter and designed to work in conjunction with healthcare providers, weight loss clinics, treatment programs, coaches, and community support groups.

Evidence-Based Practice

BreakThrough! is founded on Integrated Weight Management Therapy (IWMT; Hamilton, 2016) and incorporates evidence-based practices:

Motivational Interviewing	Environment & Epigenetics
Cognitive Behavioral Therapy	REBT
Family of Origin Awareness	Transactional Analysis
Attachment Theory	Mindfulness
Addiction Theory	Psychological Education

These approaches have proven effective in helping people successfully break through patterns that negatively impact their lives. This course promotes mental health recovery that in turn, supports sustainable behavioral change.

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Chapter 1

Mental and Metabolic Health Recovery

When we make the decision to seek counseling it's rare that we show up with a single complaint, problem, or challenge. Instead, we usually unpack an assortment of compounding and confounding problems that are affecting our lives in various ways. Compounding problems can be described as depression, anxiety, weight gain, stress or trauma that may be exacerbated by unrelenting worry, social isolation, health challenges, or sometimes, addiction¹. Confounding problems are our unique concerns associated with our family, gender, race, culture, relationships, spirituality, sexual orientation, and of course, body image.

Integrated weight management therapy (IWMT) [1] evolved from the inpatient and follow-up treatment of individuals diagnosed with two or more (dual) conditions affecting their mental and physical well-being. Through observation and clinical research, it became evident that one intervention (medical or behavioral) often failed to address the complications of dual diagnosis. In every case, a person presents with a unique blend of symptoms and physiology. We learned that for most of our clients a focus on recovery from mental health conditions supported sustainable behavioral changes. These changes were presented as lifestyle changes and included improved nutrition, regular exercise, self-care, and rest.

Providers use broad diagnostic terms like “depression” or “metabolic syndrome” because they present a cluster of “symptoms” required for insurance reimbursement. But by focusing on diagnoses, medications, labels, and treatment regimens, a singular approach didn't help us understand and meet the needs of the unique and wonderful person who'd entrusted us with their care and wellbeing. In an integrated practice, (medicine, fitness, nutrition, and mental health) we took the approach of inviting patients to prioritize problems they wished to address and matched these problems to effective interventions and practitioners. We found that this collaborative approach was beneficial for patients and providers. This course grew from that experience, lessons learned, and the feedback of early course participants. The structured approach blends

¹ Addiction in this context may be viewed as any activity, obsession, or substance use that significantly interferes with daily responsibilities and relationships

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psychological theories, research, and solutions (as well as experience, humor, stories, and common sense). This chapter discusses elements of IWMT with the goal that you'll gain an understanding of the process and application of psychological inquiry as it relates to improving our mental health and implementing behavioral change.

Throughout this text and the online modules there are hundreds of questions designed to facilitate the process of recovery. Try to complete the exercises that relate most closely with your life experience and goals. The BreakThrough! four-step framework is designed to develop awareness, explore skills and techniques to develop resistance, and progressively engage in the challenge of cognitive restructuring that promotes recovery. The goal is to help you develop a positive, empowering sense of self that celebrates your strengths, acknowledges preferences, awareness to recognize challenges, and skills to support your success.

Recognition: (new information) provides insight into behavior and traits. Teaches us how to identify and make healthy (long-term) choices to reach our goals.

Resistance: takes advantage of brain plasticity. Affirmative self-talk and new skills help re-wire and re-orient impulsive or emotionally – driven behaviors

Resilience: is a result of consistent and purposeful resistance. Describes new brain regulation that supports and advocates life-sustaining, healthy choices

Recovery: encompasses both an improved capacity for optimal self- regulation as well as a new operating range

1.1 Motivational Interviewing

IWMT begins with techniques drawn from motivational interviewing (MI) to assess readiness for change and surface concerns you may have regarding your motivation or readiness, self-view, and other concerns [2]. MI is a form of therapeutic questioning that aligns practitioners with where an individual is on their journey from contemplating to implementing change. Importantly, MI supports the identification of self-defeating and self-destructive beliefs and behaviors. (The techniques also work great in communicating with children and teens).

Everyone has a unique sense of their readiness or “dreadiness” for embarking on significant life changes. Because of that, individual motivation can range from denial to apathy, apprehension, resistance, openness, willingness - all the way to enthusiastic commitment! When faced with making changes however, most of us tend to focus on tasks (intellectual) and often underestimate the emotional impact of those changes.

Recognition: *What changes are you ready to make at this time in your life?*

Recognition: *What benefits or reward motivates you to try doing something new or different?*

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Recognition: *On a scale of 1-10, 1 being “heck no!” and 10 being “bring it on!” describe where are you on the continuum from apathy to enthusiasm?*

Recognition: *If you’re not particularly enthusiastic, what might help you to move up the scale?*

Recognition: *Describe any fears or reservations you may have starting this program.*

Recovery: *What support would you like to help you achieve your goals?*

Recognition: *What do you think is holding you back from being more active?*

Recognition: *Have you found success trying to cut back on “junk” food?*

Recognition: *Do you have a hard time sustaining behavioral changes such as eating healthier, getting adequate rest and being active?*

1.2 Attachment Theory

Attachment Theory (AT) focuses on a child’s bond with their mother through early stages of development (0-5 years). Babies’ social interactions and emotional development begins with their primary caregivers and the empathic capability of caregivers is crucial for the development of secure and healthy attachments [99, 100]. When these relationships are interrupted, or dysfunctional, our basic needs may be met inconsistently, or not at all. It’s likely then, that our first emotional memories would have ranged anywhere from confusion and sadness, to deep-seated panic-inducing fears of abandonment or rejection. Eventually in circumstances like these, we either tend to avoid, or desperately cling to caregivers. Subconsciously we may become aware that avoidance is better than experiencing pain. Or optimistically, we may turn ourselves into human Velcro, hoping that by being close, we’ll get the attention, validation, care, and nurturing we need (and want) to thrive. From these early types of interactions we’re subconsciously internalizing the damaging emotional beliefs that we don’t matter, and our needs don’t matter either.

Following on social interactions, food is one of our earliest needs. From birth through infancy we learn to associate feelings of comfort and security with the provider of food (usually our mother). The type of care and responsiveness associated with feeding and patterns of feeding, also significantly influences the nature of our attachment style(s). Without intervention, the style (or blend of styles) that develops during infancy and childhood, tends to remain as we

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mature into adulthood. Our style in turn influences our emotional attachments and behaviors in relationships and friendships. So in a course focused entirely on emotional and metabolic health, it's important we develop an awareness and understanding of our basic attachment style(s) and what we can do to change behaviors that don't accurately reflect the best of who we are now.

Four basic attachment styles are identified in literature: secure, anxious-preoccupied, dismissive-avoidant, and fearful-avoidant. Features of three of these style are described here, however most people will have a blend of attributes. Research suggests that these styles may lead to an external (vs. internal) locus of control or sense of well-being. An external locus of control simply means that we're more likely to rely on, or seek, the approval (or positive attention) of others to feel good about ourselves.

Anxious – Preoccupied

- Early attachment needs were unsatisfied or inconsistent
- Left craving love, nurturing and intimacy
- Begin to doubt that they're worthy of love
- Trained to expect conditional approval - makes it difficult to trust
- Desperate but unsuccessful attempts try to please a parent
- Alternates between distancing in resentful hurt and anger and desperately wanting attention
- Hypersensitive to criticism
- Emotions may escalate quickly if demands or need for reassurance is unmet
- Experience with abandonment, rejection, or inadequacy can cause emotional flooding
- Sometimes hard to separate what happened in the past and the reality of a present situation

Dismissive-Avoidant

- Early attachment needs were unsatisfied or met inconsistently
- Makes the decision that close relationships with others are unnecessary and messy
- They distance or attempt to wall off painful memories from an early age
- Struggle to develop emotional intelligence or sensitivity
- Willingly put on a suit of armor that shines with confidence but effectively hides deep insecurities and social awkwardness
- Professional endeavors are likely to be successful but left unchallenged it's easy to develop compulsive of self-centered traits
- May turn to partners who do not need authentic intimacy to meet their needs
- With maturity recognition that they settled can be painful, frustrating and lead to the onset of deep depression

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Fearful-Avoidant

- Early attachment needs were unsatisfied or inconsistent
- This individual still wants to have meaningful and deep relationships with others
- May have experienced maternal neglect, abuse, or significant instability such as abandonment, divorce, or foster care placement
- Maternal figure is avoidant and discouraging of dependency
- A pervasive fear of rejection, a deep-seated distrust of others, and low self-worth, hampers the development of relationships
- Wants to be close with others but when the vulnerability and fear takes over, they withdraw
- Feel as though they can never escape a sense of emptiness
- Feel that they can never do or be “enough”

Recognition: *Place a checkmark beside any of the attributes that describe your early interactions. Identify any associations to people past and present.*

Recognition: *Which attributes continue to trigger unpleasant reactions or emotions?*

Recognition: *Can you prioritize three of these that you’d like to address?*

1.3 AT & Emotional Dependency

Those of us with dependent styles, who feel our needs aren’t being met in relationships with others, may turn to behaviors such as excessive volunteering, gambling, smoking, eating, work, gaming, shopping, substance abuse, or even infidelity. Why? Because these behaviors provide temporary, mood-altering relief from how we’re feeling at the time. When we’re down, it’s a natural default (coping strategy) to do things that make us feel better. However, any cycle of emotional dysfunction that leads to an increase in the frequency of mood-altering activities, will likely result in internal conflict. Internal conflict begins with thoughts like “I shouldn’t have...” and increases fear-based feelings such as anger, hopelessness, or even despair. Internal conflict factors in the development of depression and anxiety disorders. The challenge then is to become willing to identify emotional triggers and explore any self-defeating cycles of behaviors.

Recognition: *Describe how you may act out or self-sabotage when your needs (or validation) are not met by others?*

Recognition: *How do you feel afterward?*

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1.4 Family of Origin

Family of Origin Theory (FOT) is based on Adler's observations that our early family environment and experiences significantly influence the development of our personality, our thoughts, emotions, preferences, and behaviors [3]. His work in large part led to the understanding of how a person's sense of inferiority or superiority is influenced from birth. Adler recognized that parents, mentors, teachers, and peers play a critical role in the development of our identity (self-view), resilience, drive, and ultimately, our happiness. Initial screening interviews and assessments indicate that very few course participants report happy or secure family of origin environments and experiences.

For various reasons, (including the questionable mental health of our parents), some of us may have endured, rather than enjoyed childhood and adolescence. Unfortunately, the resulting low self-esteem, harsh inner critic, and mood disturbances (such as pervasive depression, anger, or anxiety) often shadow us when we leave home.



Typically, it's not until things begin to go wrong, or we experience disappointment, that we have reason and motivation to question our thoughts and feelings. Unchecked, a negative legacy can overshadow our lives, influencing many of our decisions and actions. We'll explore these influences, so it becomes easier to identify vulnerabilities to psychological distress. This recognition helps us manage our responses to situations that in the past have prompted impulsive (spontaneous) and compulsive (repetitive) mood-altering behaviors.

Recognition: *In general, how would you describe your early influences?*

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1.5 Relationships

An entire chapter of this workbook discusses relationships and the associations with emotional eating; however, some other factors often surface early in group discussions. An unexpected trend emerged in earlier work. A high percentage of female participants diagnosed with metabolic health disorders reported being abandoned or rejected by a parent at an early age. Feelings of abandonment and rejection are intense and probably the most debilitating sources of psychic pain. What surfaced in sessions was that many times the expression of pain (hurt, anger or both) was unconsciously projected onto the relationship with the remaining parent, partner, or a caregiver. In cases where the relationship was strained or unhealthy, this was a significant trigger for emotional eating. When fears are present, or unresolved, it's difficult to have authentic, meaningful, and supportive relationships with others. After a while, there may be pervasive apprehension or outright fear of being judged or found “wanting” or “less than” coupled with the thought:

“If you really knew me...you wouldn't like me.”

Recognition: *If you've ever felt this way, what impact have thoughts like these had on your friendships or relationships?*

Course participants report that shame-based beliefs, feelings of inferiority and for some, guilt, stem from their childhood experiences. These negative feelings are often the byproduct of toxic, conditional love at home (I love you but...) or fostered by racism, prejudice, and marginalization. Unfortunately, feelings of inferiority may be further reinforced by neglect, emotional, physical, and sexual abuse.

Recognition: *If you experienced conditional love or abuse, please describe how this may still affect how you feel about yourself?*

The child who's raised in an abusive home often internalizes additional messages...**not only am I not enough...I don't matter...and what I want doesn't matter.** There are few self-beliefs that inflict more psychological pain than “I don't matter.” Across several chapters we'll explore these long-held messages and beliefs to reframe our psyche and sense of identity within the space of our mature mind.

Recognition: **Describe an experience where you were treated dismissively.**

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1.6 Transactional Analysis

Berne introduced Transactional Analysis (TA) as a therapeutic theory and brought attention to concepts such as the games people play and roles individuals may assume within relationship dynamics [4]. Anything that prompts emotional instability can result in the desire to mood-alter or self-soothe through the consumption of food and other substances. TA is featured in Chapter 9 and illustrates how differences in communication styles lead to conflict, affect relationship dynamics, and give rise to impulsive emotional eating.

Recognition: *How has emotional eating affected your wellbeing?*

1.7 Cognitive Behavioral Therapy

Cognitive Behavioral Therapy (CBT) is often the intervention of choice for effective behavioral change and weight loss programs. CBT is based on the principle that dysfunctional thinking gives rise to the development and maintenance of psychological distress. A simple way of looking at this is that *what we think is keeping us stuck!* The emphasis of CBT is to help people examine self-defeating behaviors and how these may be affecting day-to-day functioning. CBT isn't overly concerned with the psyche and past but is present directive. It encourages setting realistic goals, and actively employing skills designed to promote positive behavioral change. Dialectical Behavioral Therapy (DBT) is also directive with specific techniques that help with positive emotional regulation. A more recent development, solution-focused brief therapy (SBFT) is very effective at addressing specific situations such as quitting smoking or planning your strategy to distribute lottery winnings (see inside cover for mailing information).

1.8 Compulsion, Addiction, and “Enough”

In an era of social influences that glorify excess, it's difficult to appreciate the concept of “enough.” **The concept of “enough” is essential to our sense of well-being.** If we don't have a realistic self-view, a sense of purpose, and meaningful relationships, we may feel as though we're “not enough.” That we haven't accomplished “enough” or that we never have “enough” regardless of what “enough” might be. Take time to reflect and think through what represents “enough” in your life. A colleague (35 years sober) leads large groups of physicians in recovery from addiction. A former addict, her opening introduction is directly on point: “My name is X, and my drug of choice is MORE!” She would often say that during her active addiction, even if a shipping container of opiates was delivered to her back door, she'd still feel as though there wasn't enough. The sense of emptiness that accompanies thoughts of “I'm not enough” or “I'm not okay the way I am” is debilitating. For most of us, food becomes our “go to” or default for reducing psychological and physiological distress. Participants in BT! groups often share the following:

**“For a little while, food fills a void in me.
When I feel full, I don't feel the pain.”**

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Feelings of not being “enough” can be intertwined with loneliness, rejection, and a sense of being different. Being overweight can heighten these feelings and result in paralyzing pain. It may prompt deep-seated fears that no matter what we do, we’re constantly being judged for our appearance. Unchecked, this fear can lead to a semi-dysfunctional form of agoraphobia.

In past groups, as many as **8 of 10 participants reported spending the majority of their non-work time at home** (and that was before the Covid pandemic!). If they went out for a walk, it was after dark when there was less likelihood of being seen by others. They’d shop late at night when stores weren’t as crowded, and fewer people would see what they were buying. Others shared stories of situational anxiety related to public places such as restaurants or crowded venues. They were convinced that when they walked through the door or tried to find their seat on a crowded plane, all eyes were judging them with a mixture of hostility and disgust.

Recognition: *Please describe how concerns with self-image or your weight may have caused you to avoid activities or places you used to enjoy.*

1.9 Rational Emotive Behavioral Therapy

Rational Emotive Behavioral Therapy (REBT) [6] is a practical approach designed to foster behavioral change. Ellis’s theory was “If we change how we think about ourselves; everything else changes in turn.” This may be overly simplistic, but this is one of the fundamental concepts to building a positive, engaged, healthy sense of self. REBT focuses on several components: Action, Beliefs, and Consequences.

$$\text{Action} + \text{Beliefs} = \text{Consequences}$$

When we pair what we **Believe** with **Action** of some sort, there will be **Consequences**. Some consequences may be positive, others not so much. The goal of this approach is to examine how our **Beliefs** manifest **Consequences**. For example, if we (unconsciously) **Believe** and project that we’ll fail at something, we may not put forth the **Action** required to succeed. The **Consequence**? A less than desirable outcome that may invoke feelings of defeat, loss, regret or possibly shame. Let’s begin to identify negative, self-defeating beliefs we have about ourselves.

Recognition: *Write down a few self-defeating thoughts you may have had recently.*

Our thoughts affect our happiness and certainly our potential. While in BreakThrough! you’ll be encouraged to evaluate beliefs, you hold about yourself. After **A**, **B**, and **C** have been explored, Ellis adds “**D**” to the equation. **D** is the technique of **Disputational Analysis** (more simply known as disputing). We may discover we have an inner critic that says nasty stuff to us. When we examine our **Beliefs**, we quickly realize that there’s no place for that mean self-defeating voice in our life. Disputing is the technique of saying to ourselves something such as:

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“That may have been true at some point; but it’s not true now.” For those of you who like algebra; $DB = AC$.

1.10 Mindfulness

Mindful awareness is integrated into the development of strategies and coping skills once *choice points* have been identified. Choice points are those nanosecond insights when we recognize a situation can go one of two ways, and we have a small window of opportunity to choose or influence the outcome. In relationships, the choice point may be simply recognizing the moment where we can choose peace...or conflict. With food cravings or binge urges it’s that moment when we recognize our opportunity to choose health over impulsive indulgence.

As the concepts from BreakThrough! are assimilated, mindfulness-based stress reduction (MBSR) [7], dialectical behavioral therapy (DBT) [8] and other similar approaches, provide powerful tools to reinforce the gains that have been made. These skills are designed to help recognize and reduce stressors, as well as increasing our tolerance of negative emotions, decreasing critical self-condemnation, and enhancing our problem-solving capabilities [9]. Mindful awareness helps us develop **R**ecognition of our state(s), build **R**esistance, and ultimately maintain **R**esilience and **R**ecovery.

1.11 Discussion

One of the goals of this course is to help you *appreciate and enjoy life as you experience it now*. Recognize that you’re working on dreams and goals at your pace and that’s enough for today! Being present in life and living at the pace of life are gifts that keep us centered and allow us to give the best of ourselves to others. When we’re centered and content, we’re more likely to view our lives and surroundings without the weight of judgment, bias, or expectations. For various reasons, there’s little in this course that touches on religion and issues related to specific cultures and faith. This isn’t an oversight. One’s faith is typically tied to our family, community, and origins. If you have a specific faith and meditative or prayer practices, you’re encouraged to align these with the process of taking your journey through BreakThrough!

Throughout this course we use the term metabolic health disorder(s) rather than “obesity”. In the context of mental and physical recovery, we think this term better represents the scope of health problems and illnesses that can arise from unhealthy lifestyle patterns, heredity, targeted marketing, socioeconomic factors, and much more. When referencing medical and psychological research, we do retain the terms used by authors in their publications..

The term “soul” is used interchangeably with “psyche” and “inner self” in this workbook and acknowledges the Greek origins of psychology. “*Psyche*” was the term Socrates used when discussing matters of the soul. Well before Westernized mindfulness practices, discussions of “soul” and “spiritual awareness” were considered integral to the practices of psychology, psychiatry, and psychotherapy [10]. Plato introduced the term “*Therapeia*” meaning “service” or “care”. His characterization of “therapy” invites us to pay attention to our everyday specific needs, rather than seeking a cure after things have fallen apart [10]. As you gain awareness of

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your needs or challenges, you'll learn to harness and trust your inner coach to help keep your psyche (or soul) aligned with your life.

All of us transition through distinct cyclical phases across our lifespans; sometimes several times. The emotions associated with these phases and changes, range from optimism and exhilaration through darkness, apathy, and despair. That said, all changes, and even conflict in life are helpful. They provide us with the opportunity to sort out what we want. We can then make choices that align our focus and energy, with our dreams and desires. Typically, there's some pain that precedes the sorting out period. Then there's a period of relinquishment where we let go or give up things we don't want for ourselves. What follows is a period of settling where we enjoy what we have with feelings of achievement and contentment. If this peace is disturbed, it's likely we'll transition through these phases again. This process captures the beauty of our human existence and our magnificent power of choice. It's a natural process that helps us transition from emptiness, boredom, or even pain, to manifest purpose-driven lives.

Resisting change simply creates internal conflict and friction. If we can view our journey with the expectation of experiencing these phases, we're able to free ourselves from the weight of the past. We're able to free ourselves from guilt or shame (and the opinions of others) that may have kept us from seeking professional help, or doing things to take care of ourselves.

This process can be likened to hiking up a mountain trail. We begin at the bottom carrying the boulder of our past in our backpack. At first the weight is manageable, we may adjust it a few times, but we keep moving. About half-way up the mountain the views open up and we see the panorama before us. Above towers the dazzling snowcapped peak, below dense forest, split wide by a rushing river filled with boulders of every size. We're tired, but we want to make it to the top. As we continue on, the weight becomes too much. We fall backwards onto our rear end and start sliding down the trail. The friction in the seat of our pants is excruciatingly uncomfortable, and now, we're presented with a choice. If we want to climb to the peak, we have to open our backpack and release the boulder to join all of those in the valley below. Then we can dust ourselves off and climb with renewed energy to reach the peak of our potential.

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Chapter 2

Daily Reflection

The goal for this chapter is to explore emotional and physiological triggers that result in undesirable eating behaviors. Daily Reflection is the BT! tool that helps us identify our eating behaviors and the mood or physiological states that lead to unhealthy patterns. After completing a few weeks of reflection, your unique patterns will emerge. Early awareness of our vulnerable states helps us **Recognize** “choice” points and opportunities for change. The form is straightforward. As you complete them, please remember this course helps us focus on lasting behavioral changes. Be patient with yourself! It takes time to develop awareness and explore new behaviors. Sometimes, it just takes time for us to be ready to change what we’re doing. There’s no judgment, pass or fail in this course. In fact, many past participants continue to attend support groups to stay motivated and connected with peers.

2.1 Our Brain Influences Our Weight

Our weight is entirely influenced by what happens in our brain, so we start this chapter by exploring the relationship between our brain and body. The role of the brain is to preserve our life and maintain an internal equilibrium that supports our physical, intellectual, and emotional functioning. Unless something goes wrong, we’re generally (and thankfully) unaware of all the autonomic regulatory mechanisms (heartbeat, breathing, motor reflex, etc.) and chemical interactions that occur between regions of our brain, organs, and other systems. **Our brain is automatically doing for us, the things we don’t have the time, knowledge, or capability to manage for ourselves.** That’s a powerful statement, however, to self-regulate eating behavior, and much, much more, we have to develop awareness of what our brain does to ensure its survival and immediate satisfaction.

Basically, the hypothalamus (a walnut sized part of our brain) has highly active monitoring and feedback systems integrated with the body. It knows immediately when our temperature or activity levels are high or low, energy demands are high or low, and this is also true for our mood state and cognitive functioning. Over time, the brain develops or “learns” its

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preferred set points (or levels) for functioning. The walnut (we call Brian) constantly monitors these for desired “comfort” and to ensure our survival. At any given moment, the nut will try to do whatever it can to energize, compensate, stabilize, or simply maintain set points or levels. However, the nut doesn’t consider what’s healthy for us. It doesn’t know how!!! It’s up to us to recognize that at times, **WE** have to intervene, slow down, and make the healthy choices.

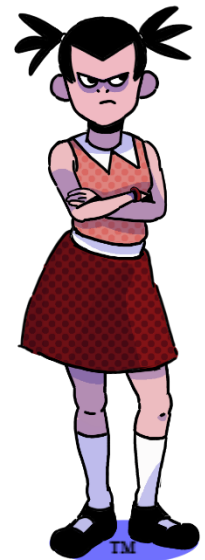
2.2 Brian, Betty, the Hippo, and “US”

Throughout BreakThrough! we take a humorous way to explain brain functions as they relate to mental and behavioral health. “For context these are the roles we discuss extensively:



1. **Brian:** The walnut-sized Hypothalamus or central part that works behind the scenes deep inside our brain to monitor and coordinate body functioning that keeps us alive.

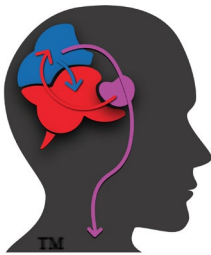
2. **Betty:** The Amygdala, otherwise known as the emotional part of our brain that records, processes and stores our emotional experiences and responses (in the Hippocampus) and can influence our perception of everything that happens to us from birth throughout our lives. “Bitching Betty” the Queen of the Amygdala is our inner critic.



3. **The Hippo:** Short for the hippocampus where our memories and new learning are stored. The Hippo can be accessed by multiple areas of the brain.

4. **WE or US:** The frontal cortex – or executive system. This is the rational logical part of our brain, it’s **US! WE** can exert control over the other parts because we’re conscious, capable of learning, and taking charge.

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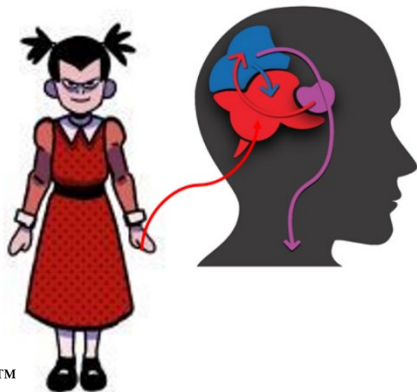
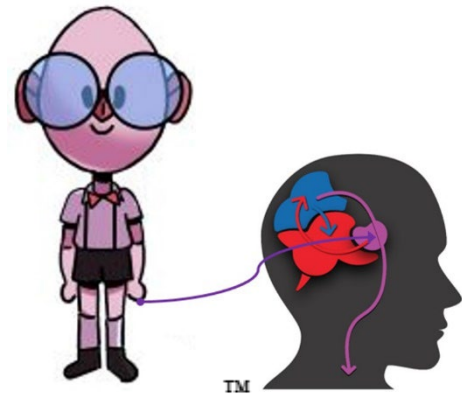


Purple – hypothalamic pituitary axis (HPA) Brian

Red – amygdala (emotions) Betty

Blue – Hippocampus (memories) HIPPO

Brian's primary job is to do whatever's necessary to ensure our survival in the face of physical or psychological challenges. He does this by regulating the hypothalamic-pituitary functions and limbic processes that connect from our brain to our body via forms of neurobiological stimulation and chemical processes. The rest of the time, Brian tries to maintain our internal balance (homeostasis). However, he can be readily hijacked by Betty and her emotional inputs.



Betty (Red) represents the emotional part of our brain (amygdala). From birth she's fully alert, recording everything we feel. She assumes control of our emotional responses to stimuli, be it negative, positive, or somewhere in-between. Anytime we have an experience, she can, and she will access and harness the emotional memories of every similar experience and respond accordingly. Because of her access, observation, and recording of all our emotional history, **Betty often becomes our inner voice.**

The **Hippocampus** is our memory where the **Hippo** takes various inputs (experiences) from Betty, Brian, and **US** (not pictured) and sorts, stores and processes them for later recall. This area of the brain is also partly responsible for inhibitory responses such as restraint to mitigate impulsivity. When communication between Brian and the Hippo breaks down, this results in elevated resting levels of corticosteroids (stress hormone) and affects Brian's ability to manage the circadian regulation of stress. Betty plays a significant role in modulating the brains; stress response due to her connections with Brain and the Hippo. Deep in the amygdala there are stress anticipatory and regulatory mechanisms that can be positive (downregulate our stress response) or negative (increase cortisol and our stress response). Of significance, the Hippo has difficulty with recall and responses when mixed, conflicting, or confusing messages are received.

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More about Betty

Betty, the emotional part of our brain is fully developed and alert from birth. She is recording everything we feel or experience through our senses, such as noise, touch, taste, temperature and more. Even in utero, before birth, she takes control of our emotional responses to stimuli, be it negative, positive, or somewhere in-between. Anytime we have a subsequent emotional event or trigger, she can and will bring forward the emotional memories of every similar experience and respond accordingly. Because of her access, observation, and recording of all our emotional history, **Betty influences our inner voice**. Many of us are hosts to “Bitching Betty” – a relentless inner critic who constantly robs us of feeling good about ourselves and our accomplishments.

When we automatically react to something alarming, it’s because there is a strong, negative emotional association or fear that’s been triggered. When **Betty** senses or “perceives” a threat she instantaneously sends Brian a distress signal that something’s wrong. **Brian** immediately responds by sending neurological impulses to the adrenal glands. This empowers action to defensively avoid the threat and our limbs (or mouths) move! These actions all happen well before **WE** are consciously aware of the threat and take informed and decisive action to further protect ourselves. If the threat continues, the **HPA (Brian)** continues to send signals to the adrenal glands which release cortisol and keep us energized.

When the danger diminishes, cortisol (stress hormone) levels fall, the physical and emotional responses dissipate, we catch our breath, and we press on. If however, **WE** add additional negative thoughts, continue to dwell on the event or situation, build resentments, (expletives) we’re now inviting Betty to take control. We’re on autopilot; operating reactively in response to her negative inputs.

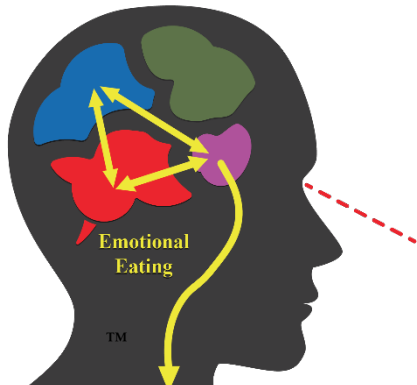


Betty Screaming at Brian

When we let **Betty** run the show (and escalate emotions), she continues to make demands of **Brian**. After a while, he gets confused. Our adrenal glands have told him that the stressful event is over, but for no reason, Betty is still yelling at him to work harder and do more. It’s in this state of mixed emotional signaling that we’re likely to do things that aren’t in our best interest (like reach for candy, chips, or a drink we don’t need).

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When **WE** don't re-assert control, Betty forces **Brian** to work past quitting time. In this state we're burning through energy reserves and resources quickly. When our glucose (blood sugar) and other (neurotransmitter and hormone) levels plummet in response to excessive stressors, **Brian** activates our carbohydrate craving machine. Remember **Brian** controls our body, 24/7 so with no hesitation whatsoever, **WE** will seek or reach for carbs and fat. In this dysregulated state, we tend to binge, consuming excessive calories.



The Emotional Response Circuit

2.3 Our Brain on Autopilot

Let's put this in the context of eating behavior. We see food and two things happen at the same time. If it's something we like (cake) **Betty** reaches out to **Hippo** and attaches a flood of positive emotional memories to what we see. **Brian** will be overjoyed with the anticipatory rush of dopamine to the D2 receptors, and without any corrective input from **US**, **Brian** energizes our arms and legs to get the cake.

This excitement and contentment is alas...temporary.

When the effect of sugar consumption diminishes, brain activity levels drop fast. **Brian** enters a state of energy withdrawal and immediately starts to crave something to help him feel that good again. **Betty** will encourage us to eat more chocolate (after all, we deserve it).

Usually what follows is that **WE** eat too much and overload **Brian's** capacity. Overwhelmed, **Brian** downwardly displaces the stress (arrow) of keeping up with our eating behavior. He doesn't want any more stimulus, and activates our neurological, vascular, and digestive systems to deal with the excess. We may break out in a sweat, feel an increase in heart rate, feel uncomfortably bloated, and even nauseous to the point of throwing up. There may be some relief, but it doesn't last long.

US "I see cake"

HIPPO "I remember - We like cake!"

BETTY "You deserve cake!"

US "but..."

BETTY "Eat the damn cake!"

BRIAN "Cake feels so good!"

BETTY "Eat more cake!"

A WHILE LATER:

BRIAN "I feel sick; my head hurts"

US "I feel really bloated; my pants feel tight"

BETTY "Really? You ate all the cake. You should know better!"

HIPPO "I'm so confused! Do we like cake or not?"

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Betty has multiple functions, and at times, a really nasty attitude! Not only does she record our pleasurable experience of eating candy, but at the same time, she’s secretly entering the grams of junk vs. health into her ledger of “good vs. bad”. When we’re feeling bloated later that day, thinking maybe we shouldn’t have eaten so much cake, “bitching” **Betty** is right there to add judgment, criticism, condemnation, and we feel even more depressed! These feelings and mood sensations are of course sent on to Brian for his processing and the cycle begins again.

Like most of us, **Brian** doesn’t like feeling criticized or dumped on by **Betty**. When we feel sad, neurotransmitter activity decreases. Brian will then grasp at any opportunity to feel better again. Unfortunately, in this cycle of (binge-withdrawal-binge) our reward system (and relationship between **Brian** and **Betty**) becomes dysregulated and dysfunctional. This state of dysfunction leaves us vulnerable for weight gain and onset of metabolic disorder (MD) [10].



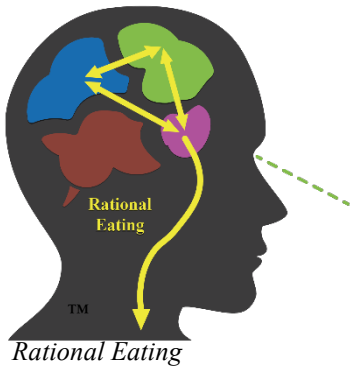
Emotional Eating

When compared with other people, those of us who struggle with being overweight have a higher activation of the reward system. This means that high-fat and high-sugar nutrient foods are more appealing to us [9]. It makes sense then, if we’re operating on autopilot and letting Betty run the show, that it’s hard to want to cut back our consumption of simple carbs [11]. Feeling we lack control often prompts abnormal eating behaviors characterized by recurrent cycles of restrictive or disordered dieting (grapefruit diet) as well as rebound overeating.

If we eat excessively for a few weeks, **Brian** and our body can cope. However, if we continue to consume a diet high in carbs and lipids (fat) we trigger inflammation of the

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hypothalamus which is the pre-cursor for triggering the onset of conditions that can lead to the development of metabolic and dementia disorders. Once the inflammation of the HPA takes hold, **Brian's** stabilizing functions and feedback mechanisms are significantly impaired. To reverse this inflammation and restore optimal functioning, it's important to focus on we're putting into our bodies.



WE CAN TAKE CHARGE of what happens in our brain, and we certainly have the capability to improve our brain health and body composition. Through awareness and being present with ourselves, **WE** learn to bypass Betty and positively regulate Brian. We develop new (life sustaining) response/reward pathways that connect **US** to the HIPPO and Brian. With this understanding, simple as it may be, we'll now explore the mood states that contribute to emotional and dysregulated eating behaviors.

2.4 Breakthrough! Daily Reflection Tool©

BREAKTHROUGH!™	
Daily Reflection	
BEHAVIOR	
<input type="checkbox"/>	EATING FOOD I KNOW IS UNHEALTHY
<input type="checkbox"/>	EATING MORE THAN I HAD PLANNED
<input type="checkbox"/>	EATING ON THE RUN
<input type="checkbox"/>	EATING TO CHANGE EMOTIONAL STATE
<input type="checkbox"/>	EATING LATE AT NIGHT
<input type="checkbox"/>	EATING FOR REWARD
<input type="checkbox"/>	HEDONISTIC BINGE EATING
<input type="checkbox"/>	ON TARGET / MINDFULL
<input type="checkbox"/>	OTHER
MOOD STATE	
<input type="checkbox"/>	TIRED
<input type="checkbox"/>	BORED
<input type="checkbox"/>	STRESSED / RUSHED
<input type="checkbox"/>	SAD / HURT / LONELY
<input type="checkbox"/>	ANXIOUS
<input type="checkbox"/>	FRUSTRATED
<input type="checkbox"/>	ANGRY
<input type="checkbox"/>	CONTENT
<input type="checkbox"/>	OTHER

With practice this daily exercise can help us become aware of our triggers, mood states and behaviors in the moment and recognize choice points. At choice points we use specific **R**esistance techniques and skills to assert **O**UR control over impulsive and emotional urges. This form is available online as a download, an APP. as well as in the appendix.

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One of our tasks is to reduce mindless eating. The next time you're thinking about eating ask yourself - *Am I really hungry?* When you sit down for a meal, look at your food. Look at the colors, the textures, and the placement of items on the plate. As you eat, pay attention to any unique flavors, or sensations. For the time you're eating, eat with intent and appreciation. If you relapse on "junk" food, just move on. Try to identify what you can and will do differently next time. Accept ups and downs with grace and humor; this is a journey of progress, not perfection

As we progress from this chapter, we're beginning to develop **Recognition** which in turn, leads to **Resistance** skills. Ultimately our goal is **Resilience**; the mindset that supports durable **Recovery**. **Resilience** is the difference between: *CRAVE versus CAVE*. This **Train Your Brain?** statement (or mantra) can help us develop resilience by replacing "old" impulsive behaviors with awareness of choices that align with our goals

I may want it, but I don't need it!

Mood States

2.5 Tired

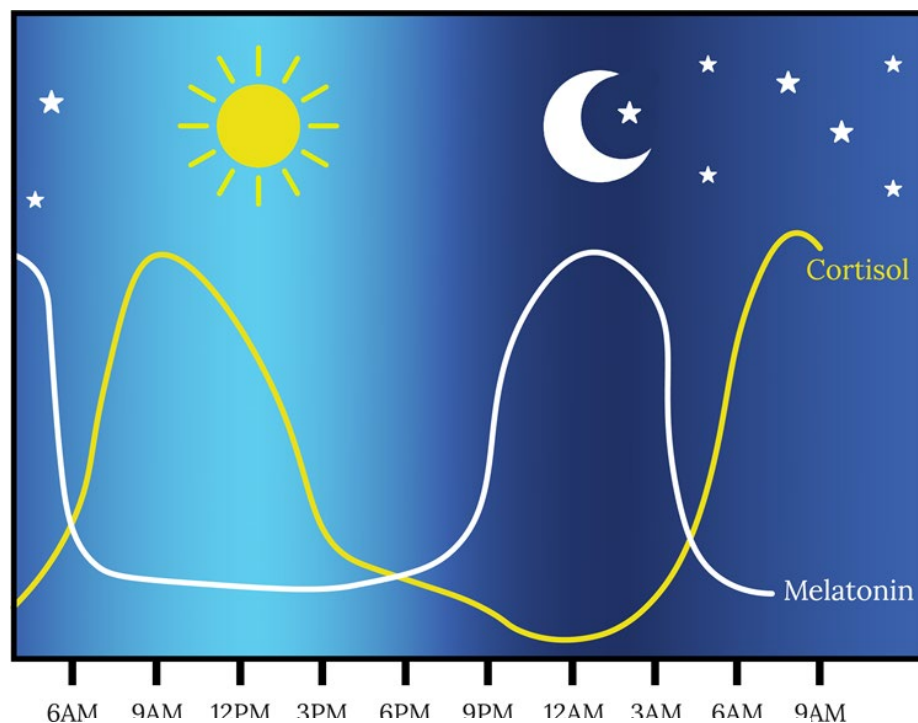
Every few years, statistics change regarding the optimal number of hours we should sleep. The average though (for adults) seems to fall between 6 and 9 hours. That said, approximately 70 million adults in the U.S. have some kind of sleep or wakefulness disorder. Think about what happens when we get tired. For most of us, our reserves of patience, tolerance, discipline, resilience, and energy are dangerously low. We're less aware, more likely to miss important signs, and make mistakes. Studies suggest that after 24 hours of wakefulness, we're as cognitively impaired as an individual with a Blood Alcohol Content of .15 (twice the legal limit for driving) [12].

When we're tired, we should sleep but...most of us don't. Even though we may be passively lounging while we're watching TV, scrolling through Facebook, reading, or engaged in hobby work, we're resting, but we're not sleeping. Sleep, light and circadian rhythms play an important role in metabolism, metabolic and mental health disorders [111]. When we sleep at night our body and brain goes into the rest and repair state when cells perform maintenance functions necessary for long term health [111]. Our bodies need sleep to restore optimal functioning. For most of us, our natural circadian rhythm (regulated by the hormones cortisol and melatonin) is a predictable 24-hour cycle. Some of us function more efficiently early in the cycle; others hit their stride later in the day. Either way, knowing our unique pattern of highs and lows is important to weight management.

This graph illustrates the onset, peak, and decline of two important hormones: cortisol and melatonin, the sleep hormone. Cortisol, the stress hormone, provides us with natural energy and motivation to wake up, get up, eat, and focus on tasks that demand sustained attention. In this diagram the onset of cortisol is around 5 AM with a dramatic increase through 9 AM. As we near lunch time, we're clearly on the downhill decline.

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This decrease explains in part, why some of us start nodding off and craving an afternoon nap. From 3 PM levels decrease further until around 3 AM when the cycle begins again. When we look at the light-colored line representing melatonin levels; we see the opposite cycle. At 5 AM, while cortisol is increasing rapidly; melatonin is falling to its lowest state. It's not until 6 PM that we see melatonin levels begin to increase and then peak between the hours of 10 PM and 3 AM. Bear in mind, this is an average cycle that's highly influenced by our light/dark environmental cues, physiological and physical factors such as obstructed sleep apnea, cardiovascular disease, frequent urination, and other metabolic illnesses and disorders that affect thyroid and pineal gland functioning [96].



Circadian Cycle – Cortisol and Melatonin

When we disregard our natural cycle, Brian gets irritated and pouts, acting like an annoyed teenager. He'll take the position that if you won't let him sleep; you have to feed him what he likes best and for energy, that's sugar! Here's the scary part All day long, Brian ensures that with no cognitive exertion on **OUR** part; we walk, talk, and breathe (sometimes drive) with little conscious effort or awareness. So... when he's tired, he can and will move your limbs to satisfy his need for immediate energy. Before you know it, you've made a trip to the kitchen and returned with a half-dozen cookies and a glass of milk.

How many times do you find yourself cupboard hopping or fridge surfing late at night? All day long you had the discipline to avoid temptation and now at the worst time of day, you're consuming a day's worth of calories in minutes. When our energy reserves are depleted, we're more likely to reach for energy-dense ultra-processed foods and our ability to control how much

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we eat is diminished as well. So...when we realize we've blown our calories through the roof do we go to bed? Some of us might - but for the rest of us - a relapse on tasty treats only increases our cravings for more and we reach for that second bowl of ice cream.

Recognition: *Do you think you're getting enough sleep?*

Where do you feel fatigue in your body?

When you're tired, do you notice changes in attitude?

Are you more careless? Any cognitive impairment?

What else do you notice? How do you attempt to upregulate your mood when you feel tired?

More on the Importance of Sleep

Our bodies thrive on restorative, uninterrupted rest. That said, many participants share they have difficulty falling asleep, or going back to sleep, because of unwelcome and intrusive thoughts, fears, hypervigilance, sensitivities to touch or sound, and more. There are numerous causes for sleep problems which can be categorized as too much, too little, and poor-quality [111]. Our brain and bodies suffer greatly when our sleep patterns are impaired. Poor sleep leads to mitochondrial dysfunction, which leads to cognitive impairment, which can lead to Alzheimer's disease [111]. Studies of the body suggest that insufficient sleep duration results in a 45% increased likelihood of weight gain and 9% for each hour of sleep loss below ideal levels. Adults receiving 7-8 hours per day of sleep fare better [13].

The process of sleep is made up of the following two primary stages [96]:

1. Rapid-eye-movement (REM) sleep
2. Non-REM sleep

When we first fall asleep we're in the non-REM stage. The non-REM stage of sleep is a time when our heart does not have to work so hard. About 80% of a full night's sleep is spent in this stage. During non-REM sleep, our heart rate, breathing and blood pressure all drop to levels below those that occur while we're awake. REM is the stage of sleep when we have most of our dreams. It is only about 20% of your total sleep time. Our blood pressure and heart rate can go up and down during this stage. If we have a nightmare that wakes us up, we may find that our heart is racing [96]. OSA increases the risk for high blood pressure which stresses the heart and contributes to coronary artery disease (CAD) [95]. CAD limits the flow of blood due to narrow

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arteries and prevents the right amount of oxygen from reaching the heart [95]. Sleep apnea also causes the blood oxygen level to drop during pauses in breathing which leads to a rise in the heart rate and blood pressure [95]. An extra strain is put on the heart when amount of oxygen sent to the heart decreases at the time when the heart needs more oxygen [95].

Short sleep duration is associated with increased waist circumference and decreased physical activity due to fatigue [13]. From the physiological perspective it's thought that sleep deprivation decreases leptin, increases ghrelin, and compromises insulin sensitivity [14]. We discuss these factors more in chapter three (3.7). For some, obstructive sleep apnea (OSA) or other conditions affecting the lung can be life-threatening and significantly impair the quality and duration of sleep. Untreated OSA can increase the risk of heart disease and diabetes. On a positive note, the benefits of treating OSA include increases in energy level, concentration and mood disorders [13]. Even a 10% weight loss can result in a 20% improvement in the severity of OSA [14]. Lastly, an important factor in getting enough uninterrupted sleep is that the brain uses this resting time to clear out potentially dangerous beta amyloid proteins [97]. These proteins contribute to cognitive impairment the development of Alzheimer's disease [97].



Betty spinning the Wheel of Anxieties for Brian.

This illustration captures the wheel of worrisome thoughts that lurk all day in the recesses of the subconscious waiting to make their appearance the very second that daily distractions and activities have ended, and our head hits the pillow.

It's like our bodies are relaxing and then we hear a faint click. What's that we wonder as our anxiety spikes? It's Betty spooling up the midnight wheel of anxieties. Suddenly we're presented with a chaotic and apocalyptic film featuring our worst fears, doubts, insecurities, and worries. We feel our heart rate increase as those moments of serenity elusively slip away. The intrusive clacking of sprockets spools up as the wheel spins and spins again.

Malevolent **Betty**, secretly afraid of the darkness and being alone with her scary subconscious stuff, doesn't want to let **Brian**, the **Hippo** or **You** to go to sleep. However, the next day, our sleep deprived companions, **Betty**, **Brian** and the **Hippo** will make sure that **WE** feel irritable, vulnerable, and easily overwhelmed until we get adequate rest.

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Techniques for improving sleep. *Stanford University* [15].

1. Aim for at least 7 hours of sleep. It is recommended that adults aged 18 and older get at least 7 hours of sleep every night. Some people may require 8 or 9 hours to feel their best. Try to find how many hours work best for you and make that your nightly goal.
1. Follow a consistent sleep schedule. Going to bed and waking up at the same time each day helps to regulate our body's internal clock. Ensuring adequate light exposure during the day while minimizing bright lights at nighttime also help to maintain a healthy sleep-wake cycle [15]. Also, a groundbreaking study of over 10,000 individuals suggests that regular exposure to bright sunlight can significantly improve glucose and lipid metabolism, reduce LDL levels, and decrease the lifetime risk of developing cardio metabolic disease [118].
2. Establish a relaxing bedtime routine. Allow yourself sufficient time to unwind and shift into sleep mode. This could include taking a warm shower or bath, light stretching, or enjoying a warm bedtime drink such as chamomile tea. Meditation and deep breathing techniques can also help balance the autonomic nervous system and promote a state of calmness.
3. Maintain an optimal sleep environment. Mattress and pillows should be comfortable and the bedroom should be cool (60-67 degrees). Minimize exposure to bright lights, disruptive noises, and electronic distractions at least 30 minutes (preferably 1 hour) before bedtime. Avoid stimulating or stressful activities before bedtime.
4. Get regular exercise and minimize sitting throughout the day. While vigorous exercise is optimal, even light exercise and increased movement can improve sleep quality. If you can perform moderate to high intensity exercise, the American College of Physicians recommends 150 -300 minutes of moderate to high intensity exercise every week to improve sleep. Evening exercise within a few hours of bedtime may impact sleep for some individuals, however this can vary from person to person so find the time of day to exercise that works for you.
5. Avoid stimulants such as caffeine and cigarettes in the afternoon. Be mindful of alcohol use close to bedtime as this can disrupt sleep quality fragmenting sleep throughout the night and particularly in the morning hours when you get more of your REM sleep.
6. Avoid naps. If necessary, limit naps to less than 30 minutes and before 3 pm. Although a short power nap (20-30 minutes) can help improve performance during the day, it does not make up for inadequate nighttime sleep and can make it more difficult to fall asleep at your desired bedtime.
7. Avoid large meals close to bedtime. Heavy foods can trigger indigestion and heartburn that disrupt sleep. Ideally, large meals should be eaten at least 2 to 3 hours before sleep.

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Light healthy snacks can help satisfy hunger and promote sleep if you have an early dinner.

8. If you are having difficulty falling asleep, get out of bed. After about 30 minutes, get out of bed and go to another room and try doing something relaxing in dim light (i.e. reading a book, breathing exercises, journaling, etc.). Once you begin to feel sleepier, return to your bedroom and try sleeping again. This can help to strengthen the association between bed and sleep.
9. If sleep problems persist, consider keeping a Sleep Diary or speak with your doctor about your sleep concerns. This can help identify problems with common sleeping patterns and would be beneficial if you speak with a doctor about your concerns.

Along with these tips, **WE** have to train our brain that it's time to rest and go to sleep. When intrusive thoughts pops up, brain-talk is essential. To exert control over our brain **WE** are going to be talking to our brain so that **we** can begin to exert control over emotional and neurological responses. . In the realm of sleep, we'll likely be reminding Betty that she's safe, and for now, *"Everything's okay; it's time to rest"*. Or something like *"Everything's is on the list; we're going to sleep now."* The key to developing this control is practice. That said it's on **US** to consistently make time to write down, organize, or review the "to-do" list. Many participants share that they find it helpful to use a pen and paper rather than dictating to their phone. This makes sense. When we see what we write, we're not only processing information with the executive part of our brain that plans and organizes, but we're also harnessing several of our other senses that can help us recall information later on.

Resistance: Write down a few "train my brain" statements and pick one to try tonight.

1. _____
2. _____

2.6 Bored

Boredom (or apathy) is a mental state that has been made possible by the incredible progress in most activities that support human life. We no longer have to spend hours a day to hunt, cultivate and cook food. With the onset of pandemic lockdowns, most of us learned that we can simply reach for our phone and within the hour just about anything was delivered courtesy of grocery stores and ride-share apps.

- We no longer have to walk significant distances
- Virtual communication has alleviated the requirement to leave our home or work for the purpose of actually meeting with people
- Physical exercise (once essential in daily activity) is now a choice, or for some, a luxury.

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- Self-indulgence, entitlement, and immediate gratification, once rare, are now promoted as desirable behaviors through social media.

How often do you hear yourself or someone else say “I’m bored”? When we feel bored, we have to ask ourselves - what’s really going on? Have we become so accustomed to high levels of stimulation that when we find ourselves with quiet time - it makes us uncomfortable? Do we become apprehensive if we feel lethargic or cognitively dull?

Boredom has become an undesirable, if not intolerable, state. Some of us who are uncomfortable with boredom naturally seek to alter or up-regulate our mood state. We may frequently find ourselves aimlessly foraging for food or drinks high in sugar and/or caffeine. Others habitually reach for cigarettes, alcohol, or other stimulating drugs that (initially) up-regulate mood. Some may go to extremes to induce stress and adrenalin (release norepinephrine and endorphins) by engaging in risk-taking behaviors, extreme sports challenges, or intense gaming.

The key to stop eating in response to boredom, is to become aware of how often it arises and then evaluate and reframe what “being bored” actually represents. Our hands love to do things and our mind is energized by the expression of creativity. As we’ll learn later on, mindfulness has us accept our low energy states as they are, so we can appreciate and enjoy them! In addiction recovery, significant emphasis is placed on achieving peace-of-mind, serenity, and contentment. So much so, that most rehabilitation programs include some form of mindfulness or emotional regulation strategies and practices. A constant state of activity doesn’t allow for stress reduction or micro-moments of restorative repair.

Downtime is a luxury we can learn to appreciate with little effort beyond organization. We can retrain our brain to celebrate the absence of stress! One BT participant decided that she had to quit a job and environment she despised. She was supported by everyone who knew about her situation. The next week she came to group concerned that she felt light headed, even high, and might have a brain tumor. She had no concept that with the release of extreme stress, her brain was naturally content and at peace.

Recognition: *Do you ever experience feeling bored? How often during the day? Week?*

How do you feel when you’re bored? Irritable? Anxious? Sad? Melancholy?

Do you typically like or crave high levels of stimulation? Activities? Social Situations?

What do you usually do to change how you feel?

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Does this activity work, or does it cause frustration? What other ways can you think about boredom?

2.7 Stressed / Rushed

When we feel stressed, often there are mounting pressures or demands that are fueling a state of tension. Rushing is how we'll likely try to keep pace with multiple demands. Most of us try to accomplish more than is practical on any given day with the expectation we'll get everything done. We do so with the earnest desire to do everything well with the hope (or expectation) that others will be happy and appreciative of our efforts.

During times of stress, the hypothalamus signals the pituitary gland to produce a hormone, which in turn signals the adrenal glands, located above the kidneys, to increase the production of cortisol. Cortisol increases the level of energy fuel available by mobilizing glucose and fatty acids from the liver but at the same time, cellular regeneration may slow down and lead to the onset of both mental and metabolic health conditions. Cortisol begins in the mitochondria, the most basic element that determines the health of each cell in our body. When cortisol is released in the bloodstream it binds to other glucocorticoid receptors which turn on and off thousands of genes all related to metabolism [11]. Relentless dysregulated states of stress cause premature aging at the cellular level, affect all systems in the body, contribute to numerous mental and physical health problems, and produce the worst symptoms in our most vulnerable areas (pain in the low back, shoulders, stomach, head, etc.).

When the body is stressed, muscles tense up. Muscle tension is almost a reflex reaction to stress—the body's way of guarding against injury and pain [15]. With sudden onset stress, the muscles tense up all at once, and then release their tension when the stress passes. Chronic stress causes the muscles in the body to be in a more or less constant state of guardedness. When muscles are taut and tense for long periods of time, this may trigger other reactions of the body such as migraines triggered by chronic muscle tension in the neck or shoulder areas [16].

In the cardiovascular system, comprised of our heart and blood vessels, chronic stress, or a constant stress experienced over a prolonged period of time, can contribute to long-term problems. This type of stress produces a consistent increase in heart rate, elevated levels of cortisol and increased blood pressure. Long term this may also contribute to inflammation in the circulatory system, particularly in the coronary arteries which can increase the risk for hypertension, heart attack, or stroke. It also appears that how a person responds to stress can affect cholesterol levels, a significant factor in metabolic associated fatty liver disease (MAFLD) [1]. Solid evidence suggests that stress significantly factors in patterns of disordered eating, weight gain, the development of metabolic disorders, and MALFD. Chronic stress can also trigger or exacerbate a variety of psychological disorders, such as anxiety, depression, panic disorder, and posttraumatic stress disorder.

The body's stress response is a highly adaptive neurological system that allows us to divert energy to cope with actual or anticipated danger instantaneously. Initially, after we

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experience a stressful event there is a (corticotrophin-releasing-hormone) suppression of food intake. This diverts our body's resources away from less pressing needs (such as finding food) and prioritizes our fight or flight behaviors. When we're stressed, cortisol (the primary stress hormone) increases sugars (glucose) in the bloodstream and boosts the brain's use of glucose. In this phase of the stress response, we're quickly depleting our available energy resources. However, several hours following the event there's a glucocorticoid rebound which stimulates hunger and an increased drive to consume foods rich in carbohydrates [17]. This rebound effect is what prompts us to urgently seek and eat ultra-processed, nutrient deficient (UPND) foods to quickly restore our energy resources.

Recognition: *Think back to the last time you experienced a stressful event. Did you find yourself eating comfort foods a few hours later? What did you choose?*

When stressors are excessive, the increased frequency and effect of these neurochemical responses become detrimental to our well-being. Chronically elevated glucocorticoids lead to stimulated appetite, energy conservation, and excessive weight gain [12, 13]. Activation of this circuitry also interacts with the HPA axis to suppress its further activation, meaning not only can stress encourage eating but for a while, eating will then suppress the feelings of stress [12]. This chronic response to stress is circular in nature. Excessive glucocorticoid production and/or elevated basal glucocorticoids lead to energy conservation (couch) and appetite stimulation (eating). Chronic stress also increases the perceived reward value of high-glycemic (UPND) food items making them seem even more attractive to us! [18]

Stress and stress-related disorders have a high risk for addiction to substances as well as significant risk for cycles of relapsing behavior [20]. Here's a simplified look at weight-related problems caused by elevated cortisol levels:

- Activation and an increase of glucocorticoids (glucose+cortex+steroid).
- Increased appetite (via action in the hypothalamus).
- Visceral fat accumulation and weight gain.
- Desensitization of the brain to leptin release.
- Altered decision making.

Western culture promotes the ability to "multi-task". In fact, we're supposed to take pride in how well we juggle several tasks at the same time. But, for most of us, it means we may do a lot; but feel tense, anxious, or stressed when things are seldom done as well as we'd like. We've become creatures of habitual multi-tasking. If you wonder at times if you may have attention deficit disorder you're not alone! Workplace studies have revealed that people tend to switch activities every three minutes during the course of a typical workday.

When we feel rushed or overwhelmed, we're typically stressed. We may experience a temporary decrease in appetite, but it doesn't last. When rushed, we tend to eat whatever's in

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front of us, or easiest to obtain. Instead of going out for lunch or taking time to relax and restore, we walk to the vending machine and work through lunch to meet the deadlines of the day. After a while, we can become so accustomed to eating from the vending machines that we convince ourselves that it's good for us with the justification of how much more we're able to get done.

It's a myth that we'll ever meet all our deadlines or get to the bottom of any list before we start another. **If we don't set boundaries for ourselves and self-care, we never get back the time we give away.** When we're rushed, we're much more likely to reach for the leftover squished chocolate bar that seemed so unappealing earlier in the day. We'll meet the unpleasant demand for energy with whatever source of UPND we can find. The antidote to stress and being rushed is to **SLOW DOWN** even if it's only for a few seconds of conscious deliberation. We have to become aware of when we're trying to do too much and learn to realistically prioritize. An effective approach to ending compulsive task-oriented behavior is to prioritize as follows:

- What has to be done today?
- What can be done today?
- What would be nice to get done?
- What can (or should) be done by someone else?

If it *has* to be done today, then get it done. Managing stressors is significant to recovery from both anxiety and depressive disorders. Generally, we get in trouble when we do "nice" first. **Procrastination increases self-imposed stress and anxiety.** That said, the hardest thing for many of us is to admit we need help. As soon as you realize that you can't get something done...communicate or call in the cavalry! There's nothing worse than the pervasive sense that if we don't get it done...we'll disappoint someone. Most people understand that we have limitations, we make mistakes, we get run down, and overcommit.

What *can* be done are those errands or projects that are short-term or that support us in the course of our week. If you're driving by the cleaners or the drugstore and you have time, you may as well take care of an errand to avoid a frantic trip later in the week. Or, if you know a monthly or quarterly report will be due in a few weeks, you may be able to complete some of it ahead of time.

What would be *nice to get done* are activities like deep cleaning the house, sorting through clothes for donation, organizing the attic or garage, uploading photos into a software program...etc. These are things that only we can do, but nothing adverse will happen if they have to wait a while. (One exception is if you have been waiting five years for your spouse to upload your wedding photos – then adverse is okay.)

What *others can or should do* are the chores or activities that others can do that then allow us to make time for pleasurable activities that help us reduce the effects of stress. The point here is that there are things we don't do well, lack the patience to do well, or simply don't have

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the equipment or interest to do well. When we think about it; most of us increase our stress by putting what's "nice to do" ahead of "what has to be done".

Recognition: *How often do you feel stressed during a day? A week?*

Describe how you feel. Irritable, anxious, overwhelmed?

Close your eyes before you answer this question. Be with your body. Where do you typically experience or store pain or muscle tension (knots) from stress?

List your most frequent stressors...are they short or long-term? Is your stress manageable, pervasive, or chronic?

What do you tend to do in response to stress? Drive faster? Try to do more?

Are you pushing yourself too hard? Are your expectations and demands of your time, energy, and resources realistic?

If the antidote to chronic stress is to learn to slow down, what can you do today to reduce your stressors?

Resistance: *Identify relaxation techniques or activities you enjoy.*

2.8 Sad, Hurt, Lonely

We know from scientific literature that depression has a significant impact on weight management and vice-versa. In one study of 100 women in medically supervised long-term treatment for metabolic disorder, 67% met the diagnostic criteria for moderate to severe depression [20]. Sadness is a natural response to circumstances that we perceive as distressing or disappointing. Aside from the grief associated with death or significant losses, sadness is a temporary emotion. In fact, as physiological responses, **emotions are rather short-lived unless we add thoughts that intensify and prolong the response.** Think about saying goodbye to a close friend over the phone. Most of the time, it's pretty easy. "Ok, talk to you later...Bye"

What's different when we're saying goodbye to someone at the airport? What additional emotions or fears do we add in that setting? Am I going to see ____ again? I don't know what I'll do if I lose _____. What if the plane crashes? What if there's a terrorist attack? What if they

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meet someone, they like better than me? Okay, you get the picture! What we're doing instead of saying goodbye is adding or projecting our insecurities, fears, and past experiences into simply saying goodbye. We're unconsciously setting ourselves up for an emotional bonfire that will justify relapse behavior, eating comfort food, or indulging in a full-blown binge eating episode.

Hurt is an emotion that centers on our perceptions, and our relationships. For most of us, it's brought on by feelings of betrayal, rejection, abandonment, criticism, disappointment, disrespect, and similar experiences. Hurt is a subjective emotional experience because it relies entirely on our perception, interpretation, and understanding of how we see ourselves and the relationships we have. The *what, why, when, where, how, and intensity* of "hurt" is a uniquely personal experience. Unfulfilled expectations are a significant source of hurt and disappointment. Ideally, we all want to be treated consistently in a loving, kind, compassionate, respectful, and nurturing manner. If we demonstrate those qualities it's reasonable to think we will be treated similarly by others. **Hurt arises when our expectations aren't met;** or when people deliberately or unintentionally treat us poorly. Unfortunately, hurt is a primary pain trigger that often leads to emotionally reactive behaviors. Sometimes, if we begin to feel as though we're surrounded by vampires – people who leave us feeling drained or dead inside – we may have to create a new tribe or community for ourselves. It's well known that the emotional interactions we experience in relationships with others, significantly affect our mood, confidence, and wellbeing. Choose support, compassion, and kindness for yourself!

Loneliness is an emotional state that has features of both sadness and hurt, but it brings forth a unique sense of emptiness that we're somehow missing out on something important in life. This is true because as a species, we're social beings. For tens of thousands of years we lived in multigenerational communities and developed what can be thought of as social homeostasis in our genetic makeup. Homeostasis refers to the physiological processes wherein stable states are maintained in the brain and body through compensatory mechanisms [120]. These adaptive mechanisms include receptors (to monitor the state of our being), a control center, and effectors (to change the state of our being). Social homeostasis refers to our brain's internal need for supportive social interactions [120] to sustain mental and metabolic health. Like other internal regulating functions, the HPA is the control center for maintaining social balance. This control center is where our brain seeks to balance seeking social connections vs a learned aversion to social interactions [120]. Just like other body functions the HPA "sets" its unique preferences, receptors and effectors that drive our "need" for social stimulation and social support.

We know from decades of research that early affection or its lack thereof affects emotional and physiological development. It's established that social contact is absolutely necessary for sustaining (or recovering) our mental health. When people isolate, (Covid pandemic) the HPA functions related to social feedback are impaired. When we isolate our social balance is deprived of stimulations which in turn leads to depression, reduced motivation, sleep dysfunction, and increased appetite.

There are strong correlations that can be made between rates of mental health disorders (anxiety, depression) and how we are now inhabiting and living in our modern world. In highly

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developed countries “independent” living is idealized. In the past century it’s now the “expectation” that every adult citizen “should” have their own dwelling, car, white picket fence or elevator. It’s not surprising that the byproduct of this relatively recent isolating form of “idealized” living may correlate with the highest rates of mental and metabolic health disorders the world has ever known. For a truly inspirational perspective, watch *Live to 100. The Secrets of Blue Zones* [121]. This documentary focuses on important mental and metabolic factors common to communities with the highest rates of longevity.

Humans need to feel and “be” a part of; not apart from!

Most of our emotions surface or occur in the context of relationships. On occasion we may laugh alone, but more frequently we laugh in the company of others. Similarly, we may respond to hurt with anger, but we rarely yell (or curse) at ourselves with the same depth of passion we’ll present to others. When loneliness is related to the end of a relationship, then it can be especially painful. We may find ourselves obsessively thinking about what we did wrong, wondering what’s wrong with us (or them), and before we know it, not only are we lonely; we just finished a half gallon of rocky heart-break road feel-better ice cream. Interestingly, the neural receptor circuits for loneliness overlap directly with the neural circuits that warn of starvation [117]. Feeling sad, some of us have protective tendencies to isolate, listen to sad music, and fixate on emotional wounds. When we feel this way; we need to do exactly the opposite. Getting out may feel like a huge challenge, but to recover try to find activities or fun classes where you’re likely to feel comfortable or even inspired!

Recognition: *How often do you feel depressed during a week? A day?*

Describe your feelings of hurt or sadness. Are they manageable, pervasive, or chronic?

Where do you physically feel or hold your hurt or sadness?

What are your most frequent triggers for feeling hurt or sad? Are they short or long-term?

What do you tend to do in response to feeling down? Retreat home? Buy indulgent foods?

2.9 Anxious

Often we hear someone say, “I’m a nervous eater.” Anxiety or apprehension may be a result of stress but many times anxiety is more closely related to recurrent, compulsive thoughts. Anxiety is an emotional state that produces a continuous low-grade stress response. This kind of

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tension or stress is very much like the static noise of a radio in the background. It may increase or decrease in volume but seldom diminishes or fades away entirely.

So, what are some common causes of anxiety? For many of us it may be the result of wanting to please everyone, but constantly worrying that we've forgotten something or haven't done something correctly. Pervasive or constant worry is stressful for our brain, lowers our resilience, lowers our immune response, and for most, results in depletion of both serotonin and dopamine. We know that in this state, eating momentarily reduces tension. The problem is we tend to eat foods high in carbs and consume far more calories than needed.

Recognition: *When do you feel anxious? How often during a day? A week?*

Do you think your anxiety is temporary, manageable, pervasive, or chronic?

Describe how you feel when you're anxious?

What are your most frequent anxious thoughts? Do they have short or long-term implications?

What do you tend to do in response to anxiety? Clean? Shop? Distractions?

2.10 Frustrated

Frustration is a unique mood state we experience when despite our best efforts; nothing is going according to plan! We may be already experiencing stress, but frustration typically results from a compounding sequence of events that leave us feeling overwhelmed. Consider the following scenario:

You're on your way home from work, and the tire pressure light comes on in your vehicle. You glance at the temperature gauge and think – "it's probably just cold." The light goes out after a while but comes on again a few days later. You wonder if you should do something but it's just not convenient. You have an important presentation to make, and you need time at home to work. For the next week you're anxious because there's a lot riding on the presentation.

Tuesday morning when you wake up it's snowing but it's still early and you've got plenty of time to get to work. You pull out of the driveway and suddenly the right front tire goes flat. (Insert expletive #4&W@! here) You pull over and look at the tire. Yep...it's flat. You call the tow service but they're out on calls and the first opening is late afternoon. Resentfully you move everything out of the way of the spare tire and find a forgotten bag of Halloween candy.

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You get the tire out and then because this is a newer car, you suddenly wonder where the jack is and what it looks like. You open the bag of candy before getting out the owner's manual to find the jack. The snow is coming down heavier and you think about calling a cab. No time for that now. You get the jack in place but then you can't find the lug wrench. Grabbing another handful of candy, you go back in the garage and start looking through tools hoping to find a socket set and extension. When you finally get back to the car the rim is sitting on the pavement. The jack isn't holding pressure. Irritated, you try again. And again. Each time the rim drops back to the pavement. In frustration you eat a few more pieces of candy. You remember some concrete blocks in the garage and before the jack deflates you prop one up under the frame.

Finally, you get the tire off and get the new one in place. As you're tightening the lug nuts the wrench slips and you cut open the back of three knuckles. (Insert another expletive here) While you're cleaning the cuts you have a few more pieces of candy. Finally you're cleaned up and ready to drive to work. More than an hour has passed. You get in the car and as you accelerate you hear an odd sound and a thump. You forgot the concrete block. You get out of the car and some strange colored fluid is leaking on the ground. How do you feel now? (Insert expletive here...and pass me the bag of candy).

As this scenario illustrates, frustration is typically the result of compounding events. All of us have countless examples of reaching that point of frustration whether it's due to our own procrastination, assumptions, or expectations. Regardless of the source, frustration can trigger unconscious, reactive behaviors. In this situation (and others) **the first action is to become aware of our state and shut down Betty**. In this example, the flood of anxiety and panic blocked US (the thinking brain), from realizing the jack screw was in the wrong position and couldn't hold pressure.

Recognition: *How often do you experience frustration during the day? Week?*

When is frustration most likely to surface? How do you respond

What's generally happening before you start to feel frustrated?

Do you feel that your frustrations are manageable, pervasive, or chronic?

Which of these patterns are most problematic for you: Timeliness, Expectations, Assumptions Procrastination?

What can you do that will help you gain control of situations that provoke frustration?

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2.11 Anger

Anger is a potent and potentially destructive emotional state. It can be likened to the uncontained forest fire of mood states and sometimes the best response is to simply walk away and remove ourselves from the source of ignition. For most of us anger is a rare emotion but generally, the source is some form of unresolved hurt. Anger produces an incredible, (not necessarily helpful) empowering neurochemical response. That response instantaneously provides us with strength and resolve, (not necessarily rational) however, the chemical release is hard on us and our body.

Like our response to extreme stressors, there's a surge of energy, adrenaline, and norepinephrine with an increase in heart rate and blood pressure. After an episode of anger, it follows that there's a huge drop in energy and sense of exhaustion – even if the situation has been resolved. Like other mood states, this is when we're vulnerable to hedonic binge eating. Remember, anytime we deplete our emotional energy reserves they must be replenished, and Brian's favorite source of energy is glucose. If anger seems like it's become a more frequent response and mood state, it may be time to look deeper, and introspectively evaluate if some significant changes and counseling may be beneficial. We may have to talk through our expectations of ourselves and others to connect with the wisdom within us.

Recognition: *Do you ever feel really angry? How often during a day? A week?*

Where do you feel the onset of anger physically in your body? Do you have early warning signs?

What are your most frequent causes of anger? ...are they short or long-term in nature?

Is unresolved hurt, expectations or resentments fueling your anger?

If other people try to talk to you about your anger, what do they say?

How do you respond?

Do you think your anger is manageable, pervasive, or chronic?

When resentful thoughts surface, have there been times when you can discuss these calmly?

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What helps you regain emotional control when you feel rage or express anger?

Identify some things you can do differently in the moment.

2.12 Daily Reflection and Introspection

When we practice daily reflection there are days we recognize that our moods and behaviors may not support our long-term goals. On days like these, we may want to avoid “checking in” with ourselves. We may feel anxious that a slip means we’re going to fail again, so we don’t want to “check self”. It’s all going to be okay! Right now, we’re focused on progress, and we can only move forward with the pace of our lives, and opportunities to make choices. In the context of this daily reflection, when we feel anxious or depressed, it’s likely that we just need to “look at” or “do” something differently. It’s not about character; it’s just learning to align our choices with our long-term goals. These are a few questions that may help support healthy choices in the moment.

Recognition: *What or who am I eating at?*

Resistance: *Where is this food going to land?*

Recognition: *Am I afraid that when I lose weight I’ll be “noticed”? (Sometimes a challenge for survivors of sexual trauma.)*

Recognition: *Am I afraid that family members or friends will judge or criticize me and my efforts to lose weight and achieve personal goals?*

A fun motivational activity some participants have enjoyed is making scrap books, collage posters, and screen savers, for “future” me. These have included clothing and style ideas, exotic travel destinations, activities such as horseback riding, hiking and kayaking, family photos, and much, much more. These reminders help us visualize, stay connected, and enjoy the process of regaining our health and realizing dreams and desires.

We don’t talk much about dreams in the context of mental and metabolic health recovery, but they’re important. Our dreams don’t really need to be judged or interpreted by any philosophical or moral “standards.” Sometimes during our waking hours, our subconscious or conscious mind cannot “close” something out. Or maybe our brain just gets tired of looping through our longings, fears or past experiences and longs for a solution, fantastical, imaginative or strange so that we pay attention. Either way, dreams are not always a kaleidoscope of

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nonsensical images and situations. They're worth our attention in that they may suggest deeper desires, or situations that we can explore in the light of day. They may also serve to reconcile situations where "closure" was not possible. We had a course participant who'd been suffering greatly after ending a toxic relationship. There had been unrelenting hostility, name calling, and other awful behaviors. Despite courage to leave, she was still stuck. Then one session she came to group, her mood was light-hearted, even playful. She'd had a dream where in the future, she'd sat down to lunch at a favorite French bistro and he'd apologized. They caught up on how their children had grown and it was a pleasant, but very final goodbye. Even though it was unlikely there'd be reconciliation, her psyche, free of judgment and pain, allowed for the healing and closure to take place.

2.13 Words on Courage (with permission of Sue Patton Thoele)

All of us appreciate authors who say what needs to be said in a gentle, encouraging, and humorous style. In her book *The Courage To Be Yourself* [18], author Sue Thoele discusses courage as an everyday actuality. That courage is the ability to do what needs to be done, or feel what needs to be felt, in spite of fear. It's the willingness to act, even when we're apprehensive, fearful, or frightened. She writes that we need to learn to honor our fears and not allow them to control our lives and our choices. That being connected to authentic inner selves doesn't mean we'll turn into selfish and self-centered individuals. It means that we can free ourselves of the torment of looking outside ourselves for approval and instead feel empowered with a realistic strengths-based identity [18].

It's inescapable that reflection (where I am), introspection (what I want), and redirection (where I want to go or what I want to do) are steadfast companions on our journey through life. As you complete the daily reflection challenge and dive into chapter three, pace yourself. There's a lot of good information and soon enough you'll be deep into the core chapters designed to take you from recognition through recovery.

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Chapter 3

Willpower is not enough!

3.1 The Role of Food in Early Development

“Eating behavior” describes the relationship we have with food almost from the moment we’re conceived. Beginning in utero, a mother’s diet during pregnancy influences a child’s preferences, metabolism, and developmental features. During this time nutrition affects development of the central reward processes in the brain, and can lead to a lifelong preference for fatty and/or sugary foods [19, 20]. At birth when we’re suddenly exposed to new sensations; (noise, light, touch, temperature, and odors) our primitive senses are overwhelmed. Most of us cry out in protest and what happens? ...someone immediately puts something in our mouth, a breast, bottle, (or finger) to pacify and nourish us.

Over the next few weeks, the emotional connections (and attachments) between unpleasant sensations, our cries of displeasure, and the comfort provided by oral soothing are reinforced for life! Later as we start to crawl, we learn that having something in our mouth provides comfort when we’re afraid, hurt, or tired. As our curiosity emerges, we discover that oral stimulation not only provides relief from frustration but at times, boredom. Yes, boredom...why the heck else would we stick our toes (or everything else) in our mouth?

For many of us, having something in our mouth (whether it takes the form of a thumb or lollipop) becomes our primary “go-to” behavior that provides relief from unpleasant experiences, emotions, or sensations. We can’t talk about what we want, so oral reward becomes a default means to satisfy other unmet needs. When we think about development from this perspective, it’s not surprising that as we mature, we continue to turn to food or other oral stimulation (such as smoking, vaping, or chewing gum) to relieve (dis)stress.

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Oral Soothing Begins Early

Recognition: *When you're stressed or upset, describe how you use food or oral soothing (smoking, gum, toothpicks) as a distraction or coping technique?*

3.2 Important Developmental Milestones

Early cognitive concepts that relate directly to lifelong eating habits and weight control are **delay of gratification, self-regulation** and “**enough.**” From the perspective of eating and early development, delay of gratification begins with parental influences. An example of this is when a mother shifts from feeding on demand to more robust yet less frequent feeding schedule. Delay of gratification is essential to learning self-regulation. When parents regulate feeding times and control portion size, this helps a child develop a learned awareness of self-regulated eating behavior. They'll eat what they need to have enough energy to make it to the next feeding. If they don't eat enough; they become hungry and irritable. If they overeat, or eat too quickly they'll likely burp most of it back up (becoming even more hungry and irritable).

Recognition: *How do you struggle with self-regulation when it comes to quantity / quality of food?*

What are some of your early memories of soothing “comfort” foods?

Exposure to different environments is important during childhood as it can encourage the development of tolerance, and more importantly, resilience. Increased tolerance results in less dramatic responses to routine sensory inputs and can reduce the incidence and magnitude of depressive disorders. Revisit the concept of “enough” briefly discussed in Chapter 1. When it comes to food...to lose weight we'll likely have to look at our patterns of eating and snacking, portion sizes and improve the quality of our diet. If this isn't something that we were taught early in life, we have the challenge of retraining our brain. This is the first R. **Recognition:** We develop this by learning what we need and what's good for us.

Resistance: We develop this by regulating content and portion sizes. *Describe your current concept of “enough”.*

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From a global perspective, most cultures endorse the notion that good behavior or the achievement of goals should be rewarded with treats. For many, this might involve a trip to get ice cream, candy, or dine at a favorite food establishment. From a learning perspective however, this introduces the concept of secondary reward reinforcement.

We don't just eat sugar or high-fat foods when we're low on energy or unhappy, we also consume them to celebrate when things are going well.

We've accepted the premise that even when we feel happy, we can (or should) do something that will make us feel even better. It's this mood-altering drive that can ultimately lead to the unhealthy use, dependence, and addiction to processed foods and other substances [20].

Recognition: *How do you typically reward yourself?*

3.3 Evolution and Nutrition

Hunger is the physiological signal that we need to seek food, however we don't reliably "measure" our hunger. As we eat, the intensity of this need diminishes as we reach fullness (satiety). If we recognize the sensations, generally we're ready to stop eating. For centuries of evolution, these primitive neural signals prompted our drive to hunt for nutritionally dense food. We grew to desire (crave) foods high in fat, because fat is the highest density substance our body can use for energy [21]. We needed lots of energy because the survival of our species was dependent on having enough energy to run down (or run away from) dinner.

We know, humans were hunters before they became gatherers. Most animals follow seasonal migratory patterns, so it's likely that early humans moved with the herds. Picture if you will, a group of people walking from San Francisco to New York and back every year. It's exhausting! After a while nesting instincts emerged and women (tired of walking across continents without strollers) likely insisted on creating camp or cave communities midway in these miserable marches. This "settling" however, demanded a metabolic adaptation: the ability for our bodies to be able to endure periods of scarcity or famine as the herds continued on. Foraging, and later farming emerged as alternative and sustainable sources of nutritional (low-fat) food. In response to these cycles of nutrition and energy demand, our species adapted and developed the capability to store fat efficiently to endure periods of scarcity.

So...what's changed? Why is fat such a problem for us now?

The answer is in understanding human evolution and our eating history. Before WWII foods high in fat or sugar tended to be somewhat scarce and expensive, and were consumed less often. Since then, fat, sugar, carbohydrates, and ultra-processed chemically enhanced food products have become available in unprecedented and affordable quantities. Adding to the

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complexity of eating, is that the free-range lean quality of “paleo-era” animal protein is vastly different from the pen-raised high saturated fatty animal products we consume today.



Surviving the Ice Age

Humanity may have survived the Ice age but now, the JUNK FOOD AGE is upon us



Being Buried By the Junk Food Age

The human race is being weakened and prematurely buried by a global tsunami of junk food. The availability of cheap highly processed palatable foods has allowed us to shift from eating to ensure our survival, to the modern concept of eating for pleasure. Its **pleasure** and the reward value of food, **rather than need, that defines hedonic eating** behaviors. Unfortunately the human race will not adapt to the present obesogenic environment of food and our bodies are suffering at the most fundamental level. Restoring mental and metabolic functioning means we have to prioritize repairing the functioning of our mitochondria. Read *Brain Energy* for more information on this important concept.

3.4 Homeostasis, Hedonic Eating, Set Point, and Allostasis

Homeostasis

Homeostasis is the tendency of a system to try and maintain internal stability (balance) in a coordinated response to any situation or stimulus that would disturb normal functioning. Stability is maintained by the constant adjustment of biochemical and physiological pathways throughout our body and most of these are directly related to the functioning of mitochondria in our cells. Probably the best example of homeostasis is thermogenic regulation of body temperature. If we get too hot, we sweat. Some adjustments occur with little or no action on our part; others prompt US to take action. If we're severely dehydrated, we'll experience an overwhelming desire for something to drink. When our metabolism is in long-term balance, normal energy homeostasis is maintained [22, 23].



Homeostasis – Drink Water Now!

There are two mechanisms involved in the regulation of food intake. The short-term signals (hunger & satiety) that occur with the onset of eating and the long-term regulation food that's regulated by our stores of body fat [22, 23]. Adipose (fat) tissues communicate with the central nervous system to maintain whole-body energy homeostasis [23]. Recently it's been discovered that there's a vast network of central nervous system nerves that connect adipose tissues (white, brown, and beige fat) to the brain [24]. When normal brain functioning is impaired by inflammation and immune system dysfunction, then regulatory mechanisms such as conversion of adipose tissue and thermogenic energy management mechanisms are disturbed [24]. This dysregulation leads to increased deposits (storage) of unhealthy white fat tissue [24].

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Hedonic Hunger

Hunger is biochemically induced only in the event of serious energy depletion. That means for most of us, mealtimes and food choices are influenced by social, cultural, and lifestyle factors. Hedonic hunger describes the desire and drive to eat for pleasure in the absence of an energy deficit [22, 23]. Often this type of eating is associated with an emotional state that drives the desire to mood-alter and change how we feel. Hedonic eating may be in response to frustration, anger, sadness, loneliness, boredom, resentments, feeling overwhelmed, and more. In the brain, the (feel good) mu-opioid receptors (MOR) and cannabinoid receptors play a significant role with regards to hedonic eating and our attraction to appetizing foods [25]. It's thought that dysregulation of the MOR and cannabinoid systems significantly contributes to the development of binge eating disorder [25, 26]. We'll learn more about the addictive nature of certain foods in chapter four however, hedonic forecasting (hedonistic anticipation) may be a subconscious motivator behind dysregulated consumption. Without giving it much thought, we know that reaching for certain foods almost always boosts our moods.

Fatty foods have a high hedonic rating, because they are tasty and the most concentrated source of energy. Fat does contain nutrients essential to growth and development [21]. But in general we consume too much of it. Until WE retrain our brain reward system, fatty foods are more attractive than foods higher in proteins and complex carbohydrates. The biological mechanisms that once ensured our survival during periods of famine, haven't evolved to keep pace with the emergence of our current fat infused obesogenic (fast-food) environment. In fact, the human adaptation of storing energy in fat cells has become a dangerous and deadly liability [22, 23, 26].

Overconsumption of hedonic Nutrient Deficient (ND) foods:

- Causes disruption of energy homeostasis that negatively affects brain reward circuitry.
- Results in compulsive food intake.
- Contributes to overeating behaviors.

When we deplete certain reserves in our brain or stores of body fat, we know we're unconsciously driven to replenish those reserves. When we recognize why we crave or reach for certain foods to restore ourselves, **WE** can take charge!

Recognition: *What percentage of your eating (or drinking) behavior is directed to intentionally satisfy homeostatic needs?*

Recognition: *Can you identify some of your hedonistic food cravings?*

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Set Point Theory

The set point theory of weight management suggests that our body weight is regulated around an ideal level and that hormonal and neural signals (to eat) are activated when our fat stores fall below a certain level [27]. The good news is that we can change our set point! There are several models that explore weight gain. The first and most common explanation is the energy balance model (EBM). This model, based on physics, holds that weight gain is generally caused by an imbalance of energy intake and energy expenditure [27]. When we consume more food than our body needs, we gain weight.

Calories (a measure of energy) come from several sources, predominantly, fat, carbohydrates, and protein. To maintain a neutral weight, the EBM model suggests that we need to moderate our caloric intake and nutrition to match our anticipated expenditure of energy. That if we want to lose weight, we probably have to reduce our caloric intake and increase physical activity when able. A problem with this model is that it considers all calories to be alike, in particular, carbohydrates.

A different approach is the carbohydrate - insulin model (CIM) [26]. To explore energy imbalance, this model takes into account the quality of food, glycemic values of foods, and glycemic loading (GL) to explore the relationship between types of food and weight management. The glycemic index is a measure of how foods with carbohydrates affect blood sugar levels. GL is a combination of the total carbohydrates and the GI factor. Foods high in sugar, processed grains, and potato products are high GL foods. These foods are digested rather rapidly which cause a significant drop in blood sugar after just a few hours, stimulating a strong desire to eat again. Conversely, berries, nuts, most fresh fruit and non-starch vegetables are moderate to low on the GI scale, absorbed by the body more slowly and result in us feeling satisfied longer. CIM posits that the hormonal response to specific foods high in GL increases fat storage, resulting in a positive energy imbalance. (In this case positive isn't good) [27].

Allostasis

It's plausible that for most of us, hedonic eating has emerged as the dominant drive with respect to eating behavior and food preferences (when, what and why) [28]. Our preferences have shifted toward energy-dense ultra-processed nutritionally deficient foods (UPND) that have been engineered to promote overconsumption in the absence of hunger [29]. Allostasis is the path to change. ***Allostasis suggests that we can shift learned set points either positively or negatively*** and achieve stability through implementing sustainable changes. The person whose operating range has shifted to active food addiction suffers from allostatic dysregulation. Put simply, overcompensation and overconsumption prompted by cravings, has shifted their functional range from one of satisfaction and normalcy, toward an unhealthy state.

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3 Principles of Allostasis

1. The most efficient regulation is anticipatory (question cravings...plan nutrition ahead)
2. The “defended” level of a set point can and should change to adapt to a new operating range. (Body adjusts to lower BMI with a decrease in “fat” seeking)
3. Optimal regulation is achieved by taking command in the brain (US - PFC)

Allostasis and the 4 Principles of BreakThrough!

1. **Recognition** - new information and awareness inform and motivate our efforts to make healthy choices.
2. **Resistance** - takes advantage of brain plasticity (its ability to change). Self-coaching and disputing skills help us rewire new neural circuits and override Betty. We actively challenge self-defeating, impulsive, or emotionally driven “old” thoughts and behaviors.
3. **Resilience** - develops as the result of consistent and purposeful resistance. This describes a new state of brain regulation that defaults to choices that support wellness and longevity.
4. **Recovery** encompasses both an improved capacity for optimal regulation as well as a new operating range.

Resistance: *You can shift your set point! What will you do differently today?*

3.5 Dopamine and the Brain’s Reward System

Dopamine (DA), a primary neurotransmitter in the brain, can be thought of as a chemical messenger that relays information across highly interconnected neural pathways linking our emotions, with our sense of reward, and desire [30]. When we encounter reward-predicting cues, such as seeing a person walking by with a huge ice-cream in hand, there’s an instantaneous and rapid increase in dopamine firing in our brain. It’s that increase in activity (and interest) that suddenly (and subconsciously) motivates us to find the nearest ice-cream store so we don’t miss our opportunity to experience pleasure. Recent research indicates that 70% of individuals suffering with attention deficit disorders (impulsivity) also suffer with metabolic disorders as well [105]. The exact mechanics and chemistry underlying this bidirectional relationship in the brain are unknown. However current research implicates dysregulation of the dopamine system in both the brain and the pancreas which is critical to regulating insulin release and blood glucose control [105].

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The reward circuitry in the brain spans two key brain regions, (1) the prefrontal region and the amygdala, and (2) the limbic system integrating the amygdala with the hypothalamus [30, 31]. Essentially these are the interfaces between US and Betty; Betty and Brian. When dopamine activity levels are low, we're more likely to seek, consume, and even binge to avoid feeling depressed or in a state of withdrawal.

We discuss compulsive behaviors in chapter four, but compulsive seeking behavior takes place when normal dopamine functioning is altered by repeated and excessive intake of substances [31]. Most addictive substances are transformed from naturally occurring substances (e.g., tobacco; fermentation of material into alcoholic beverages, and grains, sugar and fat) into substances with unnaturally high concentrations of reinforcing ingredients (e.g., nicotine, ethanol, fats and sugar) [32]. Withdrawal from UPND foods, simply triggers our cravings for more UPND foods. Even after periods of healthy or restrictive eating, if we return to eating UPND foods this will reinstate and re-trigger our UPND food seeking behaviors. This is particularly true if we're under the influence of stressors or negative emotional states.

Recognition: *How does UPND withdrawal affect you?*

What cravings does it trigger?

What is the danger when you relapse on UPND foods?

Can you identify some of the emotions that follow a relapse episode?

3.6 Serotonin

Dopamine activity affects our motivation and desire, but not our experience of pleasure. In our brain-body connections serotonin is the neurotransmitter that regulates our moods and sense of contentment. Most don't realize that over 90% of the human body's total serotonin is in our digestive tract [32]. So how does this work? The amino acid tryptophan is a gut derived metabolite that's required for the development of serotonin and melatonin, the sleep hormone [32, 33]. High levels of tryptophan are found in certain protein rich foods and beverages, such as canned tuna, milk, and turkey. Interestingly though, it's difficult for naturally occurring tryptophan in these food groups, to compete with other food substances and amino acids [32].

Ultra-processed foods or comfort substances high in carbohydrates, (chips, cookies, cake, cereal, and more, reach the brain faster creating the serotonin "high". Some processed foods are engineered (coated with chemicals) to start working almost immediately in the gut-brain pathway. Increasing serotonin levels can alleviate depression but it's temporary. The insulin that

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allows tryptophan to enter the brain, subsequently causes an abrupt drop in blood glucose levels resulting in fatigue, irritability, and cravings for “more”.

This process explains why we crave and cave, often increasing our consumption of carbohydrates during periods of depression. **Serotonin** levels play an important role in the regulation of **appetite, sleep, and impulse control**.



Dysregulation of any of these three factors can contribute to weight gain. Carb cravings are often observed in people trying to give up smoking. This is because nicotine rapidly increases serotonin secretion in the brain. Conversely, withdrawal often results in depression and irritability. We tend to develop “addictions” or “preferences” for substances that act most rapidly in the brain.

For patients with premenstrual syndrome (PMS), premenstrual dysphoric disorder (PMDD), and seasonal affective disorder (SAD), excessive carbohydrate intake temporarily relieves depressive symptoms by increasing serotonergic activity [34, 35].

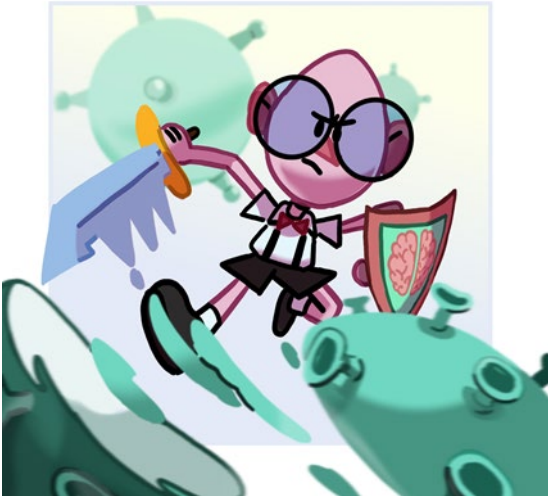
For women with PCOS, food cravings associated with higher insulin levels present a significant challenge and an increased likelihood of developing binge eating disorder [34, 35]. The interventions for these disorders are numerous and exceed the scope of this course. They include pharmaceutical and medical treatment, nutrition and dietary considerations, sleep hygiene, exercise, stress reduction strategies, mindfulness, and much more.

3.7 Gut Research

The diversity and health of our gut microbes plays a significant role in our mental health and our body’s ability to fight infection, manage moods, downregulate the production of the stress hormone, cortisol and much more [36, 37]. Gut health and homeostasis (balance) is disrupted by our lifestyle, unhealthy eating styles, and stress [38]. Put simply, the health of our stomach and what we put in it affects the functioning of our brain [36, 37]. For some time, the gut has been called the “second brain” because its network and interconnectivity is more complex and influential than previously known. Through three communication pathways (the nervous system, endocrine system and immune system) the “gut-brain” pathway constantly sends information from the digestive tract directly to the brain (Brian) to maintain homeostasis [35, 36].

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In general we begin to suffer when the good/bad bacteria percentage ration falls below 85/15. When this ration is disturbed a condition known as leaky gut can develop over time which is linked to the development of autoimmune disorders such as rheumatoid arthritis, lupus, Hashimoto's and others. When pathogens creep up, due to illnesses, aging, stress and poor nutrition, dysbiosis takes place [109]. In this state, we're more vulnerable to infections and disease, which can pass directly into our brain. It's an odd thought, but the gut microbiome is among the larger organs in our body [36, 37].



Brian fighting off inflammation

Diets high in saturated fats (cholesterol) affect gut functioning resulting in intestinal inflammation that in turn, alters the blood brain barrier, leading to the onset of neuroinflammation [38]. This disruption in communication between our gut and host systems leads to the development of metabolic disorders, diabetes mellitus, and autoimmune disorders. This disruption also contributes to the development of neuropsychiatric disorders, including autism, anxiety, ADD/ADHD, major depressive disorders and dementia [38]. High cholesterol has been positively linked as a significant factor for the onset of Alzheimer's.

Ghrelin is a gut peptide released in response to nutrients that is directly correlated with activation of brain regions that control food intake regulation, emotional circuitry, and reward responses]. Stress that elevates glucocorticoid secretion will elevate circulating ghrelin levels that in turn lead to increased food intake. Leptin is another important factor in the “gut-brain” pathway because it signals fullness and reduces appetite [38]. When our brain loses sensitivity to leptin signaling, we tend to eat more than we need because the gut-brain messaging that we've consumed “enough” becomes unreliable.

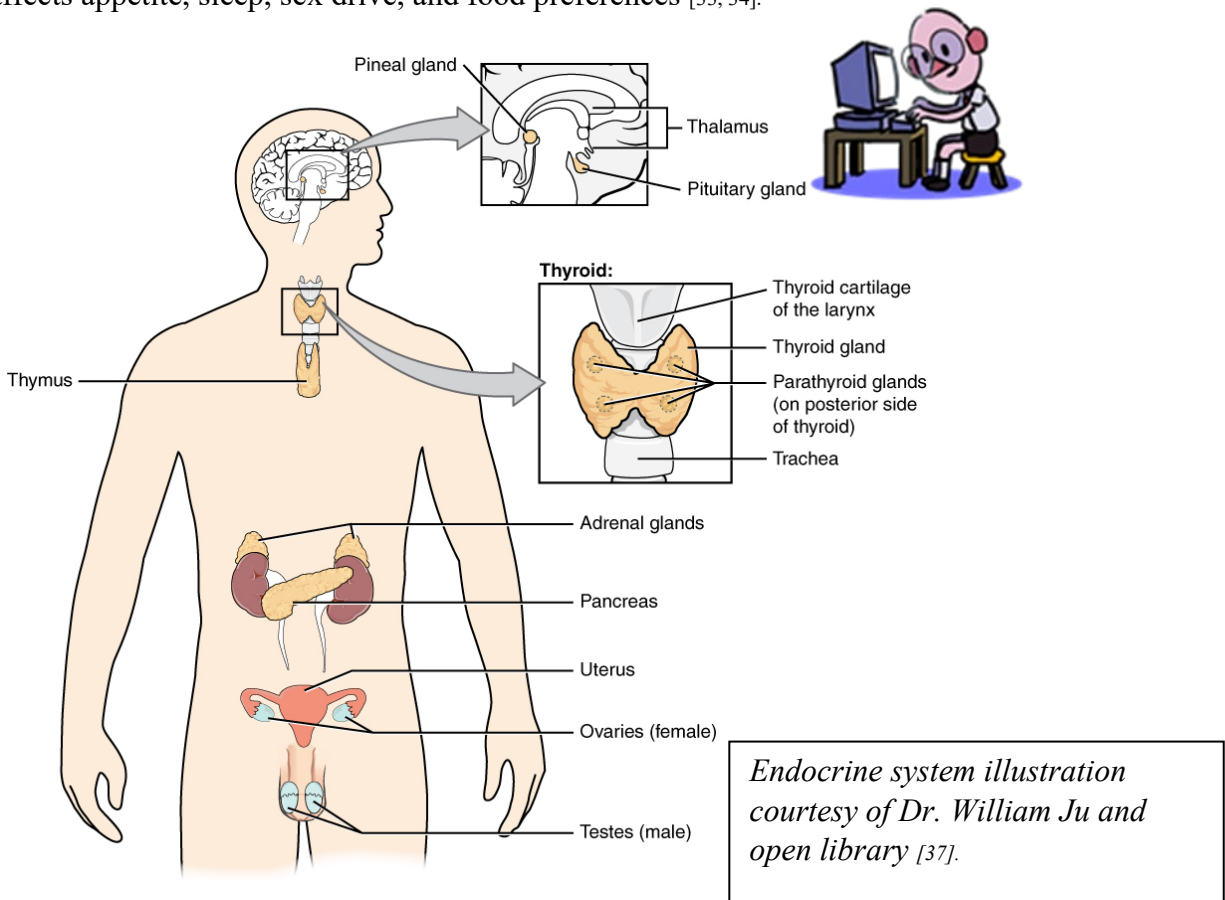
3.8 Hormones

In the human body, two major organ systems participate in relatively “long distance” communication: the nervous system and the endocrine system. Together, these two systems are primarily responsible for maintaining homeostasis in the body [39]. Briefly, the endocrine system uses hormones rather than neurotransmitters to communicate and manage metabolism. It is slower to respond than our nervous and immune systems but it longer acting [38]. The pancreas, kidneys, heart, adrenal glands, gonads, thyroid, parathyroid, thymus, and even fat, are sources of hormones [39]. The endocrine system works in large part by acting on neurons in the brain, which control the pituitary gland (Brian). Brian is always monitoring and testing our blood so when he senses increases stress the pituitary gland is activated. This activation secretes factors into the blood that act on the endocrine glands to either increase or decrease hormone production. If we're stressed the signals the liver to release sugar so we can react instantaneously to imminent

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danger. This is what's known as a feedback loop, as it involves communication from the brain to the pituitary gland to an endocrine gland and back to the brain [39]. The endocrine system is very important for the activation and control of basic behavioral activities, such as sex; emotion; responses to stress; and eating, drinking, and the regulation of body functions, including growth, reproduction, energy use, and metabolism [39]. Endocrine cells that line the gut produce hormones that communicate directly with the brain and play a significant role in weight management [39].

When we're suffering mitochondrial dysfunction as well as the effects of natural aging, decreases in estrogen, progesterone, and testosterone (all linked to the dopaminergic and serotonergic pathways) can result in weight gain, mood changes, and decreased interest in sex [33, 34]. This is also a factor with synthetic hormones such as those used for birth control. These medications can interfere with the absorption of nutrients in the gut microbiome, deplete serotonin levels (which contributes to depression), and increase cortisol levels which negatively affects appetite, sleep, sex drive, and food preferences [33, 34].



Don't hesitate to discuss any concerns you may have with your primary care provider or endocrinologist who may consider thyroid tests to screen for imbalances. Endocrinologists are experts in treating diseases associated with hormonal systems, ranging from thyroid disease to diabetes mellitus [39].

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3.9 Inflammation

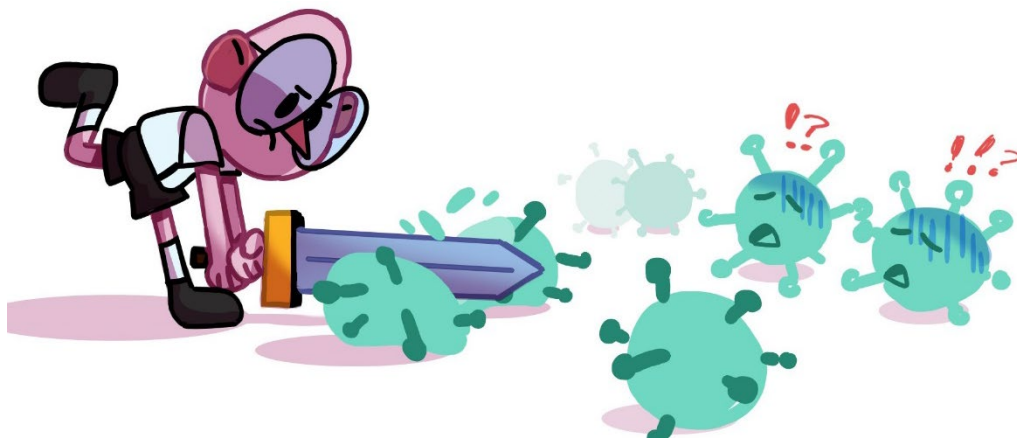
If we have a rash on our face, we're careful to treat the inflamed area until it disappears to prevent scarring. However, low-grade inflammation in the hypothalamic area (caused by the overconsumption of fats and carbohydrates), is hidden from our view. Inflammation in this area is a precursor for the development of metabolic and cognitive disorders (dementia) [38]. This "hidden" inflammation is metabolic in nature and targets cells specialized in energy metabolism leading to insulin resistance [38].

If there's just a short period (2-3 weeks) of consuming excess saturated fat and carbs in the diet, the effects of metabolic disturbance can be reversed. However, after a longer period, the neuroprotective mechanism fails resulting in inflammation [38]. This inflammation leads to the production of cytokines and leads to deficiencies in insulin and leptin signaling [38]. Reducing the intake of simple carbs, high fructose corn syrup, and saturated fats (inflammatory foods) helps our brain DETOX and recover from inflammation & immune system dysregulation [40].

3.10 Cytokines

Low-grade chronic, systemic inflammation caused by high levels of circulating cytokines is an emerging factor in crossover studies of depression, anxiety, metabolic disorders, autoimmune disorders, and rheumatoid arthritis [38]. A cytokine is a small protein released by cells that has a specific effect on the interactions between cells [40]. Cytokines influence brain neurotransmitters that either affect the brain positively (brain plasticity) or negatively (pro-inflammatory) in the HPA axis [38, 40]. (Brian doesn't like pro-inflammatory cytokines).

Stress (anxiety) and depression are both associated with activation of our immune system. Activation of this system is helpful in terms of fighting off germs and viruses however if the immune system is constantly inflamed due to chronic stress, our anti-inflammatory response diminishes and leaves us vulnerable to continual infections, and diseases. When inflammation is persistent, it causes an increase in production of inflammatory cytokines [38, 40].



Brain Fighting Inflammatory Cytokines

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Increased cytokines interfere with tryptophan availability which reduces the production, release, and synaptic brain uptake of serotonin. From what we discussed earlier, this further explains how serotonin activity is diminished and leads to the development of depression [40]. Clinical studies confirm this research. When certain cytokines are administered to patients, they deplete available serotonin and typical symptoms of depression and increased anxiety emerge. High levels of inflammation not only cause mitochondrial dysfunction but can also change thoughts, emotions, motivations and behaviors. For example, when we have a viral infection we generally become lethargic, unmotivated and want to just stay in bed [111]. This is a perfectly normal response, as resting allows for the conservation of resources that the body needs for survival and recovery.

On a positive note, the Mediterranean and plant-based eating styles seem promising for alleviating and recovering from many of the symptoms of chronic inflammation.

3.11 Understanding the Glycemic Index and Blood Sugar Regulation

The glycemic index (GI) refers to the total increase of blood glucose after consuming a specific carbohydrate-containing food relative to a reference food [41]. Physicians developed the GI in 1981 for people with diabetes [41]. It's a guide to food selection that help us recognize and manage the GI content in foods. Consuming low GI foods helps prevent large increases in blood glucose (blood sugar), which is important for managing or avoiding the onset of T2 diabetes. Glycemic variability measures the peaks and valleys in blood sugar levels in the time following the consumption of food. Blood sugar spikes associated with foods high in sugar, fructose, and high fructose corn syrup are a known risk factor for developing many clinical conditions, including diabetes and cardiovascular disease [41, 42].

When we consume carbohydrates, our body breaks them down into glucose, a type of sugar that is used by every cell in our body for energy. As our body produces glucose, blood sugar levels rise [41, 42]. This stimulates the pancreas to make insulin, a hormone that helps our cells take in glucose from our bloodstream lowering our blood sugar levels. If we frequently eat meals and snacks high in carbohydrates, elevated glucose levels require the pancreas to continuously release insulin which can lead to a state of insulin resistance. Insulin resistance is a condition where insulin isn't working effectively to allow glucose to be used as an energy source [111].

In this state, the pancreas is working over-time to produce insulin to try and keep blood sugar levels in a healthy range. If we don't change our style of eating, eventually, the pancreas wears out leading to the onset of T2 diabetes. The purpose of a low GI diet is to keep our blood sugar more stable throughout the day [41, 42] and reduce the need for taking insulin medications that can cause weight gain. To avoid developing diabetes and other conditions this means we moderate the intake of foods containing glucose (sugar), fructose, high fructose corn syrup, and saturated fats to avoid blood sugar spikes and dips [42]. This is particularly true if we want to avoid weight gain following successful bariatric and pharmaceutical interventions for weight loss. As we briefly discuss other aspect of wellness, it's important to realize that our overall

focus should shift to supporting the health of our mitochondria, which in turn will improve our mental and metabolic functioning.

3.12 Insulin Resistance and Liver Health

Insulin resistance is generally accepted as a dominant factor leading to type 2 diabetes, and the most probable single link between obesity, type 2 diabetes, and cardiovascular disease [43]. Different tissues, including those in the brain can manifest insulin resistance. In the brain insulin resistance negatively affects the functioning of the HPA and the Hippo. This in turn can lead to cognitive impairment and a reduced ability to moderate stress responses and regulate appetite [107]. T2 diabetes is a manifestation of insulin resistance at the level of the liver; a key factor to metabolic inflexibility [44].

Metabolic flexibility is a measure of the body's ability to respond or adapt to conditional changes in metabolic demand, insulin resistance, and the mechanisms that govern energy selection between glucose and fatty acids [44]. When we put on weight, fat not only get stored around our body, but it also gets deposited in organs such as the liver, pancreas, heart and other ectopic regions. Fat impairs the functioning of the pancreas to produce insulin and the liver is one of the organs most affected. Fatty liver, oxidative stress, and mitochondrial dysfunction are key pathophysiological features of insulin resistance [119]. In the brain insulin plays a direct role in how mitochondria respond to stress. A state of insulin resistance impairs effective stress response and inhibits mitochondrial biogenesis [111].

T2 diabetes and metabolic associated fatty liver disease (MAFLD) are directly related (bidirectional). If we have one condition; it's likely the other will develop. It's estimated that 1 in 6 people with T2 diabetes has undetected liver fibrosis [45]. A healthy liver is key to regulating blood sugar, and it's important to pay attention to the types of sugar we consume. We know the body breaks down glucose in the cells for energy which triggers the pancreas to release energy. This is not true for fructose. Foods high in fructose (reference GI index) and high fructose corn syrup trigger the storage (not the release) of energy. They do not trigger insulin release or the release of hormones like leptin that "tell" us we're full. Because we don't feel full, we tend to "overeat" these types of foods.

Cholesterol and Liver Health

Another key factor in liver health relates to cholesterol levels and triglycerides. Cholesterol travels through the blood on proteins called "lipoproteins." Two types of lipoproteins carry cholesterol throughout the body:

- LDL (low-density lipoprotein) cholesterol, sometimes called "bad" cholesterol, makes up most of your body's cholesterol. High levels of LDL cholesterol raise your risk for heart disease and stroke.
- HDL (high-density lipoprotein) cholesterol, sometimes called "good" cholesterol, absorbs cholesterol in the blood and carries it back to the liver. The liver then flushes it from the

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- body. High levels of HDL cholesterol can lower your risk for atherosclerotic cardiovascular heart disease (ASCVD) and stroke [121].

The primary component events of ASCVD, (the major cause of death and morbidity in the US are related to the development and consequences of plaque buildup in the arteries. When our body has too much LDL cholesterol, the LDL cholesterol can build up on the walls of blood vessels. For your well-being, if you have a familial history of heart disease, t2 diabetes and similar illnesses, insist on regular screenings for blood health and liver functioning. Adults who consume a diet rich in simple carbohydrates and saturated fats are more likely to develop cognitive impairment in later life. So...what can we do? We can increase our physical activity and work with a dietician to learn about food habits that support insulin functioning [122]. Three types of foods to avoid are those high in fat, added sugars, and refined carbohydrates.

3.13 Muscle Movement Matters to Metabolic Recovery & T2 Diabetes Prevention

We don't spend much time thinking about of all the interconnectivity between our brain and body. But, our brains and muscles are in constant conversation with each other, sending electrochemical signals back and forth. It's a fact that to sustain brain health we have to keep our muscles moving [39] and this is even more important as we age. Exercise can improve mitochondrial biogenesis (new cells) and mitophagy (flushing of dead or "old" cells) both in the brain and our muscles [111]. Skeletal muscle is the type of muscle that allows us to move our body around and it's one of the biggest organs in the human body. This muscle is also an endocrine tissue, which means it releases signaling molecules that travel to other parts of our body to tell them to do things [39]. The protein molecules that transmit messages from the skeletal muscle to other tissues -including the brain - are called myokines [39].

Myokines are released into the bloodstream when our muscles contract, create new cells, or perform other metabolic activities. When they arrive at the brain, they regulate physiological and metabolic responses there, too [39]. As a result, myokines have the ability to affect cognition, mood, and emotional behavior. Exercise stimulates what scientists call muscle-brain "cross talk," and these myokine messengers help determine specific beneficial responses in the brain. These can include the formation of new neurons and increased synaptic plasticity, both of which boost learning and memory. In these ways, strong muscles are essential to healthy brain function [39].

Even moderate exercise can increase metabolism in brain regions important for learning and memory in older adults. [49] The brain responds to exercise in strikingly physical ways. The hippocampus, which we know plays a major role in learning and memory, shrinks in late adulthood increasing our risk for developing dementia [49]. Exercise has been shown to increase the size of the hippocampus, even late in life, improving memory, processing speed, executive function; protecting against age-related loss and improving spatial memory [49].

3.14 Physical Activity

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Regular exercise is a proven prevention and treatment strategy for individuals with pre-diabetes and T2 diabetes [44, 46]. A consistent regimen of resistance training (RT) and endurance training (ET) promotes health benefits through increases in muscle mass that positively impact insulin responsiveness and glucose control [47]. Exercise recommendations ideally combine RT and ET training with to achieve gains in muscle mass as well as reducing circulating pro-inflammatory cytokines to achieve metabolic health [47].

A summary of research articles studying physical activity and eating behavior also suggests there's a common neurocognitive link found in the prefrontal cortex (PFC) [46]. Exercise improves blood flow to the brain by increasing BDNF protein activity, feeding the growth of new blood cells and brain cells [46]. If motivation and activity increase in one area; there may be a positive **“spillover”** effect [48]. We may experience increased motivation in other areas related to our well-being [48]. Exercise motivation and self-regulation are both positively associated with eating regulation [48]. This is because exercise increases mood-boosting brain chemicals, such as serotonin, and endorphins. These up-regulating boosts ease pain and increase pleasure while lowering stress-induced cortisol levels [46, 47, 48].



We're Built to Migrate; Not Hibernate!™

Numerous studies report that physical activity (such as walking) has a positive and significant health outcome with respect to premature death from metabolic health disorders, and some cancers [49]. Exercise also increases our breathing rate, improving both heart and lung function. This is important because roughly 80% of unwanted body fat is released from the body through our lungs [50]. Losing weight requires unlocking the carbon stored in fat cells, thus reinforcing that often heard refrain of “eat less, move more.” [50].

Replacing just one hour of rest (sedentary time) with exercise raises the metabolic rate to seven times that of resting removing additional carbon from the body, raising the total released by about 20% [51].

Physical activity also increases levels of adenosine; a type of neurotransmitter that's involved in energy metabolism and expenditure [48]. Levels of adenosine fluctuate, but generally distress, anxiety and trauma depletes adenosine, whereas cognitive and physical activity result in higher amounts of adenosine by bedtime. This is important because adenosine helps us fall asleep more readily and also have restorative phases of deep sleep [51]

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Exercise (150 min / week) is associated with lower rates of depression, anxiety, memory loss, and may slow the onset of dementia and Alzheimer's disease [49]. Physical activity is one of the behavioral pillars of integrated lifestyle medicine for recovery from mental and metabolic health disorders. If you're looking for motivation, exercise keeps us looking and feeling younger! We might think we can just eat right and avoid exercise, but it just doesn't work for long-term health and weight management. Similar to planning what we're going to eat each week, we can also plan for exercise or activities.

Important considerations in planning are realistic scheduling, engaging in recommended physical activities that we enjoy, and having alternatives if the weather, or gym hours are inconvenient. Other small habits we can incorporate to increase our metabolism include parking further away from work or store entrances, taking the stairs, standing more when we don't need to be sitting, and even performing household chores like laundry, vacuuming, or mowing more frequently [98]. Sometimes it's as simple as this 'Train Your Brain' mantra:

I may not want to, but ...I'M GOING TO!

Recognition: *Identify activities that you enjoy.*

Resistance: *How can you schedule these activities into a daily and weekly regimen?*

Resistance: *Visualize and describe some benefits of exercise for yourself.*

Resilience: *Are there people (or pets) who'd be great support in getting started?*

Resilience: *Where can you actively migrate later today? Everyday?*

Recovery: *(visualization) I enjoy the feeling and satisfaction that I get from physical movement. What "bucket list" activities or challenges can I try now?*

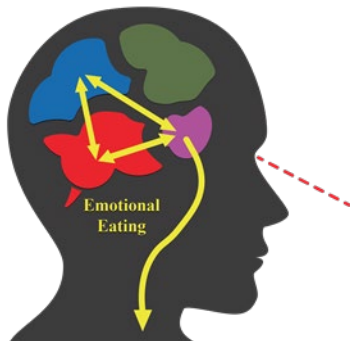
3.15 Weight Management

Two primary goals for weight management are reducing the health risks associated with metabolic disorders and maintaining a desired long-term body weight. For most of us, *mental*

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health restoration and lifestyle changes are required to sustain or maintain successful weight management. Yo-yo cycles of dieting and failures are directly related to energy management and set point theory. When it comes right down to it; consumption of sugar and saturated fats (as well as alcohol) are toxic to our mitochondria and impair our body's ability to flush or rebuild healthy cells that sustain life and longevity. Our forward facing focus is restoring our metabolic function (metabolism). To restore our metabolism, the challenge **WE**'re taking on is to retrain our perceptions of the reward value of food and beverages. When we challenge the impulsive, emotional UPND pleasure/reward response with accurate and realistic thoughts, we can successfully reduce our UPND food intake and avoid temptations that lead to overeating.

Supervised weight loss programs often encourage the use of food journals or apps for nutrition and calorie monitoring. These help to build awareness of what we're eating, but they're not without controversy. It's certainly helpful to develop an awareness of what we're actually consuming throughout the day or a week. That said, for some people this monitoring feels punitive and can become an unhealthy fixation that leads to onset of disordered eating, eating disorders, and associated health problems. Work with a nutritionist!!!! Think of dietary suggestions as an opportunity to try new foods, new cooking or preparation methods. Enjoy the challenge of being resourceful and adventurous.



Visualize a plate of fries before they're cooked. You've got a raw potato and a quarter cup of vegetable oil. Would you be willing to chomp down on slices of raw potato and chase it with a few shots of oil? Sometimes to build resistance, we just have to play through (or visualize) the consequences of a quick fix.

3.16 Genetic Contributions

Genes, and mitochondria expression at the cellular level influence our mental health, as well as our body composition, drive to eat, and even our eating behaviors. Current research suggests that almost all mental and metabolic health disorders can be traced to mitochondrial dysfunction of some kind [106]. Cells that are overly excited due to chronic stress or anxiety, may cause over activity in cells. In the body this may lead to atrial fibrillation which increases the risk for a subsequent heart attack. In the brain, this excitability may produce transient ischemic attacks that often precede a strokes. We also see this excitability in the manic phases of bipolar disorder, PTSD, panic disorder, and other conditions marked by mania. Cells can also be sluggish and underactive as seen with metabolic disorders and depression. Or in some cases, cells may be dying faster than they're supposed to, resulting in shrinking of or brain.

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So far all the gene mutations that lead to metabolic disorders have their normal function in the hypothalamus, the area of the brain (Brian) we know controls our appetite and energy expenditure [50]. With respect to mental health, there is no one gene or cellular dysfunction that activates a particular psychiatric disorder or any other complex psychological trait. In fact, many genes and cells interact to influence the human brain. Normal and disordered psychological characteristics are polygenic, meaning that they are each shaped by a large number of genes [52]. While rare mutations in certain genes may have a disproportionate impact, for the most part, each of the many relevant genetic differences plays a very small role in increasing or decreasing risk of a particular condition or influencing a given trait [52].

Polygenic risk scores (PRS) are predictors of the genetic susceptibility to diseases [49]. On their own, PRS will never be able to establish or definitively predict a diagnosis of common complex conditions (eg, mental health disorders), because genetic factors only contribute part of the risk and PRS will only ever capture part of the genetic contribution [53]. Consider the individual who has inherited a predisposition for alcohol dependence (alcoholism) from one or both parents, or grandparents. If that person doesn't drink, it's highly unlikely they'll trigger the genetic ON switch for this disease. That said, they still may have a higher likelihood for developing other types of addictive disorders or behaviors. We can help ourselves and future generations if we talk about our genetic inheritance with providers [52, 53].

3.17 Ketogenic Diets and Ketosis

Many popular diets restrict the consumption of carbohydrates, and these are generally referred to as Ketogenic Diets (KD). This style of eating can be difficult to sustain because the first few days, and sometimes weeks of strict KD aren't much fun. A person may feel depressed, and even mentally or physically impaired. This response isn't surprising considering the role of carbohydrates/glucose in our diet. The brain and central nervous system (CNS) rely almost entirely on the availability of glucose for energy and (feel good) mood regulation. In fact, on a daily basis (with healthy conscious eating) the brain will use up to 60-70% of the total body metabolized glucose [5].

There are at least twelve KD eating styles but what they have in common is that after 3 - 4 days (sometimes longer) without carbohydrate intake (KD or fasting) the CNS will find and use alternative energy sources [54]. For most people, the liver will eventually produce ketone bodies that can be used in place of glucose for energy [54]. However it takes time for our brain chemistry to adjust to ketosis, and for us to feel "normal." Once the body adjusts, ketone bodies are efficient energy sources, ghrelin levels increase, and we experience a reduction in appetite [54]. The challenge however with KD (and with most restrictive eating styles) is that restricting activates compensatory brain responses that increase our perceived "reward" value of food as well as our preoccupation with food.

These responses simply makes us think about and crave UPND foods. If we're unaware of why this is happening, any weight loss due to restrictive dieting may be short-lived. To the point, our brain needs time to adapt to changes with respect to our (BMI) percentage levels of

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fat. If we try to lose weight too quickly our brain (in survival mode) may desperately attempt to have us return to a previously comfortable BMI composition.

One of the concerns with any weight loss regimen, particularly the newer medications that reduce appetite by signaling “fullness” in the brain stem, is that in a state of starvation we may actually be losing equal amounts of fat and muscle. This loss of muscle tissue (which can be measured by Dexa scans) impairs cellular recovery at the most profound levels and can eventually lead to the onset of sarcopenia. It’s strongly recommended that any change in eating styles be supervised by a medical provider to avoid issues with nutrition, cholesterol, fatty liver disease, blood sugar, sodium levels, and more.

Speaking of medical providers, here’s some inspiration. Doctors in a practice in England recognized that over a 30-year period there was an 800% increase in the prevalence of Type 2 diabetes in their practice (1987 – 2017) [55]. To address this problem, they began a program where participants opted to follow a lower carbohydrate diet (LCD) for an average of 23 months [55]. For those who had Type 2 diabetes there was a 46% rate of remission. For those at the pre-diabetic phase (HbA1c 42 to 48 mmol/mol), a 93% rate of remission was achieved! This program relied on an integrated approach to wellness [55]. Aside from LCD nutrition guidance, participants were provided with regular follow up appointments, an evening support group led by a psychologist, as well as family education on nutrition and meal preparation [55].

3.18 Artificial Sweeteners

Guidelines released by the World Health Organization, show that non-sugar sweeteners do not offer any long-term health benefits and particular substances / brands may increase a person’s risk for developing chronic diseases [56] or exacerbate other conditions such as Chron’s disease or irritable bowel syndrome [57]. Studies of the brain confirm the suspicion that artificial sweeteners (AS) interfere with our HPA (**Brian’s**) learned control of energy intake and body weight regulation [57]. This is significant because of our systemic reliance on AS to reduce overall caloric intake [57].

So...what’s going on here? Let’s review a little bit of history and the concept of “conditioned” responses. At some point in high school, most of us learned about Ivan Pavlov, a Soviet Nobel Peace Prize winner who gained fame for his experiments involving dogs, food, and cues such as ringing a bell when food was being served. What Pavlov discovered in exploring salivary (mouth-watering) responses is profound. Not only are digestive responses (cephalic phase reflexes) stimulated by the consumption of food, but well before we even eat through input from our other senses such as sight, sound, or smell. The hungrier we are, the stronger the reflexive response. These reflex responses prepare the digestive system for the reception, digestion, absorption, and optimal processing of food.

With consumption of unaltered food our brain (**Brian**) learns (and encodes for future reference) what the body can expect in term of content (energy) from certain foods and adjusts

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the digestive response accordingly. In other words, after we have a standard breakfast, our brain knows that we consumed 70 calories in an egg and another 100 from a piece of toast, even if we never read the nutrition labels. Put back in terms of human evolution, before the introduction of highly processed food stuffs, what we tasted and ate; sweet, fat, salty or otherwise, contained a predictable number of calories, nutrients, and energy density.

An 8 oz. serving of orange juice contains approximately 110 calories, and 25 grams of sugar. Anytime we get ready to drink a glass of OJ, Brian knows in advance that our body will receive 110 calories and 25 gm of sugar. To maintain energy homeostasis, after drinking the juice, Brian would downregulate our demand for other energy intake accordingly. In other words, over the course of that day, if everything's balanced, we should naturally adjust to consume 110 fewer calories of something else. When we go shopping, it's common to see orange beverage products advertising 50% less sugar (conveniently placed next to actual orange juice). It still looks and tastes like orange juice however, these products contain added water and artificial sweeteners. These blended products confuse Brian when he's trying to balance anticipated sugar intake with energy demand. Unsure of the orange substance, did we get 110 calories or something else?

With the introduction of artificial sweeteners (and fat substitutes) our brain can no longer predict if something sweet contains the anticipated calories from sugar or if (in the case of artificially sweetened drinks) we're consuming something else entirely [58]. With the advent of artificial ingredients in UPND foods, our brain can no longer rely on sight or taste for energy management, feelings of satiety (fullness), or anticipated nutritional content. This means that downstream neural, hormonal, and metabolic responses are also affected [58]. Humorously, it's been said that if we want to be healthy don't eat anything that didn't exist prior to 1900 AD.

3.19 Ultra Processed Food

In the United States, ultra-processed food make up nearly 60% of the calories Americans consume. We often call these “junk” food but the term used in research is “hyper-palatable”. Almost 70% of food consumed in the US meets the ultra-processed hyper-palatable designation. It's important to recognize that these foods are designed to be chemically addictive by companies invested in making profits from substances known to cause addiction. Many of the most popular brands, (coincidentally those also highest in added sugar, fat and chemicals), were designed, produced, and introduced by tobacco industry giants about the same time smoking and the cigarette industry came under attack.

We know that most grocery items are “processed” in some form or fashion. Eggs undergo “washing” before packaging. Carrots are peeled, corn is shucked, and peaches are diced before being frozen or canned [59]. There are different levels of processing, some of which are beneficial and reduce the transmission of e-Coli and pollutants. Of concern, are the “ultra-processed” foods which are essentially formulated in such a way that they are “pre-digested.” They're easily absorbed by the body, and engineered to overcome our natural mechanisms that regulate appetite and satiety (3.7) [59]. Foods that are very high in fat and carbohydrate in a kind of an equal ratio

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don't exist naturally. They're designed by food scientists to look a certain way, feel a certain way in your mouth, and smell a certain way when you open the package [123].

Many ultra-processed food products (UPF) start with fiber-rich grains like rice, oats, and corn. These are milled into small particles and then refined to remove all the nutrient rich components [59]. These starches are then used in a process called extrusion cooking which further breaks down the starches releasing glucose [59]. This substance is then forced through small holes which causes it to expand. This stuff can then be shaped and combined with other ingredients to create endless varieties of foods such as breakfast cereals, baby foods, corn chips, puffs, snack bars, cookies, pastries and more [59]. Food products created in this fashion are easily chewed and rapidly digested. They're often formulated with chemicals and flavors designed to appeal to our "hedonistic" urges. We know these "urges" or cravings can easily result in:

- Compulsive or unrestrained eating.
- Double the amount of calories we consume per minute.
- Consuming an additional 500 Calories per day compared with eating styles that rely unprocessed fiber-rich foods.

Lastly, because UPF are low in fiber, they further dysregulate our gut macro biome affecting our brain health and emotional stability (3.7) [59, 60].

3.20 The Importance of Creating Habits and Routine

One of the keys to long-term weight management is developing and sticking with simple routines that incorporate new habits in support of long-term lifestyle changes [61]. A healthy lifestyle includes consistent consumption of nutritious foods, physical activity, and sleep [61, 62]. When we add structure to our days we're more likely to avoid impulsive behaviors that lead to relapse. Those who are successful at maintaining weight loss often eat the same foods, engage in consistent exercise, and do not skip meals [61, 62]. It can be helpful to think about our routines in two broad categories. We all have what scientists categorize as "primary" and "secondary" routines [63]. Primary routines are those that are important for keeping us alive and meeting our basic biological needs. Examples of primary routines include sleeping, eating, and personal hygiene [63]. Our secondary routines are those that reflect our individual preferences and motivations and include our hobbies, exercise, work/study, and how we spend our leisure and social time [63].

Weight management and maintenance behaviors, of course, span across both our primary and our secondary routines. In terms of our primary routines, eating behaviors are important for managing weight over the long run. In fact, when researchers track the behaviors of people who maintain their weight-loss, they find that planning meals most days of the week and tracking calories and fat are commonly reported routines [61, 62, 63].

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Planning for success

A novel way to approach the issue of adherence is to create a routine around your specific health recommendations. Once established, routines do not require conscious effort or thought and should be structured in a way that reduces the need for decision making [63].

It's important to note the difference between a routine and a habit. Habits are associated with a cue [63]. For example, washing one's hands after using the restroom is a habit because hand washing is associated with the event of using the restroom. Like a routine, a habit requires little conscious thought. However, after prolonged absence of the cue, an individual's habit may subside. A routine is not dependent on a cue. On average it can take more than 2 months for new habits to become routine [60]. Some steps that can help establish positive routines [63].

- Use meal replacement products that support your health recommendations
- Plan meals ahead of time to avoid last-minute decisions
- Before going to a restaurant plan your choices before going
- Take meals to work/school
- Schedule an exercise class or workout with a friend
- Plan vacations or time away from home

3.21 $A + B = C$

We will spend a significant amount of time working on this equation developed by Ellis, a founding father of cognitive behavioral therapy [5]. It's a straightforward and useful technique to recognize what keeps us stuck, and what we can do differently.

Actions combined with **Beliefs** produces **Consequences** [5]. These can be positive or negative. It's fair to say that discussions on nutrition and exercise can produce a host of negative feelings and memories of failed attempts, but that's "old stuff" or "old beliefs". As you work on your plan for weekly meal planning and physical activities (actions) write down some encouraging thoughts to help you begin creating new "beliefs" with positive health consequences and rewards.

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Resilience: *Identify three positive “self-coaching” statements you can start using this week.*

3.22 Family Legacy

Many of our biological, psychological, and social (also referred to as biopsychosocial) attributes are inherited and influenced by our family (racial and cultural) and environment. As mentioned earlier, there is a significant genetic inheritance that contributes to our metabolic and psychological development and predicts (or determines) our vulnerability to metabolic disorders and other health problems.

Use the family tree on the last page of this chapter to document the health/weight and mood history of your grandparents and parents. If you heard anecdotes like “grandma was always angry” or “grandpa was an alcoholic” just enter that information as it was told to you. There are two open boxes to enter information about other family members such as aunts, uncles, or siblings who may be of relevance to **your** health. If possible, the goal is to visualize the history and contribution of previous generations and to understand the influences on your development as well as potential areas of vulnerability.

Recognition: *Have you lost loved ones prematurely as a result of cardiovascular issues related to weight?*

Recognition: *Are you concerned about the health and wellness of your parents, siblings, and friends?*

Recognition: *How do you feel your weight is holding you back from exploring new opportunities, hobbies, jobs, or other possibilities?*

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Family History – Metabolic and Mood

Grandmother M
Health
Mood

Grandmother P
Health
Mood

Grandfather M
Health
Mood

Grandfather P
Health
Mood

Mother
Health
Mood

Father
Health
Mood

Siblings
Health
Mood

You
Health
Mood

Relatives
Health
Mood