Journal of Psychosomatic Research 74 (2013) 479–485

Contents lists available at SciVerse ScienceDirect

Journal of Psychosomatic Research

Somatization is associated with deficits in affective Theory of Mind ☆

Cynthia M. Stonnington [a,*], Dona E.C. Locke [a], Chiu-Hsieh Hsu [c], Cheryl Ritenbaugh [b], Richard D. Lane [d]

[a] Department of Psychiatry and Psychology, Mayo Clinic, Arizona, United States
[b] Department of Family and Community Medicine, University of Arizona, Tucson, Arizona, United States
[c] Department of Epidemiology and Biostatistics, University of Arizona Mel and Enid Zuckerman College of Public Health, Tucson, Arizona, United States
[d] Department of Psychiatry, Psychology and Neuroscience, University of Arizona, Tucson, Arizona, United States

ARTICLE INFO

Article history:
Received 4 December 2012
Received in revised form 10 April 2013
Accepted 12 April 2013

Keywords:
Conversion Disorder
Emotional Awareness
Functional Somatic Syndromes
Somatization
Theory of Mind

ABSTRACT

Objective: To determine whether deficits in mental representation of emotion may constitute a mechanism for somatization.
Methods: In this case–control study, we obtained measures of cognitive and affective Theory of Mind, emotional awareness, positive and negative affect, depression, anxiety, and physical symptoms and determined psychiatric diagnoses in consecutive outpatients, aged 19 to 60, with Conversion Disorder (n = 29), Functional Somatic Syndromes (n = 30), or "explained" Medical Disorders (Controls) (n = 30). Main outcome measure was the Animations-L score, i.e., use of words describing emotional content while performing the Frith–Happé Animations (video) Task, an established Theory of Mind measure in which the emotional content of a story is conveyed through movement.
Results: Groups were similar in number of physical symptoms, negative affect, and ability to describe emotional experiences on a written measure that specifically solicited such descriptions. Conversion Disorder and Functional Somatic Syndrome groups scored lower on Animations-L, endorsed significantly less positive affect, and had more anxiety than Medical Controls. Animations-L and positive affect scores were predictive of group membership, with lower scores predicting somatizing conditions.
Conclusions: Relative to Medical Controls, a deficit in the encoding and reporting of emotion when the emotional content of the stimulus is conveyed in action occurs equally in Conversion Disorder and Functional Somatic Syndrome patients and is consistent with previous findings in somatoform disorder inpatients. Difficulty with "conversion" from implicit (action, somatic) to explicit (representational) processing of emotions, exacerbated by anxiety, may constitute a mechanism for somatization.

Introduction

Somatization is a major medical problem. Patients with somatization have significant degrees of disability in social and occupational function, consume an inordinate share of medical resources, and have psychiatric conditions that typically go unrecognized and inadequately treated [1–4]. The problem is exacerbated by the fact that the phenomenon of somatization is not well understood. The purpose of this study is to advance our understanding of whether deficits in the capacity to establish mental representations of emotion may constitute a cognitive mechanism of somatization.

"Theory of mind" (ToM) is the ability to explain or predict behavior [5–7] based on mental states, including thoughts, beliefs, intentions, or feelings attributed to the self or others. Cognitive ToM includes inferences about thoughts and beliefs that explain behavior, whereas affective ToM includes inferences about feelings and motivations that explain behavior [8]. The Frith–Happé-Animations Task (AT) [9,10], originally designed to assess ToM and explore impairments in cognitive ToM functioning [11], consists of video sequences depicting a small and a large triangle that move about in a way that conveys a story. Subjects

Abbreviations: ToM, Theory of Mind; AT, Frith–Happé-Animations Task; LEAS, Levels of Emotional Awareness Scale; UA, Arizona Medical Center Family Medicine; CD, Conversion Disorder; FSS, Functional Somatic Syndromes; MC, medical controls; MADRS, Montgomery Asberg Depression Rating scale; HAM-A, Hamilton Anxiety Scale; SCL-90, Symptom Checklist, Somatic Symptom Subscale. SF-36, Short Form 36-item Health Survey; Animations-L, measure of emotion-related words usage while performing the Frith-Happé Animations Task; TAS-20, Toronto Alexithymia Scale; PANAS, Positive and Negative Affect Scale; MSS, Mental States Stories; ANOVA, one way analysis of variance; SES, socioeconomic status; PTSD, Post Traumatic Stress Disorder; GD, Goal Directed.

☆ Previous Presentations: 58th Academy of Psychosomatic Medicine meeting in Phoenix, Arizona, November 18, 2011; 1st Dutch National Conference on Medically Unexplained Somatic Symptoms, Utrecht, the Netherlands, November 24, 2011; the 70th Annual Meeting of the American Psychosomatic Society, Athens, Greece, March 15, 2012; and the 23rd Annual Meeting of the American Neuropsychiatric Association, New Orleans, Louisiana, March 24, 2012.

* Corresponding author at: Division of Psychiatry, Mayo Clinic in Arizona, 13400 E Shea Blvd., Scottsdale, AZ 85259, United States. Tel.: +1 480 301 4853; fax: +1 480 301 6258.
E-mail address: stonnington.cynthia@mayo.edu (C.M. Stonnington).

0022-3999/$ – see front matter © 2013 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.jpsychores.2013.04.004

with intact ToM functioning attribute thoughts, feelings, intentions and beliefs to the moving triangles when asked to describe what is happening during the animations. Impaired performance on this task has been most commonly associated with autism spectrum disorders [5,12] and more recently dementia [13] and schizophrenia [14].

The possibility that the AT can be used to assess the capacity to mentally represent emotions can be traced to the work of Michotte [15,16]. Based on the observation that movements of simple geometric shapes induced emotions in research volunteers, Michotte hypothesized that emotion perception is grounded in the analysis of simple motion cues (approach, avoidance, contact intensity), and that the perception of biological motion induces a behavioral state in the viewer that may be experienced as emotional. Nearly a half century later, Premack and Premack [17] used computerized animations of geometric shapes to show that 1 year-old infants recognize the goals of objects and attribute positive or negative value to their interactions well before they can make more complex mental state attributions such as wants or beliefs. These and other findings suggest that properties of movement are a forerunner of complex mental state attributions [9], and are consistent with the view that the capacity for ToM arose from the motor system to detect intentions and thereby predict the behavior of others [18].

The possibility that the AT can be used to detect deficits in affective ToM was first established in an fMRI study of alexithymia, a trait commonly linked with somatization [19–21]. In that study, the AT was administered during fMRI to students who were classified as alexithymic or non-alexithymic [20]. Results demonstrated that the dorsomedial prefrontal cortex was more activated in controls than alexithymic individuals, and this difference correlated positively with perspective taking [20].

These findings are consistent with two studies from a German Psychosomatic Inpatient Unit using the LEAS, a performance measure of the ability to describe one's own and others' emotions in response to hypothetical emotion-evoking scenarios. LEAS scoring defines a continuum that quantifies the tendency to describe emotions as lower level bodily, sensori-motor states or higher level differentiated emotional feeling states [22]. Lower scores on the LEAS are therefore consistent with a deficit in the capacity to mentally represent emotional states. In the first study, inpatients with somatoform disorders compared to patients with other psychiatric diagnoses scored significantly lower on the LEAS prior to treatment, and LEAS scores significantly improved after three months of multi-modal inpatient treatment [23]. In a second study [16], the investigators adapted the LEAS scoring system to measure the emotional content of narratives while performing the AT (i.e., the Animations-L score). Animations-L, therefore, can be considered a measure of affective ToM, as the emotional content must be inferred/mentally represented from the seemingly interactive movements of the triangles. Relative to control subjects, German inpatients scored lower on Animations-L, i.e. they were less likely to attribute emotions to the moving triangles. This study provided further evidence of a deficit in affective ToM in somatoform patients. Their more limited use of emotional words in describing what happened during the animations indicated that somatoform patients were less able to mentally represent the emotional information conveyed by the stimuli.

In the current study we sought to extend previous findings by determining whether previous findings on the AT and Animations-L applied to American outpatients with somatoform conditions and whether the findings varied as a function of somatoform condition type. The study of German inpatients used two types of animations: Goal-Directed, depicting simple goal-directed activity (e.g., fighting), and ToM, depicting more complex interactions associated with more complicated thoughts and feelings. In this study we also included a third type of animation depicting Random Movement, i.e., no specific interactions between characters, which had been used in previous research in other contexts [9]. We selected Conversion Disorder as one of the comparison groups due to the specific and often dramatic physical symptoms that are not medically explained and because of the historical significance of this group in psychosomatic medicine. In contrast, Functional Somatic Syndromes are characterized by medically unexplained physical symptoms that are typically more non-specific and diffuse in nature. We chose the latter rather than Somatization Disorder or Hypochondriasis as a comparison group because Functional Somatic Syndromes are more common and are often seen among highly educated or previously highly functioning individuals.

We therefore hypothesized that outpatients with Conversion Disorder and Functional Somatic Syndromes would manifest impaired affective ToM, as measured by Animations-L, compared to control subjects who had known medical disorders with symptoms that were thought by their physicians not to exceed objective medical findings. We secondarily hypothesized that Conversion Disorder patients would manifest a greater deficit in affective ToM than Functional Somatic Syndrome patients, given that the symptoms of the former are often more dramatic and unusual than those of the latter. The traditional view that psychological conflict or distress participates in the etiology of Conversion Disorder symptoms specifically implicates a deficit in psychological awareness and ability to create mental representations of emotion in this condition. Third, to examine the specificity of our findings relative to affective ToM, we examined performance on a battery of measures of cognitive ToM independent of the AT. We hypothesized that groups would not differ on cognitive ToM.

Method

Subjects

From a total of 330 University of Arizona Medical Center Family Medicine (UA) and 118 Mayo Clinic in Arizona outpatients approached for the study, 59 outpatients with somatizing conditions (29 outpatients with Conversion Disorder and 30 outpatients with Functional Somatic Syndromes); and 30 outpatients with known medical conditions, ages 19 to 60, were consecutively recruited (Conversion Disorder and Functional Somatic Syndrome from Mayo Clinic, Functional Somatic Syndrome and medical controls from UA) between August 2008 and June 2010. Conversion Disorder patients were matched for age and sex to medical control patients, since this was our primary comparison. Those patients who were approached but did not enroll in the study either declined to participate for personal reasons, were not staying in town long enough to participate, did not match the Conversion Disorder patient (in the case of medical controls), or did not meet our inclusion criteria when screened. Conversion Disorder patients were diagnosed by their Mayo physicians according to DSM-IV criteria after a thorough medical and neurological work up to rule out other conditions. Conversion Disorder symptoms included functional paralysis, functional movement disorder, functional dysphonia, or functional behavioral spells (i.e., psychogenic non-epileptic seizures). Patients with Functional Somatic Syndromes were judged by their physician to have somatization, based on the physician's assessment that the patient's physical symptoms were not fully explained by known medical and neurological conditions. Functional Somatic Syndrome patients were variously diagnosed with fibromyalgia, irritable bowel syndrome, chronic fatigue syndrome, vulvodynia, cyclic vomiting/abdominal pain syndrome, or temporomandibular joint syndrome. Medical controls had physical symptoms, were being followed at a university primary care clinic, and were judged not to have somatization by their physician, i.e., the patient's physical symptoms did not exceed those typical for their condition. Diagnoses included diabetic neuropathy, chronic obstructive pulmonary disease, sciatica, chronic back pain, arthritis, migraine headaches, Lyme disease, pulmonary hypertension, or muscular dystrophy. Even in patients with chronic back pain, migraine headaches, and arthritis, medical symptoms were fully explained and there was no evidence of somatization per the clinical judgment of their physicians. Patients were included if their primary