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Impaired Recognition of Dynamic Body Expressions After Right Hemisphere Damage

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Objective: Studies of patients with right hemisphere damage (RHD) have consistently found impairments to their ability to recognize emotions from facial expressions and prosodic cues. However, there is no consensus as to whether these deficits extend to other types of emotional expression such as body movements. The objective of this study was to compare the performances of RHD patients and a healthy control group at recognizing basic and complex emotions from dynamic facial and bodily expressions. ***Method:*** We evaluated 17 adult RHD patients whose lesions had occurred at least 6 months previously and 17 healthy control subjects. Four emotional tests were given using dynamic facial and bodily expression stimuli for basic and complex emotions and two nonemotional tests for facial perception and identification of nonemotional bodily movements. ***Results:*** The results showed that RHD patients performed worse than the control group at all emotion recognition tests for both facial and bodily expressions. Positive correlations were observed between the four emotional tests for the whole sample and for the RHD group. Finally, there were no significant differences between the RHD patients and the control group in the two nonemotional tests. ***Conclusions:*** The results of the study suggest that impairments to emotion recognition in RHD patients are not limited to facial expressions but also include bodily expressions of different types of emotions. These findings underscore the importance of extending characterizations of patients' emotion recognition skills beyond facial expressions.

Public Significance Statement

This study shows that adults who acquire right hemisphere brain damage present impairments to their ability to recognize emotions expressed through various types of gestures, including facial expressions and body movements. Describing emotion recognition impairments in patients with acquired brain damage such as those described in this study is fundamental to better understanding their cognitive impairments and providing them appropriate care and assistance in recovering and reintegrating into their communities.

Keywords: emotion, bodily expressions, facial expressions, right hemisphere, social perception

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One of the cognitive disorders that has been described more frequently in patients with right hemisphere damage (RHD) than in those with damage to the left hemisphere are emotion recognition deficits (Adams et al., 2019; Yuvaraj et al., 2013). Emotion recognition, also known as emotional perception, is the ability to identify other people's emotional states from environmental cues (Mitchell & Phillips, 2015). This includes a variety of nonverbal cues such as facial gestures, body movements, and prosody. Several review and meta-analysis studies concluded that right hemisphere dysfunction impairs emotion recognition for at least two types of expressions, namely facial and prosodic expressions (Abbott et al., 2013; Adams et al., 2019; Alba-Ferrara et al., 2018; Bora & Meletti, 2016; Yuvaraj et al., 2013). However, despite the vast literature reporting emotion recognition impairments in RHD patients, little is known about the processing of nonfacial visual emotional cues such as bodily expressions. These include gestures and movements made with the entire body (head, arms, hands, torso, and legs). Although the face is part of the body, bodily expressions are considered to be a different way of emotional expression (de Gelder, 2009; Peelen & Downing, 2007). Like facial expressions, bodily expressions are also significant cues for social behavior, and processing them is essential to inferring others' internal states. Despite this, bodily expressions have never occupied a central role in emotion recognition studies and have been relegated in comparison with facial expressions, which have always prompted greater interest (de Gelder, 2016).

Studies with healthy participants have shown that it is possible to identify emotions from bodily expressions alone, without facial information (Abramson et al., 2017; Atkinson et al., 2004, 2007; Aviezer et al., 2012; de Gelder & Van den Stock, 2011; Lopez et al., 2017; Martinez et al., 2016; Roether et al., 2008; Van den Stock et al., 2007). For adult patients with neurological pathologies, difficulties in recognizing bodily expressions have been reported in people with autism spectrum disorder (Atkinson, 2009; Leiva et al., 2019), behavioral variant frontotemporal dementia (Van den Stock et al., 2015), multiple sclerosis (Cecchetto et al., 2014), Huntington's disease (Zarotti et al., 2019), and even in patients with schizophrenia (Vaskinn et al., 2016). But research with RHD patients has lagged behind studies of other groups of patients. To date, there have only been three studies of bodily emotional expressions in RHD patients, which described cases with and without impairments (Benowitz et al., 1983; Heberlein et al., 2004; Sprengelmeyer et al., 2010). One of these showed that patients who had difficulties with bodily expressions also showed deficits with facial expressions (Benowitz et al., 1983), while another reported deficits in facial expression recognition with conservation of bodily expression recognition (Sprengelmeyer et al., 2010). Finally, Heberlein et al. (2004) evaluated the performance of patients with focal lesions in the right hemisphere, the left hemisphere, and bilateral lesions with bodily expressions of basic emotions. They found that almost half of the RHD patients presented deficits in bodily expression recognition, while that proportion was much lower in those with left hemisphere or bilateral damage.

One aspect worth highlighting is that the three studies mentioned above that analyzed RHD patients' performance with bodily expressions used different stimuli for facial and bodily expressions: some included movement and other static images. Several studies argued that stimuli using movements are more ecological and both bodily and facial expressions are recognized with greater precision when presented in a dynamic format rather than when recognized using photos (Atkinson et al., 2004; Calvo et al., 2016; Pollux et al., 2019; Recio et al., 2011; Visch et al., 2014). Evaluating emotion recognition using dynamic facial and bodily stimuli is thus significant.

Furthermore, studies of bodily expression recognition have included basic emotions but not complex ones. The latter types of emotional expression are displayed during interactions with other people, they are essentially social, and processing them is vital to proper social adjustment (Adolphs et al., 2002; Lamm & Singer, 2010). Although recognizing complex emotions implies high-level cognitive processes such as the theory of mind (ToM), it also involves the ability to recognize emotions (Mitchell & Phillips, 2015). This points to the need for studies of emotional processing in RHD patients to include both facial and bodily expressions of both basic and complex emotions rather than limiting themselves to just one of these.

Given that studies on bodily expression recognition in RHD patients are scarce and that the relationship between this skill and the recognition of facial expressions of various types of emotions is unknown, in this study we analyze the performance of a group of RHD patients at recognizing dynamic expressions of basic and complex emotions in comparison with a healthy control group. We also analyzed the presence of correlations between performance with bodily and facial stimuli to ascertain whether there is an association between these.

Method

Participants

The patient sample was selected using intentional nonprobabilistic convenience sampling in which potential participants were identified from the Neuropsychology Unit of the Hospital Interzonal General de Agudos Eva Perón in Buenos Aires, Argentina.

A total of 34 people took part: 17 RHD patients and 17 control participants. The mean age of the RHD group was 54.5 (SD = 14.4), with a range of 27–69 years, and the mean number of years in school was 9.7 (SD = 3.7), with a range of 4–17 years of formal schooling. The brain damage in most of the RHD patients was caused by a stroke (14/17), followed by traumatic brain injury (2/17), and a single case in which the origin was infectious (herpes encephalitis). The mean evolution time for the pathology was 28.5 months (SD = 30.8), with a range of 6–99 months. Table 1 lists the characteristics of the patients who were evaluated. The final size of the patient sample (n = 17) was similar to other studies on emotion recognition among RHD patients, the mean for which is 16 (SD = 7) participating patients (median n = 14; minimum n = 8; maximum n = 30), according to the meta-analysis of Adams et al. (2019).

The control group consisted of 17 participants without neurological and/or psychiatric pathologies. The mean age was 53.2 years (SD = 14.8), with a range of 25–72 years, and the mean number of years in school was 11.4 (SD = 4.0), with a range of 5–18 years of formal schooling. There were no significant differences between the ages of the RHD group and the control group (t = −0.270, df = 32, p = .790) or their schooling (t = 1.290, df = 32, p = .210). Distributing the groups by gender did not prove necessary as the tests used were not affected by this (Leiva, 2017).

The criteria for inclusion in the RHD group were: (a) a brain lesion located exclusively in the right hemisphere as documented by a computed tomography scan or magnetic resonance imaging and caused by an acquired neurological pathology; (b) a minimum age of 18 years at the time the brain damage occurred; (c) for patients over 65 years of age, having a score within the normal ranges at the Mini–Mental State Examination according to the normative data for Buenos Aires

Table 1

Demographic and Neurological Data on Patients With Right Hemisphere Lesions

Patient	Gender	Age	Education[a]	Type of brain injury	Chronicity[b]
1	Male	27	9	Traumatic brain injury	56
2	Male	61	6	Hemorrhagic stroke	6
3	Male	59	16	Hemorrhagic stroke	6
4	Male	62	9	Ischemic stroke	7
5	Female	62	7	Hemorrhagic stroke	20
6	Female	67	7	Ischemic stroke	8
7	Female	68	12	Ischemic stroke	98
8	Female	27	14	Herpes encephalitis	27
9	Male	34	12	Traumatic brain injury	48
10	Male	69	4	Hemorrhagic stroke	99
11	Male	52	12	Ischemic stroke	25
12	Male	40	7	Hemorrhagic stroke	7
13	Male	64	7	Hemorrhagic stroke	8
14	Male	62	8	Ischemic stroke	6
15	Male	44	11	Hemorrhagic stroke	6
16	Female	64	7	Hemorrhagic stroke	43
17	Male	65	17	Hemorrhagic stroke	15

[a] Level of education is expressed in years of formal scooling. [b] Chronicity = number of months since injury.

(Butman et al., 2001); (d) at least 6 months having passed since the patient acquired the neurological pathology; (e) no visuospatial hemineglect; (f) absence of elementary visual deficits (uncompensated loss of vision); (g) right handedness and adequate mobility of the right hand; (h) native Spanish speaker; (i) literacy. For the pathology-free control group, healthy participants of a similar age and with a similar number of years of schooling to the patients who met criteria (f)–(i) were considered.

Instruments

Facial and Bodily Expression Recognition Battery (REFyC by Its Acronym in Spanish; Leiva, 2017)

The battery is made up of five tests that use video stimuli (each approximately 5 s long) and aims to evaluate recognition of facial and bodily emotional expressions of basic and complex emotions through dynamic stimuli. It also includes a nonemotional control task for recognizing instrumental and locomotor movement. It was validated for the Argentinian population and has sufficient internal consistency indicators and a Cronbach's α of .894 for all the emotional tests. It also has solid convergent validity indicators: There were significant associations between the emotional tasks and various emotional tests that have a long history of use in neuropsychology (Leiva, 2017).

The five tests in the REFyC battery are:

1. *Facial expressions of basic emotions*: 28 videos of facial expressions of fear, happiness, surprise, disgust, sadness, anger, and one neutral expression.
2. *Facial expressions of complex emotions*: 24 videos of facial expressions of admiration, arrogance, compassion, flirtation, contempt, and embarrassment.
3. *Bodily expressions of basic emotions*: 28 videos of bodily expressions of fear, happiness, surprise, disgust, sadness, anger, and one neutral expression.
4. *Bodily expressions of complex emotions*: 24 videos of bodily expressions of admiration, arrogance, jealousy, compassion, flirtation, contempt, gratitude, and embarrassment.
5. *Nonemotional bodily movements*: 18 videos of instrumental movements (e.g., hammering) and locomotor movements (e.g., running).

In the four emotional tests, the participants observed videos of expressions that were presented on a computer screen (Figure 1). After each video was shown, the participants were asked "What is that person feeling?" and were asked to choose from six written options that appeared on the same screen at the end of each video. The options for all the emotional tests were made up of the correct emotion, three distractor emotions from the same group as the test emotion (i.e., either basic or complex emotions), "neutral," and "other." For the nonemotional bodily movement task, the procedure for presenting the stimuli was similar and participants were asked "What movement is that person performing?" They were then told to select the answer they considered to be correct from a list of six options that were shown on the screen, including the correct option, four distractor movements, and "other."

There was no time limit for responding to any of the tests and the videos were repeated once if the participants requested this. The score for each of the tests in the battery was calculated separately and one point was assigned for each correct answer for each case.

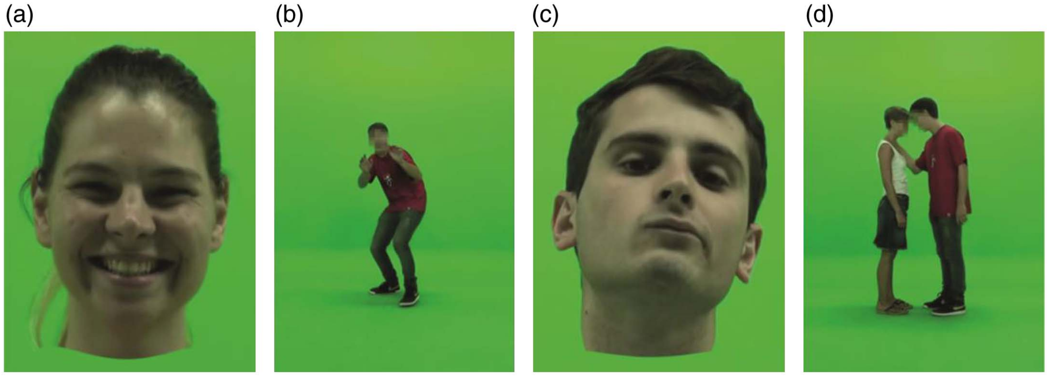
Facial Perception

An experimental task was used to evaluate nonemotional facial perception. This was a visual matching task containing 30 items in which participants are shown a photograph of a face without an emotional expression in the top half of the computer screen and three faces below this, only one of which is the same as the one at the top. Participants were told that their task would be to point out which of the three faces at the bottom of the screen was the same as the one at the top. The faces were neutral expression photographs from *Pictures of Facial Affect* (Ekman & Friesen, 1976) that had been edited to hide extrafacial features (hair and neck). The percentage of correct answers was calculated to obtain the score.

Procedure

The procedure for this research was approved by the Research Committee and the Bioethics

Figure 1
Screen Capture Examples of the Emotional Tests



Note. (a) Facial expressions of basic emotions (happiness); (b) bodily expressions of basic emotions (fear); (c) facial expressions of complex emotions (arrogance); and (d) bodily expressions of complex emotions (flirtation).

Committee at the Hospital Interzonal General de Agudos Eva Perón in Buenos Aires, Argentina. All participants signed an informed voluntary consent form before being evaluated, as per the Helsinki Declaration, and their anonymity was maintained throughout the process. After the participants had signed the informed consent form, they were evaluated individually over one or two sessions that lasted a maximum of 45 min each.

Data Analysis

For each test, the percentage of correct answers was calculated for each participant by dividing the number of correct answers by the total number of items in the task. Descriptive statistics were calculated for each test and the differences in the performances of patients and control participants at the four emotional tests were analyzed using Student's t-test for independent samples. Cohen's d was calculated to analyze the effect size of these comparisons. Since the nonemotional bodily movement and facial perception tests had a non-normal distribution and the variance between the groups was not homogeneous, the Mann–Whitney U test was used to compare the difference between the groups, and the Probability-of-Superiority (PS) index was used as an indicator of effect size. To minimize the effect of multiple comparisons of the statistical tests used, the p value was adjusted to make it consistent for all six comparisons (Bonferroni correction). Finally, the association between the four emotional tests was analyzed using the Pearson correlation.

Results

Performance of the RHD Patients and the Control Group

Table 2 contains the descriptive statistics for the six tests that were given to patients and controls.

The percentage of correct answers among RHD patients was lower than for the control group at all the emotional tests (Table 2)—in other words, for the recognition of bodily and facial expressions of both basic and complex emotions. While among the RHD group, the average percentage of correct answers at the emotional tests was between 55.1% and 68.5%, among the control group, these percentages ranged between 75.2% and 83.1%.

Statistical comparisons of the performances of RHD patients and the control group revealed significant differences for all emotional tests with large effect sizes (Table 3). The RHD patients performed worse than the control group at all the emotional tests (Table 2).

Furthermore, the performance of the control group was compared with that of the subgroup of patients with RHD caused solely by stroke (n = 15). Signficant differences were also observed for the four emotion recognition tests: bodily expressions of basic emotions ($t(29)$ = 3.729, adjusted p = .005), facial

Table 2
Descriptive Statistics of the Performance of RHD Patients and the Control Group at All Tests

Tests	RHD group				Control group			
	M (*SD*)	*Mdn*	Min	Max	*M* (*SD*)	*Mdn*	Min	Max
Bodily expressions of basic emotions	57.4 (14.5)	60.7	32	86	77.1 (13.7)	82.1	43	100
Facial expressions of basic emotions	68.5 (11.5)	71.4	39	89	79.6 (10.5)	78.6	61	100
Bodily expressions of complex emotions	55.1 (15.3)	54.2	29	79	75.2 (10.7)	79.2	50	88
Facial expressions of complex emotions	63.7 (13.2)	66.7	29	83	83.1 (10.5)	87.5	58	100
Nonemotional bodily movements	94.1 (5.7)	94.4	83	100	97.7 (3.4)	100.0	89	100
Facial perception	90.0 (14.1)	96.7	43	100	98.4 (2.7)	100.0	90	100

Note. RHD = right hemisphere damage; Min = minimum; Max = maximum.

expressions of basic emotions ($t(29) = 2.859$, adjusted $p = .047$), bodily expressions of complex emotions ($t(29) = 4.867$, adjusted $p < .001$), and facial expressions of complex emotions ($t(29) = 4.579$, adjusted $p < .001$).

The results did not reveal differences between the RHD group and the control group for the nonemotional bodily movements test ($U = 88.5$, $Z = -2.094$, adjusted $p = .216$, average range$_{CG}$ = 20.79 vs. average range$_{RHD\ group}$ = 14.21) or for the facial perception test ($U = 72.5$, $Z = -2.623$, adjusted $p = .054$, average range$_{CG}$ = 21.74 vs. average range$_{RHD\ group}$ = 13.26). Although the control group had a higher rate of correct answers for both nonemotional tasks (Table 2), the difference was not great enough to be statistically significant, and the effect size of the analyses showed that the difference between the RHD group and the control group was close to 0 (nonemotional bodily movements: PS = 0.31; facial perception: PS = 0.25).

Correlation Between Emotional Tests

Table 4 shows the results of the Pearson correlation between the four emotional tests. When the complete sample was analyzed, the results showed significant positive associations between all the emotional tests. However, there were positive correlations within the results for the RHD group alone for all the tests except between bodily expressions of basic emotions and facial expressions of complex emotions ($r = 417$, $p = .096$). Although the latter was not significant, the correlation trend runs in the same direction as was observed in the total sample and the other correlations within the RHD group (Table 4).

Discussion

The results of this study showed that RHD patients present impairments to the recognition of dynamic facial and bodily expressions of both basic and complex emotions. Furthermore, these impairments were found to be positively associated—that is, the worse patients performed with one type of emotional stimuli, the worse they performed with the other, and vice versa. These results complement the findings described in studies that use case study designs (Benowitz et al., 1983; Heberlein et al., 2004; Sprengelmeyer et al., 2010) and include the characterization of

Table 3
Results of the Comparison of the Percentage of Correct Answers of the RHD Group and the Control Group at the Four Emotion Recognition Tests

Emotional tests	Patients vs. control group			
	$t_{(32)}$	*p*	adjusted *p*	Cohen's *d*
Bodily expressions of basic emotions	4.074	<.001	**.002**	1.4
Facial expressions of basic emotions	2.949	.006	**.035**	1.0
Bodily expressions of complex emotions	4.433	<.001	**.001**	1.5
Facial expressions of complex emotions	4.749	<.001	**<.001**	1.6

Note. RHD = right hemisphere damage. Comparisons with $p < .05$ are marked in bold.

Table 4
Pearson Correlations Between the Four Emotional Tests for the Entire Sample and for the RHD Group

Groups	Tests	Bodily expressions of basic emotions (BEBE)	Facial expressions of basic emotions (FEBE)	Bodily expressions of complex emotions (BECE)	Facial expressions of complex emotions (FECE)
Complete simple ($N = 34$)	BEBE	1	**.784***	**.730***	**.713***
	FEBE		1	**.626***	**.754***
	BECE			1	**.806***
	FECE				1
RHD group only ($n = 17$)	BEBE	1	**.723***	**.537***	.417
	FEBE		1	**.549***	**.663****
	BECE			1	**.725***
	FECE				1

Note. RHD = right hemisphere damage.
Statistical significance levels: * $p < .05$. ** $p \le .01$. *** $p \le .001$.

the patient group. Although it was to be expected that there would be some variation within the group and that not all patients would present impairments, our results indicate that one of the characteristics that patients with RHD present is a deficit in emotion recognition from facial and bodily expressions. This impairment affects both basic and complex emotions. The data allows us to expand the characterization of emotion recognition skills, contributing to the large body of work that has already reported that RHD patients present impairments to the recognition of facial emotional expressions (Abbott et al., 2014; Adolphs et al., 2000; Blonder et al., 2012; Borod et al., 1990; Bowers et al., 1985; Charbonneau et al., 2003; Cooper et al., 2014; Etcoff, 1984; Harciarek et al., 2006; Sanz-Martín et al., 2006; Tippett et al., 2018; Yeh & Tsai, 2014) and deficits in identifying emotional prosody (Difalcis et al., 2018; Kho et al., 2008; Leiva et al., 2017; Rymarczyk & Grabowska, 2007; Wright et al., 2016, 2018).

The group study discussed here provides evidence to support the suggestion that RHD patients present impairments to social perception in response to a variety of emotional stimuli that are not restricted exclusively to facial stimuli (Adams et al., 2019; Yuvaraj et al., 2013). In this sense, given that impairments to emotion recognition are observed in response to various nonverbal cues such as facial expressions, bodily movements, and prosody, we posit that the deficit affecting these patients is unlikely to be limited to a specific type of stimuli. These impairments seem to be the manifestation of a more general emotional processing disorder. This argument is supported by our results, which showed positive associations between performance at the different emotional tests for both the entire sample and the subgroup of patients and found that patients showed no impairment to the processing of non-emotional facial and bodily stimuli. These results are thus in line with theories like the Right Hemisphere Hypothesis (Gainotti, 1969, 1972, 2019) that argue that this hemisphere plays a preponderant role in processing emotions, such that the ability to recognize emotional expressions is affected in patients with damage to this hemisphere. However, our results only allow a partial interpretation as they are biased by the methodological design we used, which only included RHD patients and not patients with left hemisphere damage. Although our data does not allow us to argue that deficits of this sort exclusively affect RHD patients, it does support the claim that they are typical of a certain proportion of these patients. Indeed, given that earlier studies described difficulties in recognizing facial expressions and prosody among patients with left hemisphere damage (Adams et al., 2019; Yuvaraj et al., 2013), it is to be expected that some of these patients would also present impairments to the recognition of bodily expressions. Consequently, the data presented here only partially supports the Right Hemisphere Hypothesis and should be corroborated and re-evaluated in future studies that use appropriate designs to this end.

One novel aspect of our work was the inclusion of stimuli using bodily expressions of complex emotions, the recognition of which was also impaired among RHD patients. Several authors have concurred that, from a cognitive perspective, the identification of basic emotions requires a different, simpler form of processing than complex emotions do (Baron-Cohen et al., 2009; Happé & Frith, 2014; Mitchell & Phillips, 2015). It has been suggested that complex emotions depend on the capacity to differentiate oneself from others and also on the ability to process others' points of view, that is, ToM (Tracy & Robins, 2004). However, there is no widespread consensus as to how emotion recognition and ToM relate to one another (e.g., Adolphs, 2010; Baron-Cohen et al., 2009; Blair, 2005). According to Mitchell and Phillips (2015), one operational way to elucidate this discussion is to distinguish the cognitive processes involved in relation to the types of tasks at which participants are assessed. The authors in question proposed that a basic emotion recognition test (e.g., observing an expression of fear and selecting the verbal label that corresponds to this) is a task that only involves the simple processing of perception and emotion recognition, whereas recognizing complex emotions requires the combined functioning of emotion recognition skills and ToM. According to their argument, identifying complex emotions based on visual cues implies not just the intervention of high-level cognitive processes (ToM) but also an interaction between emotion recognition capacities and more complex cognitive processes (Mitchell & Phillips, 2015). After analyzing our results as a whole, we were able to infer that RHD patients present impairments to the recognition of facial and bodily expressions of complex emotions due to difficulties processing the emotional component. A general failure in the processing of emotional information may be enough to explain impairments in the recognition of both facial and bodily expressions of basic and complex emotions. However, our study did not evaluate ToM in the patients included, and therefore, we cannot rule out the possibility that difficulties with this ability also contributed to their test performances.

From a clinical point of view, our results suggest that emotion recognition skills should be evaluated using a variety of stimuli, including facial, bodily, and prosodic stimuli. Several studies show that in populations in which impairments in recognizing facial emotional expressions were observed, impairments in recognizing bodily expressions were also found. In this study, we have presented data for RHD patients but similar results have been found for patients with autism spectrum disorder (Atkinson, 2009; Leiva et al., 2019; Mazzoni et al., 2020), behavioral variant frontotemporal dementia (Van den Stock et al., 2015), multiple sclerosis (Cecchetto et al., 2014), and schizophrenia (Vaskinn et al., 2016). The evaluation of emotion recognition using different types of stimuli seeks to achieve a richer, more ecological description of the multiple aspects of an ability that is fundamental to achieving efficient social interactions (Adolphs, 2010; McDonald, 2013). Additionally, it also allows us to identify areas of strength and/or weakness that may help health professionals select treatment objectives and better therapeutic interventions. For example, the recent study by O'Connell et al. (2021) showed that impairments to recognizing emotion in patients with right hemisphere lesions are associated with poorer social well-being, particularly withdrawal from social activities and decreased social support. This is why treatments that focus on emotion recognition skills are potentially promising when it comes to improving the social lives of patients following brain lesions. If RHD patients present impairments to the recognition of a variety of social cues that include but are not limited to facial expressions, as our results suggest, treatments that contemplate a variety of emotional expressions may play powerful role in cognitive rehabilitation. This is why future studies should examine how useful bodily expressions are in the neurorehabilitation of emotion recognition skills.

This study is not without its limitations. The sample of RHD patients we analyzed was heterogeneous as it was made up of participants with lesions in different regions of the right hemisphere. Although this was not the objective of this study, it would be important to analyze in future research which areas of the right hemisphere are associated with the impairments to emotion recognition that we have described here. Although the selected sample of participants share the criterion of having suffered damage to the right hemisphere alone, which means that the results can be extrapolated to others with similar characteristics, the differences within this group depending on the location of their lesions were not analyzed.

Conclusions

In this study, we showed that impairments to emotion recognition in RHD patients are not limited to facial expressions but also affect bodily expressions of different types of emotions. We found that RHD patients have difficulties in recognizing dynamic facial and bodily expressions of both basic and complex emotions. Our results underscore the importance of extending characterizations of patients' emotion recognition skills beyond facial expressions to encompass the variety of emotional stimuli that are present in everyday life.

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