Relationship between handedness and persistent emotional distress in adults experiencing an earthquake

Relazione tra dominanza emisferica e disturbi emotivi in una popolazione esposta a terremoto

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SUMMARY. Aim. Post-traumatic emotional distress follows exposure to trauma and may be affected by atypical cerebral lateralisation. We aimed to explore the relationship between handedness and emotional dysfunction in people exposed to a natural disaster. Methods. About 22 months after an earthquake, 326 exposed adults completed the Edinburgh Handedness Inventory, the Impact of Events Scale-Revised, and the Insomnia Severity Index. Results. Mixed-handed people, compared to right-handed, had a 3.3 fold increase in odds to have emotional distress. Consistent left-handers scored higher than consistent right- and mixed-handers on the ISI scale. Conclusions. Findings support that lateral preference is associated with emotional distress in people exposed to trauma.

KEY WORDS: disaster, handedness, post-traumatic stress disorder (PTSD), sleep disorder, lateralization.

INTRODUCTION

Lateral preference, as indicated by handedness, is associated with emotional disorders and increased perception of emotional peritraumatic stress in trauma-exposed people (1-3). Post-traumatic stress disorder (PTSD) was found to be associated with lower degree of consistent right-hand preference, mixed lateral preference (1,4,5) or left hand (2,6). Parental left-handedness and mixed lateral preference increased likelihood of PTSD (4); these are both associated with PTSD symptoms among children with history of interpersonal trauma (5), adolescents exposed to disasters (7), and adult army veterans (1). Finally mixed handedness predicts PTSD after two years post-disaster (8) and is associated with poorer PTSD treatment response (9).

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RESULTS

Two-hundred-and-nineteen (76.3%) subjects were right-handed, six (2%) were consistent left-handed, and 65 (21.6%) were mixed-handed. The prevalence of emotional distress was 54% (n=162). Insomnia was reported by 108 participants (36%). Parental left-handedness (PLH) was found in 34 individuals (11.3%). PLH was associated with other than consistent right-handedness (left-handed, OR=6.5; 95% CI, 1.1-38.4; mixed-handed, OR=3.3; 95% CI, 1.6-6.7). Detailed results of the comparison between groups are listed in Table 1.

DISCUSSION

Our results are consistent with previous data supporting that lateral preference is associated with the persistence of emotional distress following exposure to trauma. This study extends earlier findings from adolescent populations and city inhabitants to a large adult rural population. We found significant differences on the IES-R total, intrusion and hyperarousal subscale scores among mixed, consistent left-handers and consistent right-handers. Similar differences emerged between PLH and nonPLH participants. However, PLH status did not increase the likelihood to have emotional distress. Thus our data do not support that parental left-handedness could be associated to emotional problems following trauma, as previously proposed by Chemtob and Taylor (4).

We also found that subjects with persistent emotional distress scored higher on the ISI scale. It should be recalled that sleep complaints and disturbances are often associated with emotional problems and constitute core symptoms of PTSD.

The evidence of a relationship between abnormal lateral preference and emotional difficulties in response to trauma appears to be an important issue for implementation of early psychological support interventions. But the most intriguing issues arose from this
study is the possible role of anomalous hemispheric specialization or integrative network failures in altered development of emotional processing circuits and in post-traumatic vulnerability.

As hypothesized by several scholars emotion processing functions are lateralized (13,14) and experimental data increasingly unveil a relationship between altered hemispheric specialization during the development and vulnerability to PTSD and other stress-induced emotional disorders (15).

Emotional distress is associated with consistent atypical cerebral laterality in the general population (6) and abnormalities in left-right cortical asymmetry and hemispheres connectivity have been found in children exposed to early life trauma that is a major risk factor for PTSD and emotional dysregulation under stress conditions in adulthood (15,16). Moreover studies in apes are consistent with the view that stress functioning and reactivity are associated with the development of hemispheric specialization in primates (17).

Limitations of this study may be constituted by the following: due to privacy regulations, we obtained no data from people who were contacted and decided not to participate in the study; hence, it is possible that some unexplored variables could have determined participation in the study. We also did not use specific interviews for diagnosing PTSD, so we are unable to infer how many people in our sample actually suffered from PTSD. Besides, we did not investigate the relatedness of participants with disaster victims, i.e., whether they had a relative who was present in the theatre of the disaster or whether they were present themselves; however, in a small village with about 1000 residents, where almost all people are acquainted with each other, the emotional impact is high in every person. We feel that the major limitation of this study was its cross-sectional nature, hence we may not infer as to whether sleep disorder was a consequence of the earthquake and associated disaster or it was present before the traumatic event.

Despite the above limitations, our data are consistent with those from previous studies and should drive researchers to further investigate causality in the relationship between posttraumatic emotional distress, lateral preference and abnormal brain asymmetry.

### REFERENCES


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### Table 1. Multivariate logistic regression analyses

<table>
<thead>
<tr>
<th>Emotional distress</th>
<th>Cases</th>
<th>Non-cases</th>
<th>OR</th>
<th>95% CI</th>
<th>OR*</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>37 (37.0)</td>
<td>63 (63.0)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00-4.41</td>
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</tr>
<tr>
<td>Female</td>
<td>125 (62.5)</td>
<td>75 (37.5)</td>
<td>2.83</td>
<td>1.73-4.66</td>
<td>2.44</td>
<td>1.35-4.41</td>
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<tr>
<td>≤ 8 yrs of school</td>
<td>127 (62.2)</td>
<td>77 (37.8)</td>
<td>1.00</td>
<td>0.35</td>
<td>0.21-0.57</td>
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</tr>
<tr>
<td>&gt; 8 yrs of school</td>
<td>35 (63.5)</td>
<td>61 (36.5)</td>
<td>1.00</td>
<td>1.00</td>
<td>0.49-2.33</td>
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</tr>
<tr>
<td>Unmarried</td>
<td>34 (48.6)</td>
<td>36 (51.4)</td>
<td>1.00</td>
<td>0.75-2.23</td>
<td>0.63-4.67</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>115 (55.0)</td>
<td>94 (45.0)</td>
<td>1.29</td>
<td>0.63-4.67</td>
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<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>13 (61.9)</td>
<td>8 (38.1)</td>
<td>1.72</td>
<td>0.63-4.67</td>
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<tr>
<td>PLH nonPLH</td>
<td>138 (51.9)</td>
<td>128 (48.1)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.02-4.84</td>
<td></td>
</tr>
<tr>
<td>ISI score&lt;15</td>
<td>24 (70.6)</td>
<td>10 (29.4)</td>
<td>2.23</td>
<td>1.00-4.84</td>
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<td></td>
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<tr>
<td>ISI score≥15</td>
<td>93 (86.1)</td>
<td>123 (64.1)</td>
<td>1.00</td>
<td>5.95-20.54</td>
<td>1.00</td>
<td>5.64-17.09</td>
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<tr>
<td>Right-handed</td>
<td>111 (48.5)</td>
<td>111 (48.5)</td>
<td>1.00</td>
<td>0.34-10.47</td>
<td>1.00</td>
<td>0.36-2.33</td>
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<td>Left-handed</td>
<td>4 (66.7)</td>
<td>2 (33.3)</td>
<td>1.88</td>
<td>0.86-2.64</td>
<td>3.34</td>
<td>1.54-7.24</td>
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<tr>
<td>Mixed-handed</td>
<td>40 (61.5)</td>
<td>25 (38.5)</td>
<td>1.50</td>
<td>1.00-4.41</td>
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</table>

*All variables are adjusted for each other and for age.