



The Neuroscience of Trauma
“The Body Keeps the Score”
Bessel van der Kolk, 2014

THE BRAIN FROM THE BOTTOM UP

➤ THE REPTILIAN BRAIN

- Located in the brain stem, on line when we are born [eat, sleep, wake, cry, breathe, feel temperature, hunger, pain]

➤ THE LIMBIC SYSTEM

- Seat of emotions, monitors danger, central command post for safety

➤ TOGETHER THEY FORM THE EMOTIONAL BRAIN

3 LEVELS OF INFORMATION PROCESSING

The Triune Brain

- ❖ COGNITIVE (beliefs, thoughts, interpretations ...)
- ❖ EMOTIONAL (emotions and affective processing)
- ❖ SENSORIMOTOR (physical and sensory responses, sensations and movements)

“A brain within a brain within a brain.”

THE TRIUNE BRAIN

THE REPTILIAN BRAIN

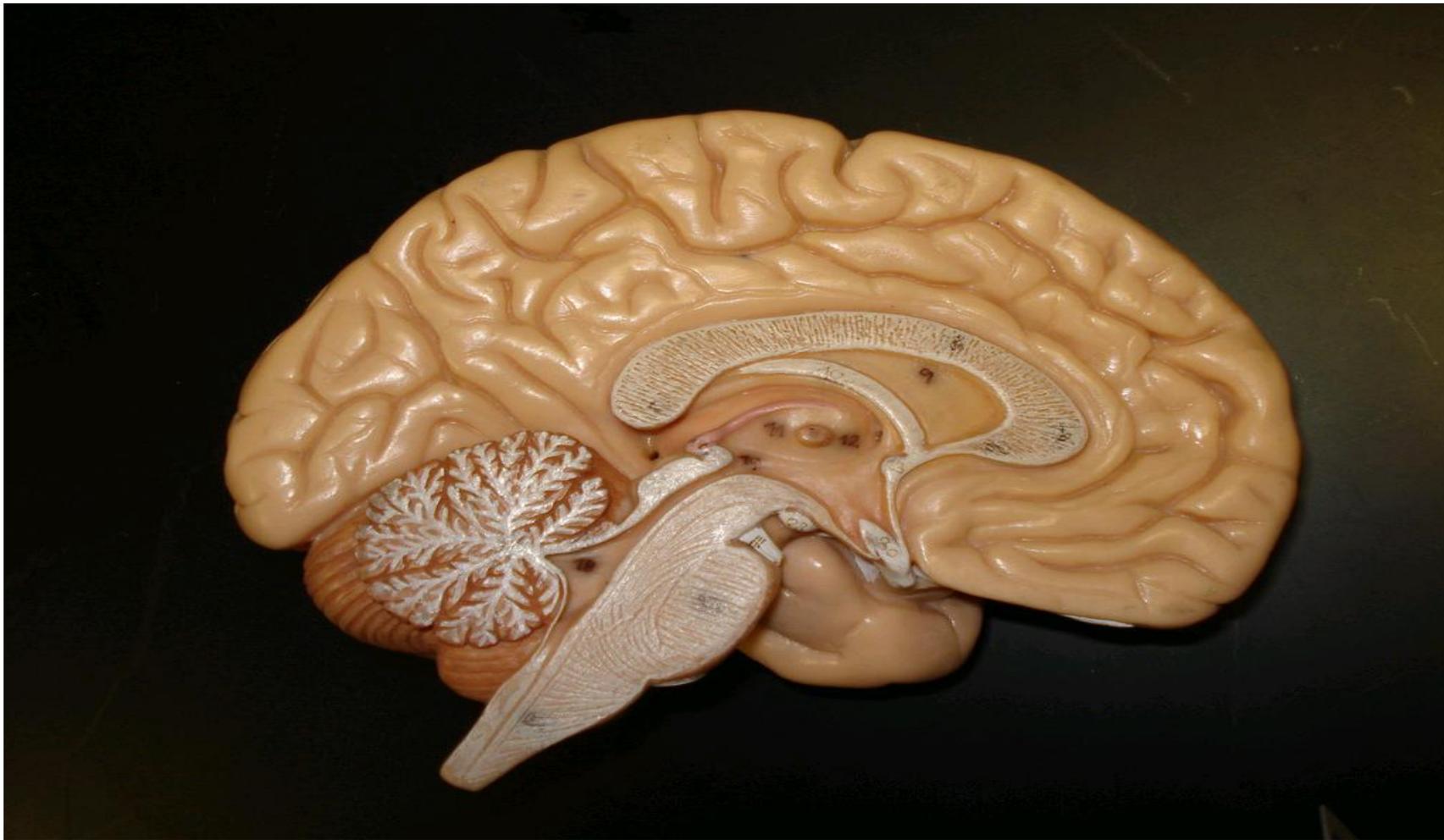
governs arousal, homeostasis and reproductive drives

THE LIMBIC BRAIN

surrounds the reptilian brain and is concerned with emotion, memory and some social behaviours, learning, and relational experiences

THE NEOCORTEX

last to develop, enables self awareness and conscious thought



SEE HANDOUTS ON THE AUTONOMIC NERVOUS SYSTEM—
THE SYMPATHETIC AND PARASYMPATHETIC SYSTEMS

What happens when trauma comes?

What changes in the brain?

FIGHT

FLIGHT

FREEZE

- First the limbic system commands the SNS to prepare for fight or flight—if not enough time, it commands the body to freeze (a hypotonic response).
- Now both the SNS and the PNS are highly activated—it is an analgesic effect, numbing the body and mind. People report being in an altered state.
- “Going dead” or being unable to fight back are frequent reactions to physical violence, torture and sexual assault.
- PTSD is characterized by chronic ANS hyperarousal (the alarm is almost always on) as the SNS arousal is always high; people wonder why they are so reactive and cannot handle the daily stressors of life.

What parts of the brain are involved with PTSD?

Neuroimaging research conducted by Bessel van der Kolk (2014)

The 4 most important parts of the traumatized brain are:

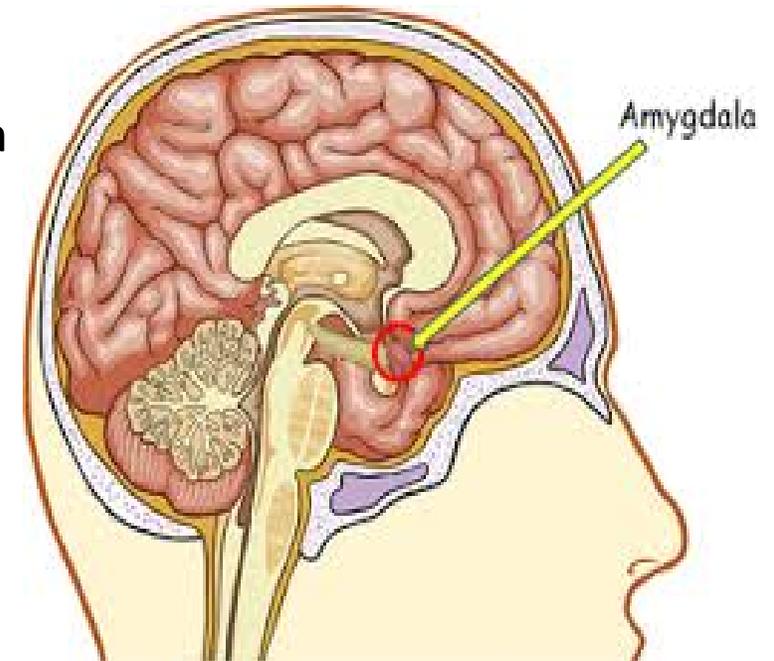
1. **Thalamus** – “The Cook” (van der Kolk, 2014, p. 70)
2. **Amygdala** – “Smoke Detector” (van der Kolk, 2014, p. 60-64)
3. **Hippocampus** – “Central Command System” (van der Kolk, 2014, p. 60-69)
4. **Medial Prefrontal Cortex** – “The Watchtower” (van der Kolk, 2014, p. 62-69)

From: B. van der Kolk, “The Body Keeps the Score”

AMYGDALA

THE SMOKE DETECTOR

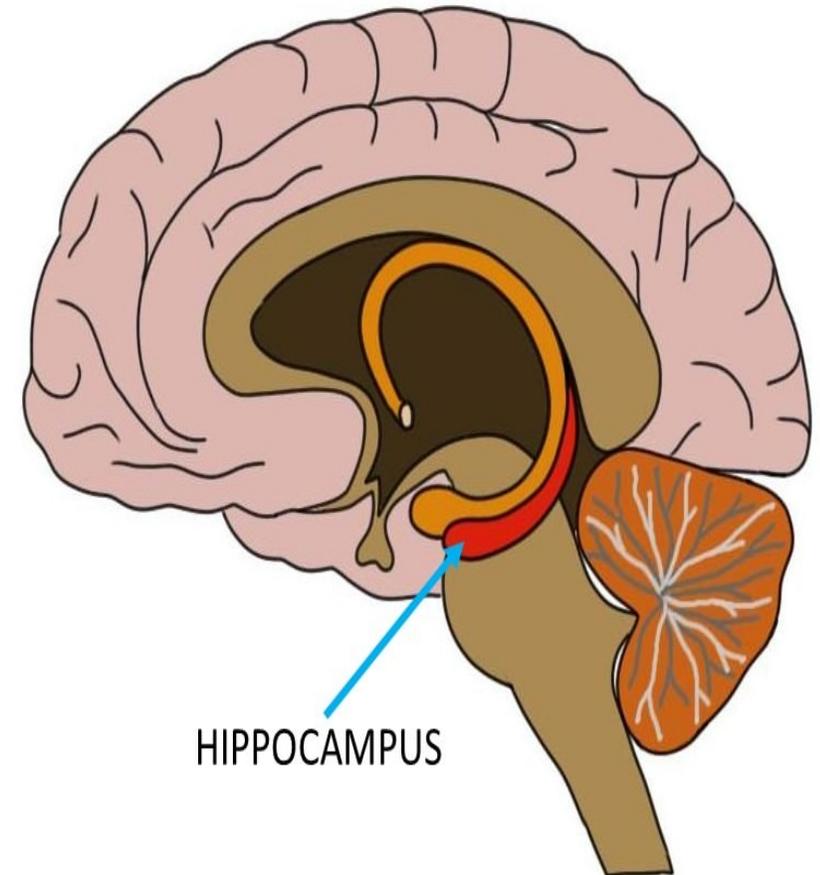
- Part of the brain's emotional processing system
- Is the “sounding alarm” when the system is under threat
- Initiates the SNS
- With PTSD, it becomes over active which results in a generalization of the fear response so that the person increases his/her fearful behaviour
- This explains the over-reaction (hypoactive amygdala) as seen in dissociated people— everything shuts down when triggered



THE HIPPOCAMPUS

CENTRAL COMMAND STATION

- ❖ Receives input and sends messages to the amygdala and the cortex
- ❖ Essential structure for encoding and storing memory and learning and plays a central role in our ability to compare different memories and make inferences from previous learning (Cozolino, 2010)
- ❖ Chronic stress can cause death of the hippocampal neurons and shrinkage if the alarm has been on too long. Is due to the effects of long periods of exposure to cortisol
- ❖ It then cannot infer past from present



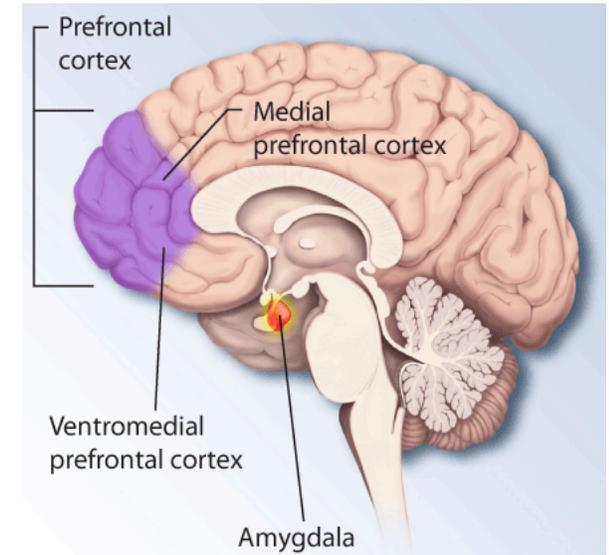
RELATIONSHIP BETWEEN THE HIPPOCAMPUS AND THE AMYGDALA

- ❑ “The relationship between the amygdala and the hippocampus is extremely important to human experience and contributes significantly to top-down and left-right integration.” (Cozolino, 2010, p. 85)
- ❑ The amygdala is biased toward both right and down systems; hippocampus is left and top processing.
- ❑ The amygdala has a major role in emotional and somatic organization of experience; the hippocampus is vital for conscious, logical and social functioning.
- ❑ “Their relationship will impact affect regulation, reality testing, resting states of arousal and anxiety, and our ability to learn emotional and more neutral information.” (Cozolino, 2010, p. 85)

MEDIAL PREFRONTAL CORTEX

THE WATCHTOWER

- ✓ Is part of the cognitive processing system
- ✓ Regulates the generalization of the fear response and overall increase in fearful behaviour initiated by the amygdala
- ✓ Suppresses the stress response and plays a role in the regulation of cortisol, the stress hormone
- ✓ It plays an important role in emotional regulation
- ✓ Is important in the retrieval of episodic memory (Lanius et al., 2006, p. 149).



“Learning how to breathe calmly and remaining in a state of relative physical relaxation, even while accessing painful and horrifying memories, is an essential tool for recovery.”

VAN DER KOLK, 2010 “BEFRIENDING THE EMOTIONAL BRAIN”, P. 207

THE KEY ROLE OF RELATIONSHIPS

According to Bessel van der Kolk (2014),

“You have to find someone you can trust enough to accompany you, someone who can safely hold your feelings and help you listen to the painful messages from your emotional brain. You need a guide who is not afraid of your terror and who can contain your darkest rage, someone who can safeguard the wholeness of you while you explore the fragmented experiences that you had to keep secret from yourself for so long. Most traumatized individuals need an anchor and a great deal of coaching to do this work.” (p. 211).

THE BODY KEEPS THE SCORE (van der Kolk, 2014)

- Trauma profoundly changes how we perceive the world (Janoff-Bulman, 2010)
- Trauma is a response of the whole organism.
- Developmental trauma impacts key structures underlying emotional regulation.
- We can directly train our arousal system by the way we breathe, chant, move, and interact with others— attunement is at the core of affect regulation (with self and others).
- Traumatized people need to have physical and sensory experiences to:
 - (a) unlock their bodies
 - (b) activate effective fight/flight
 - (c) tolerate their sensations
 - (d) befriend their inner experience and
 - (e) cultivate new action patterns

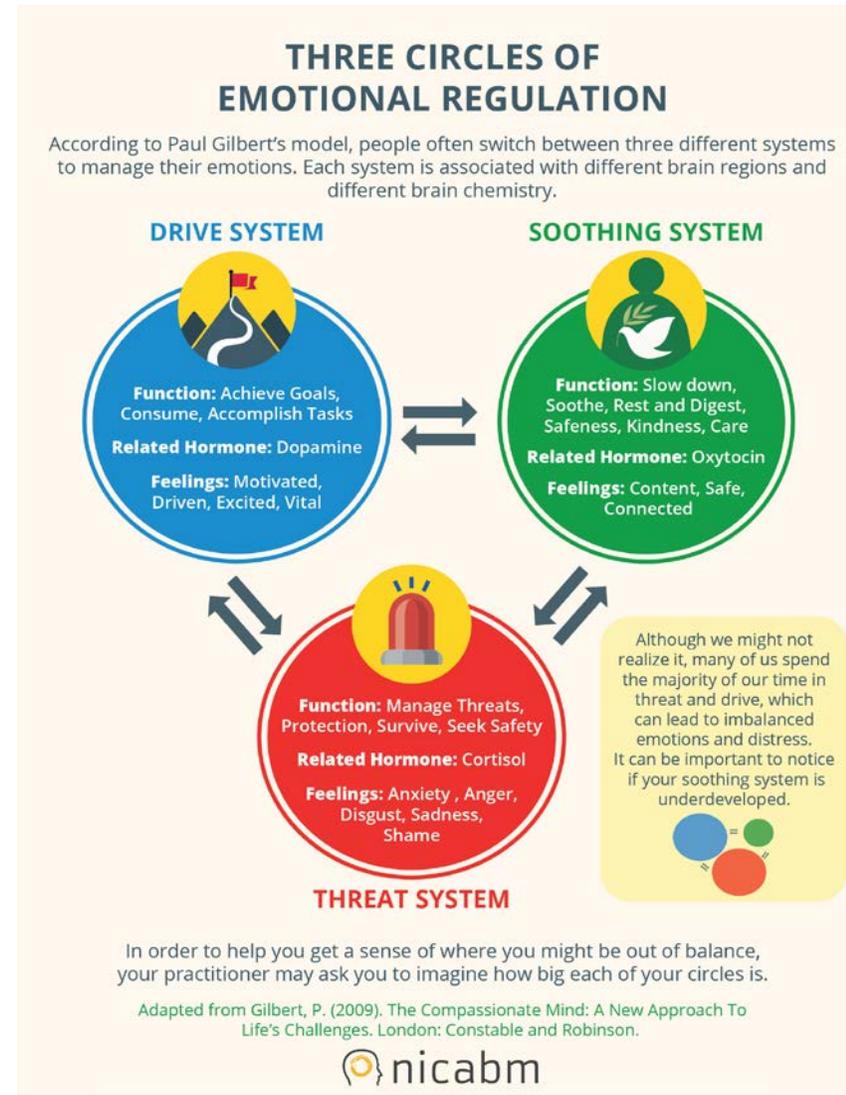
IT IS NO LONGER ONLY ABOUT THE TALKING CURE! (van der Kolk, 2014)

HOW TO WORK WITH TEENS TRAUMATIZED BY DATING VIOLENCE

WHAT STRATEGIES CAN WE LEARN FROM SELF-REGULATION THEORY
AND EMPIRICALLY SUPPORTED TRAUMA TREATMENTS?

AFFECT REGULATION

UNDERSTANDING HOW TO SELF-REGULATION IS KEY TO TRAUMA REPAIR



SEE HANDOUTS ON WINDOW OF
TOLERANCE

SAFETY FIRST

TDV victims with PTS have an acute alarm system, looking for danger

First step is SAFETY FIRST

- Initiate strategies to restore a sense of safety,
 - In your relationship together
 - Internally for themselves
 - In social relationships (family and peers)
 - In community (school and neighbourhood settings)

SELF-REGULATION STRATEGIES

NEXT STEP IS THE DEVELOPMENT AND PRACTICE OF SELF-REGULATION STRATEGIES AND RESOURCES – Testing the preferred strategies in context as coping strategies

- **Breathing exercises**
- **Relaxation exercises**
- **Grounding exercises**
- **Self-soothing exercises**
- **Visualization strategies**
- **Thought-stopping exercises**

HOW TO WORK WITH TRIGGERS

- ❖ Understanding the neurobiology of the trigger
- ❖ Learning what precipitates a trigger reaction
- ❖ How to manage an emotional trigger, naming their bodily states/physiology
- ❖ Focus on their social engagement system to keep them online
- ❖ Understanding how the trauma caused cognitive distortions (working with guilt, shame and stigma)
- ❖ Help youth notice moments of safety and connection
- ❖ Practice in the real world

PROCESSING THE TRAUMA NARRATIVE

CAUTIONARY NOTE: Do not delve into the trauma narrative without prior training in trauma therapy. There are several online trauma training and licensing programs on the last slide.

WHAT TREATMENTS ARE THE GOLDEN STANDARD FOR TRAUMA NARRATIVE EXPOSURE & REPAIR

1. EMDR – Eye Movement Desensitization Reprocessing (Shapiro)
2. Sensorimotor Psychotherapy (Pat Ogden)
3. Neurofeedback (B. van der Kolk)
4. CBT Trauma Exposure Therapy (Edna Foa and Colleagues)
5. Mindfulness (Dan Siegel)
6. DBT – Dialectical Behavior Therapy (Linehan)
7. Self-Compassion Therapy (Neff or Gilbert's work)

TRAUMA INTERVENTION PROGRAMS

TRAUMA-FOCUSED CBT (Cohen et al., 2006)

TF-CBT is an empirically validated intervention for treating children and youth exposed to traumatic events. Is a structured child/youth & parent trauma-focused model. Follows a standard treatment guide.

Provides psychoeducation; affect regulation and coping skills training; modules on working through stress symptoms, helping children confront memories of abusive experiences or avoidance of reminders

Includes trauma narrative processing modules.

Training is available on-line

CBITS – Cognitive Behavioral Interventions for Trauma in Schools (Jaycox, 2004)

CBITS is an empirically validated, manualized program for youth in inner-city schools who have been exposed to trauma and have PTS symptoms.

Is a 10 session group-based trauma program for youth and includes training in relaxation, dealing with negative thoughts, solving real-life problems, approaching anxiety-provoking situations and coping with trauma events.

Designed for both peer and parental support

Includes individual session, 4 group-parenting meetings, and an educational session for teachers. On line training available.

TRAUMA INTERVENTION PROGRAMS

TARGET - Trauma Affect Regulation Guide for Education and Therapy (Ford et al., 2011)

Is an empirically validated treatment for adolescents with complex trauma histories and developmental trauma disorders. It is manualized and has 10-12 sessions delivered both individually or in groups.

Involves psychoeducation, and a 7-step sequence for skills using CBT, Mindfulness and experiential approaches. Has creative arts components.

Target does not involve trauma processing of memories.

SPARCS – Structured Psychotherapy for Adolescents Recovering from Chronic Stress (Habib et al., 2013)

SPARCS is for teens of both genders and the focus is on coping, relationships, and improving functioning in the present. It comprises 22 group sessions and combines techniques from trauma programs such as TARGET and from Dialectical Behavior Therapy for adolescents.

PREVENTION PROGRAMS FOR TDV

DATING MATTERS®: STRATEGIES TO PROMOTE HEALTHY TEEN RELATIONSHIPS (Tharp, 2012)

For 11-14 years of age, to stop TDV perpetration and victimization before it starts. There are multiple prevention components for individuals, peers, families, schools, and neighbourhoods. It includes the role of gender in relationships.

Individual level includes: youth substance use, sexual risk behaviours, poor emotion regulation and acceptance of traditional gender roles.

Relationship level includes: peer conflict, parental conflict, peer experiences of TDV

SAFE DATES (Foshee et al., 2005; Foshee et al., 2014)

Evidence based, RCTs to support its efficacy.

Is a school-based dating violence prevention program for 8th and 9th grades.

10 classroom sessions. Now includes Families for Safe Dates. Teaches sexual & behavioral norms for dating, conflict management skills, social control, gender-role conflict, victimization and perpetration education and awareness of service supports. Involves a poster contest.

Evidence shows that the program is effective for females & males, whites and non-whites.

PREVENTION PROGRAMS FOR TDV

PUBLIC SAFETY CANADA'S CRIME PREVENTION PROGRAMS (2012)

Lists and describes 9 programs that target both youth (12 to 17 years) and family programs. They provide treatment manuals and offer training with most of the programs.

Programs address violence, delinquency, substance use, conduct disorder, depression, healthy relationships, to name a few topics. Most programs are cognitive behavioural approaches with psychoeducational components, behavioural change monitoring and community involvement.

PREVNET's Bully Prevention Toolkit (see website for this resource)

37 tools to “prevent bullying, promotes healthy relationship, offers a leadership training module, supports the core values of safety, empathy, caring, respect for diversity and integrity.”

Also on PREVNet: e-learning program—**Cyberbullying: Parent's Guide to Having Conversations About Online Social Relationships.**

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WEBSITES FOR TRAUMA & TDV RESOURCES

National Child Traumatic Stress Network at <http://www.nctsn.org>

National Centre for PTSD at <http://www.ptsd.va.gov>

International Society for Traumatic Stress Studies at <http://istss.org>

Child Trauma Institute at <http://www.childtrauma.com>

Dan Siegel's MINDSIGHT website on mindfulness practices at <http://www.mindsight.com>

Canadian Red Cross for on line courses and building safer organizations and communities at <http://redcrosslearning.ca>

PREVNet at <http://www.prevnet.ca>

Centre for Disease Control

<http://www.cdc.gov/violenceprevention/intimatepartnerviolence/teendatingviolence/>

Public Safety Website for National Crime Prevention at <http://www.publicsafety.gc.ca/NCPC>

THANK-YOU
QUESTIONS or COMMENTS