Somatosensory Symptoms After Brain Injury: Using Tracking To Help Support Cognitive Rehabilitation

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Disclosures and General Information
I have no financial disclosures to make.
I have no non-financial disclosures to make.

Member of ASHA Special Interest Groups 2 Neurogenic Communication Disorders, and 13, Swallowing Disorders

Member of the American Society for Bioethics in Medicine

A word about this presentation...
Thank you for attending.
I am not going to read my slides aloud; I can safely assume you all know how to read by this point.
I am going to give you lots of references you can access at your convenience.
Today’s Objectives:

• You will be able to list at least 3 somatic/sensory (s/ss) symptoms associated with brain injury.
• You will be able to list at least 2 neural mechanisms underlying s/ss symptoms associated with brain injury.
• You will be able to list at least 3 methods of tracking s/ss symptoms which can be used by brain injury survivors.
• You will be able to identify at least 2 ways tracking s/ss symptoms supports cognitive rehabilitation.

Think about it…
The mosquito in the room
The seat kicker

Jane
• “I can’t go anywhere without freaking out.”
• “I get sick when I try to read.”
• “My boyfriend is really getting frustrated because I have the heat cranked up, but then I open the window.”
• “How can I hold down a job when I have this new kind of funk in the corner? I can’t just walk out of a meeting!”
• “I can’t stay here, I gotta get out.”
• “What the hell is wrong with me? I’m a grown man crying like a girl because I can’t draw a damn clock!”
• “God, what is wrong with these chairs?”
• “I’m useless. I can’t even go to the store. My wife is afraid to take me to the store now because I get so pissed off I just want to start swinging at people.”

Eric
Slide 7

**Definitions**
- Somatic: “Of the body”
- Sensory: “Of the senses”

Sensorysomatic = “Awareness of sensory input to the body; awareness of the body.”

V. Tuttle, D.O., personal communication, February, 2023

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Slide 8

**But what about “SOMATIZATION”?**

- “A process whereby psychological distress manifests as physical symptoms, which can occur in the presence or absence of organic pathology. When symptoms occur in the context of an identifiable medical condition (e.g., brain injury), somatization would be considered when the nature, severity, or course of symptoms differ from what can be attributed to the medical condition.”


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Slide 9

**Isn’t this just conversion disorder?**

No, there’s a difference.

The primary difference lies in the presence of symptoms affecting any aspect of the body which can be understood to have no physical basis in any disease or conversion disorder.

In other situations, the problem is considered a physical manifestation of a psychological problem.

So what are these symptoms?

Typical or frequently occurring sensory/sensorysomatic symptoms after brain injury
- VISUAL e.g. diplopia (double vision), blurred vision, strabismus, decreased convergence, decreased accommodation, ocular pain
- AUDITORY e.g. tinnitus, sensorineural hearing loss, auditory processing disorders
- VESTIBULAR e.g. dizziness, loss of balance, difficulty with sensing the position of the body in space
- TACTILE e.g. difficulty recognizing change in temperature, difficulty tolerating certain textures
- HEADACHE
- SLEEP DISRUPTION
- ENDOCRINE e.g. disruption of menstrual cycle, loss of muscle mass, dysregulation of mood

Atypical or less frequently occurring somatic/sensorysomatic symptoms after brain injury
- GUSTATORY e.g. lack of taste, persistent off-taste, lack of appetite, lack of awareness of hunger
- OLFACTORY e.g. lack of smell, phantom smells, increased sensitivity to some odors
- DIGESTIVE/GASTROINTESTINAL e.g. vomiting, prolonged gastric emptying, constipation.
Where is this all coming from?

Neural Underpinnings of Somatic/Sensory Symptoms

- **PONTINE DEGENERATION**
  - Autonomic regulation
  - Arousal, balance, coordination

- **INSULAR LESIONS**
  - Temperature
  - Pain perception

- **AXONAL DAMAGE**
  - Excitation/inhibition of sensory receptors

- **NEUROCHEMICAL DISRUPTION**
  - Neurotransmitters
  - Acetylcholine disruption
Let's revisit that earlier definition:

- When symptoms occur in the context of an identifiable medical condition (e.g., brain injury), somatization would be considered when the nature, severity, or course of symptoms differ from what can be attributed to the medical condition.

"You cannot responsibly call something a conversion disorder until you have ruled out every other possibility."

Ellen Deibert, M.D.
Why the disagreement?

Let's see what the research has to say about this

Chandran et al (2020), Forrest et al (2018), Astafiev et al (2016): increased hypersensitivity to sensory symptoms (e.g., tinnitus) was associated with increased post concussion cognitive symptoms (e.g., irritability, decreased attention, and mood).


Gualteri and Johnson (2006): positive correlation between sensory sensitivity and slowed processing and decreased cognitive flexibility.

Study designs and limitations

Many studies only look at the acute stage, not the chronic stage.

Many studies only look at one gender.

Many studies focus on either hyper-sensitivity, or hypo-sensitivity, not both.

Many studies only look at auditory or visual symptoms.
It’s all connected...

• “...The pervasiveness of multisensory influences at all levels of cortical processing compels us to reconsider thinking about neural processing in unisensory terms. Instead, the multisensory nature of most, possibly all, of the neocortex forces us to abandon the notion that the senses ever operate independently during real-world cognition.”

Gazanfar and Schroeder, 2006.

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How somatic/sensory symptoms affect brain injury recovery

• Positive association between the presence of these symptoms and prolonged recovery times
• Processing speed & cognitive flexibility are the most common association cited
• Survivors express feelings of lack of control, doubt
• Anything that requires more effort to do is fatiguing. More fatigue = prolonged recovery
• Lack of belief in the authenticity of the symptom by medical providers results in mistrust between survivors and treaters

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"I Avoid Interactions With Medical Professionals As Much As Possible Now": Health Care Experiences of Individuals With Traumatic Brain Injuries

Joy E. Keenan and Laura E. Keenan

University of Wisconsin-Madison/University of Minnesota, Minneapolis MN

AJSLP
Tracking: helping to make sense of it all and supporting cognitive rehabilitation

*Identify the symptoms: “Giving something a name makes it real, as well as something to be communicated about.” (More Light)
*Identify how they affect the survivor
*Validation
Aim at improving their everyday lives through functional changes in management of the symptoms

Examples of tracking: journals
- Headache journals
- Pain scale journals
- Environmental journals
- Fatigue journals

Examples of tracking: scales
- Pain scales
- Duration scales
- Effort scales
How does this support cognitive rehabilitation?

- Identifies symptoms that are interfering with survivor’s ability to participate in a given task, or in therapy itself.
- Separates observed phenomena/behaviors from value-based judgments.
- Identifies the circumstances in which those symptoms are most intense or prolonged.
- Fosters ability to predict and plan around the symptoms.
- Identifies patterns of symptoms which can be used to develop better medical management of those symptoms.
- Utilizes fundamental cognitive skillsets such as attention, self-observation, memory, organization, planning, and review.
- It can also help support development of insight.

Case study: Jane

Jane sustained a brain injury when her plane crash-landed after engine failure.

**Before tracking**
- Had panic attack episodes mid session.
- Had onset of headache and nausea during new cognitive tasks, especially attention-based tests.
- Had onset of abrupt gastrointestinal distress when reading for longer than 5 minutes.
- Had difficulty regulating body temperature.

**After tracking**
- Identified triggers for panic attacks (sounds, smells).
- Identified cognitive tasks that caused headache, nausea, and the environment in which they frequently occurred (lighting, movement, font size, color).
- Identified specific times of day in which she was too hot/too cold and in doing so, was able to plan around it.

Applying tracking information to an executive function task for Jane

- Using Plan-Execute-Repair structure (Suzanne Keeley Phillips) and applying the data from the tracking, Jane was able to anticipate how her symptoms might interfere and how to plan around them.
- **Task**: doing the grocery shopping.
  - **What could possibly go wrong**: panic attack trigger from crying child, nausea from over-stimulation of sound and fluorescent lighting.
  - **What could be done to prevent/manage something going wrong**: go during hours when less likely to be children in the store, wear sunglasses or tinted lenses in store, use noise-canceling headphones or earplugs, plan route so that she was in and out of the store in the most rapid time possible.
Case study: Eric

Eric fell from a roof while installing a skylight; the skylight unit then fell on him

BEFORE TRACKING

- Unable to tolerate being seated for more than 15 minutes without getting up and pacing the hallway
- Completed independent tasks, like paying bills, but had trouble remembering or processing information in the room
- Nearly got into a fistfight at WalMart
- Burst into tears and sometimes racking sobs during challenging tasks.

AFTER TRACKING

- Identified postural instability, and changed seating to accommodate it
- Identified visual/auditory environmental distractors that interfered with task initiation or completion and planned accordingly
- Identified low frustration tolerance from difficulty understanding speech in the presence of background noise, and from people standing too close to him; and changed time of day when he shopped
- Correlated cognitive fatigue with his tearfulness and planned around it.

Applying tracking information to an executive function task for Eric

- Using Mind-Mime method (Sara Ward, MS CCC-SLP; Kristen Jacobsen, MS, CCC-SLP) and applying the data from the tracking, Eric was able to anticipate how his symptoms might interfere and how to plan around them. His task was organizing the insurance paperwork in his dining room.

  M. Make an image of the future space. What will it look like? (All papers spread out on the table, lots of envelopes, the tv going in the kitchen, the newspaper also on the table, his ipad)

  I. What will I look like doing it? Self-project and see yourself in that space. (Standing, not sitting, at the table, back to the other doorway so that I am not looking at the kitchen or the tv in that room, and I am placing papers in 1 of 3 piles, grouped by health insurance, disability insurance, and legal communication)

  M. Mentally time travel. How am I moving to achieve this? (I am allowing myself to walk a lap of the room every 5 minutes, and to stretch every 15 minutes; my phone is silenced; the ipad is turned off)

  E. Future emotion. How do I feel in that space? (If I feel tearful, I know my brain is too fatigued and I need to stop for a few hours; I won’t focus on the information in the papers that might trigger emotion, just the destination pile for the papers themselves.)

This was functional application of the data he had gathered and analyzed through tracking.

Applying tracking to task management by fatigue level or effort: Gretchen

- Gretchen was asked to identify tasks or settings that are very fatiguing for her, such as going to the lawyer’s office, or going to her tax preparer’s, or even family gatherings.
- She assigned a value from 1 to 5 for each task, with 1 being “not very fatiguing” and 5 being “very fatiguing.”
- She kept a log over the course of a few months, noting time of the day, people present, and weather conditions.
- Purpose was to save this data and be able to identify patterns and correlations.
- Gretchen decided to start tracking her fatigue level up to 6 months before taking on any new tasks or settings.
- The goal is to avoid reaching a 5, as it is always better to prevent a fire than to have to put one out.
Let's wrap it all up:

- The somatic/sensory symptoms are real, and based on neurological damage.
- Research shows that these symptoms can affect cognitive processes.
- They can, and often will, interfere with the survivor's ability to participate in aspects of their daily lives, including rehabilitation.
- Through identification (naming), tracking, organizing, and analyzing this information, the survivor gains understanding of their own brain's state, leading to better control in managing their symptoms.
- Through application of the information to planning of activities and tasks, the survivor feels more in control and functions better.

Questions?
References


References continued

References Continued


• https://psu-sysc.kumu.io/dynamics-of-concussion

References continued


• Deibert, Ellen M.D. Personal conversation, 2014.