Physiological reactivity at rest and in response to social or emotional stimuli after a traumatic brain injury: A Systematic Review

Alice Bodart 1, Sandra Invernizzi 1, Laurent Lefebvre 1, Mandy Rossignol 1

Cognitive Psychology and neuropsychology department, University of Mons (Mons, Belgium)
alice.bodart@umons.ac.be

1. Introduction
Physiological reactivity (PR) refers to bodily changes in response to an emotional or threatening event, under the influence of the autonomic nervous system and the hypothalamic-pituitary-adrenal axis (HPA axis). Patients with traumatic brain injury (TBI) frequently experience emotional difficulties, which have been associated with impaired PR (Rushby et al., 2013; de Soussa 2010; Francis et al., 2016). Although these disorders are known to exist, to date, no systematic review of the literature on PR abnormalities in TBI has been conducted.

2. Objectives
Conduct a systematic review of the literature on PR abnormalities after moderate to severe TBI

3. Method
In accordance with PRISMA guidelines, a systematic search across 6 databases was conducted including studies:
- Assessing PR at rest or in response to emotional stimuli
- In adults with moderate-to-severe TBI
- Compared to a control group
- Measured at least one of heart rate (HR), heart rate variability (HRV), respiratory sinus arrhythmia (RSA), electrodermal activity (EDA), salivary cortisol, facial electromyography (EMG), and blink reflex.

4. Results

Identification of studies via databases

<table>
<thead>
<tr>
<th>Identification</th>
<th>Records identified from PsychINFO, PsychArticles, PubMed, Scopus, Cochrane: Databases (n=286)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening</td>
<td>Records screened on title or abstract (n=247)</td>
</tr>
<tr>
<td></td>
<td>Reports assessed for eligibility on full article (n=27)</td>
</tr>
<tr>
<td>Included</td>
<td>Studies included in review (n=18)</td>
</tr>
</tbody>
</table>

Records removed before screening:
Duplicate records removed (n=39)

Records excluded (n=220):
- Animal studies (n=9)
- Assessment of a pharmacological intervention (n=1)
- Participants under 18 or over 80 (n=20)
- Patients in a persistent vegetative state (n=0)
- Other pathologies than moderate to severe TBI (n=131)
- No control group (n=15)
- No physiological measures (n=30)
- Review, meta-analyses, or poster (n=14)

Reports excluded (n=9):
- No control group (n=8)
- Review (n=1)

Discrepancies were observed according to the type of physiological measure. Compared to controls, in most studies, TBI patients exhibit:
- A reduction in EDA, corrugator muscle activity, blink reflex.
- No difference in zygomatic muscle contraction, salivary cortisol levels and cardiac activity

5. Discussion
Although disturbed EDA responses were frequently reported in patients with TBI, other measures did not consistently indicate an impairment in PR. These discrepancies could be due to the lesion pattern resulting from TBI, which could affect the PR to aversive stimuli. In addition, methodological differences concerning the measurements and their standardisation as well as the characteristics of the patients may also be involved in these discrepancies. We propose methodological recommendations for the use of multiple and simultaneous PR measurements and standardisation.