Relative Stability of Alexithymia and Openness to Emotions in one Psychiatric Day Hospital Setting

Jean-Marc Triffaux [12*], Julian Nasello [13], Olivier Luminet [4], Catherine Servais [1], Mireille Close [1], Etienne Quertemont [3], Adélaïde Blavier [3]

1 Day Psychiatric Hospital « La Clé », Psychosomatic Medicine and Group Psychotherapy.
2 Department of Medical Psychology, University of Liège, CHU of Liège,
3 Department of Psychology, University of Liège,
4 Research Institute for Psychological Sciences, UCLouvain and Belgian Fund for Scientific Research (FRS-FNRS).

* email address: jmtriffaux@uliege.be; phone number: 00324 342 65 96.

Abstract

Alexithymia (literally, difficulty finding words for emotions) and Openness to Emotions (OE: referring to the cognitive representation, communication, regulation, perception of internal and external bodily sensations, and social restriction of emotions) are strongly linked to psychopathology. The absolute and relative stability hypotheses were tested in order to determine whether significant changes occurred on these constructs after therapy, a condition where changes were expected for both constructs. Negative attitudes toward treatment (NTI) and perceived social support (PSS) were expected to significantly predict alexithymia and OE.

Patients (*N*=179) who participated in this longitudinal study filled-in the Toronto Alexithymia Scale (TAS-20), the Dimensions of Openness to Emotions scale, the NTI subscale, the Multidimensional Scale of Perceived Social Support and the Social Desirability scale.

After treatment, we observed significant decrease of all alexithymia scores and significant increases of three OE scores, that is, cognitive representation, communication, and regulation of emotions. Regression analyses revealed that gender, age, NTI, and PSS were significant predictors of alexithymia and OE. NTI strongly predicted lower OE levels and higher alexithymia levels, whereas PSS had opposite predicting effects on these constructs.

In conclusion, the significant changes, and the moderate to high correlational levels observed between *before* and *after* alexithymia and OE scores, strengthen the relative stability hypothesis for both constructs. In addition, PSS represents a protective factor and NTI a vulnerability indicator for therapists. Our aim is to optimize treatment by providing therapists treating emotion difficulties a more concrete array of variables that potentially either promote or subvert recovery.

Keywords: Alexithymia; Openness to Emotions; Relative Stability; Negative Attitudes toward Treatment; Perceived Social Support; Psychiatric Day Hospital.

Key Practitioner Messages

- After their psychiatric day hospital treatment, patients presented significant decreases in alexithymia scores and significant increases in scores on the openness to emotions dimensions (i.e., cognitive representation, communication, and regulation of emotions).
- After treatment, changes in alexithymia and OE were substantial, which is encouraging for therapists. These results highlight that alexithymia and openness to emotions are relatively, but not absolutely stable.
- Negative attitudes toward treatment strongly predicted higher alexithymia levels and lower openness to emotions abilities. However, perceived social support appeared as a protective factor because it significantly predicted lower alexithymia and higher OE levels.

1. Introduction

Alexithymia is considered to be a personality construct and has been defined as a difficulty finding words to describe emotions (Nemiah and Sifneos, 1970; Sifneos, 1973; Bagby, Parker, and Taylor, 1994a). The term is derived from Greek *a-,* the alpha privative; *-lexis-* for word/speech; and *-thymos-* for mood or emotion (Nemiah and Sifneos, 1970). Alexithymia is divided into three main components (Bagby et al., 1994a): difficulty identifying feelings; difficulty describing feelings; and an externally-oriented way of thinking (an impoverished inner fantasy life). Given the specific approach of alexithymia, Reicherts and colleagues (Reicherts, 2007a; Reicherts, 2007b; Reicherts, Genoud, & Zimmermann, 2012) have developed a complementary construct: The Openness to Emotions (OE) Model. This model encompasses six dimensions: the "*cognitive-conceptual representation of emotions*", the "*communication of emotions*", the "*regulation of emotions*", the "*perception of internal and external bodily indicators of emotions*" and the "*normative restrictions of emotions*". Therefore, the OE model involves cognitive-experiential, social-communicative, and somatic levels of processing (Reicherts, 2007b).

Since the third wave of psychotherapy interventions, the impacts of emotional process on psychological distress have been well established. In therapy, alexithymia and decreased abilities in OE are known to be psychological comorbidities of several psychopathologies. Alexithymia was reported to be related to depression (Honkalampi, Hintikka, Tanskanen, Lehtonen, and Viinamäki, 2000; Beblo et al., 2012; see a meta-analysis: Li, Zhang, Guo, et

al., 2015); to anxiety disorders (panic disorders: Izci, Gultekin, Saglam, et al., 2014; social anxiety disorders: Dalbudak, Evren, Aldemir, et al., 2013); to attention deficit hyperactivity disorders (Edel, Rudel, Hubert, et al., 2010); and to Borderline personality disorders (Taylor, Bagby, Parker; 1997). Alexithymia is also associated with a higher risk of death from several causes (e.g., accidents, injury, or violence: Kauhanen, Kaplan, Cohen, et al., 1996), with interpersonal problems (Zarei and Besharat, 2012), and with a non-assertive social functioning (Vanheule, Desmet, Meganck, & Bogaerts, 2007). It has been recognized that OE is linked to eating disorders (Perroud, Reicherts, & Guerry, 2004), obesity (Di Monte, Renzi, Paone, Silecchia, Solano, & Di Trani, 2020), hypertension (Di Trani, Mariani, Renzi, Greenman, & Solano, 2018), Type 2 diabetes (Lai, Filippetti, Schifano, Aceto, Tomai, Lai, Pierro, Renzi, Carnovale, & Maranghi, 2019), dependency and personality disorders (Reicherts, Casellini, Duc et al., 2004; Reicherts, Casellini, Duc, & Genoud, 2007), phobias (Reicherts, Rossier, & Rossier, 2012), burnout (Genoud, & Reicherts, 2012), and gambling behaviours (Reicherts, 2007b; Di Trani, Renzi, Vari, Zavattini, and Solano, 2017).

Alexithymia and OE are considered to be personality traits. Recently, a growing body of evidence showed that alexithymia is a dimensional construct (Keefer et al., 2019; Parker, et al., 2008) that should be analysed as a continuous factor. As observed by Honkalampi et al. (2018), several studies on alexithymia have not adequately distinguished between absolute and relative stability, and we can infer that the same issue may be found in other personality construct studies. More than twenty years ago, some authors (Santor, Bagby, & Joffe, 1997; Roberts and DelVecchio, 2000; Luminet, Bagby, and Taylor, 2001) have proposed a distinction between two aspects of stability: relative stability (i.e., "*the extent to which the relative differences among individuals remain the same over time*" (Luminet et al., 2001, p. 255)) and absolute stability (i.e., "*the extent to which personality scores change over time*" (Luminet et al., 2001, p. 255)). Different statistical analyses are appropriate to test the two aspects of stability (e.g., Mikolajczak and Luminet, 2006). In this study, we explored the relative stability hypothesis by using the "correlation-level" technique (i.e., Pearson's correlations and Linear regression analyses performed on *before* versus *after* scores), and the absolute stability hypothesis, by using the "mean-level" technique (*t-paired tests* performed on *before* versus *after* scores) within a clinical population. This distinction between absolute and relative stability is important because it gives to professionals a better understanding of clinical outcomes. If absolute stability is achieved, we can consider that alexithymia and OE are deeply anchored traits, not-modulable by therapy. However, if relative stability is demonstrated then modifications of alexithymia and OE scores are possible, although within a certain magnitude. In that case, both alexithymia and OE can be considered as dynamical traits, modulable by therapy.

Studying the changes in alexithymia and OE in the therapy context is crucial. The outcomes are highly important for patients in order to find adequate parameters that will reduce their psychological distress. They are also important for the professionals who need to work with patients on the main factors that could improve their emotional skills. In this study, we followed patients from the beginning to the end of their support in a psychiatric day hospital "La Clé" (Belgium). A psychiatric day hospital is a structure that offers group psychotherapy activities while also providing an alternative to both full-time hospitalization and individual therapy. Patients spend the day participating in various group workshops focused on specific objectives (e.g., conflict management, emotional expression, emotional regulation, mindfulness therapy, etc.). The program ran from Monday to Friday, from 8:30 to 16:00. Every Monday, patients were asked to set up their weekly schedule. They all received a common core of activities and had to set up their weekly schedule (among various proposed activities) according to their therapeutic objectives. Each activity lasted between 90 to 120 minutes, and each patient participated in either three or four activities per day. Following this framework of support, we expected that psychiatric day hospital treatment would have benefits for patients by decreasing their alexithymia levels and by increasing OE levels (especially on representation, communication and regulation of emotions). Along these same lines, some authors have already shown that multimodal psychotherapy significantly decreased scores of alexithymia (Stingl et al., 2008; Spek, Nyklíček, Cuijpers, & Pop, 2008; Beresnevaite, 2000; Grabe et al., 2008; Subic-Wrana, Bruder, Thomas, Lane, Köhle, 2005; Cameron, Ogrodniczuk, and Hadjipavlou, 2014) and increased scores of OE (Reicherts, 2007b). Reicherts (2007b) showed that among the OE dimensions, representation, communication and regulation of emotions displayed significant improvements after therapy.

1.1 Alexithymia and OE *after* treatment

Determining significant predictors of alexithymia and OE is crucial for therapists. It gives them the opportunity to detect concrete factors that could either promote or interfere with the improvement of emotional skills. In this study, we aimed to describe whether demographic variables (i.e., gender, age and stay duration), and specific factors, such as Perceived Social Support (PSS) and attitudes toward treatment, significantly predict scores of alexithymia and OE *after* treatment.

With respect to demographic variables, the scientific literature has largely documented gender influences in alexithymia. Generally, men are known to present higher levels of alexithymia (Luminet, Cordovil de Sousa Uva, Fantini, & de Timary, 2016; Levant, Hall, Williams, & Hasan, 2009; especially for the externally-oriented way of thinking dimension: Larsen, Van Strien, Eisinga, & Engels, 2006; Moriguchi et al., 2007) and women tend to have higher levels of difficulty identifying feelings (Moriguchi et al., 2007). For OE, Reicherts (2007b) reported that

women present higher abilities in communicating emotions, and men present better skills in regulating emotions. Age has been reported to be negatively related to alexithymia scores, at least for the difficulties to identify and discuss about feelings dimensions (Moriguchi et al., 2007) and COMEMO (Reicherts, 2007b); whereas, on the other hand, the externally-oriented way of thinking increased with age (Moriguchi et al., 2007). Lastly, researchers have not yet reported significant influences of the duration of the treatment on alexithymia (Stingl et al., 2008).

As mentioned above, special focus was given to PSS as the literature has reported a causal role of PSS on wellbeing (Cohen and Syme, 1985; Kessler and McLeod, 1985) by acting as a coping resource (Zimet, Dahlem, Zimet, & Farley, 1988). Several authors proposed models that situated perceived social support as a "buffer" from stressful events or as a factor that acts directly on these stressful events (Zimet et al., 1988; Cohen and Wills, 1985; Cohen, 1992; Cohen and McKay, 1984). Thoits (1986) suggested that PSS represents a "coping assistance" and stops or reduces the impacts of stressful situations as it helps to change the situation itself, by modifying the meaning of the situation, and/or by altering the individual's emotional response associated with the stressor events. Based on these models, we assume that PSS could have significant positive effects on emotional skills. With respect to this, some authors have already found significant impacts of PSS on difficulties associated with alexithymia (Lumley, Ovies, Stettner, Wehmer, & Lakey, 1996) and OE (mainly communication of emotions: Leroy, Delelis, Nandrino, & Christophe, 2014).

In order to determine whether psychiatric day hospital treatment has beneficial indirect effects on alexithymia and OE for patients, we needed to consider the attitude toward treatment. For example, Vogel and colleagues (2008) showed that emotional disclosure is linked to willingness to seek therapy for psychological distress. Furthermore, to illustrate the importance of this aspect, other authors have found a significant and positive correlation between the attitude toward treatment and alexithymia (Delbrouck, 2013). This means that having negative attitudes toward treatment (e.g., patients believing that no one can help them, presenting a high propensity to drop out of their support program, or having negative attitudes toward therapists) predicts higher alexithymia levels.

In summary, we expect to observe significant reductions in alexithymia and significant improvements in OE after psychiatric day hospital treatment. We expect these significant changes especially because the clinical setting, in general, invited patients to verbalize their difficulties, to identify their emotional states and to find new strategies for regulating them. In addition, some specific activities were provided on a regular basis that focused on the improvement of these abilities. Absolute stability will be tested through mean changes (i.e., M/ANOVA) and relative stability will be tested through Pearson's correlations and regression analyses. We then expect that in multiple regression analyses we will find significant predictions of gender on difficulty identifying feelings (DIF) and the externally-oriented way of thinking (EOT); of age (negatively) on DIF, difficulty describing feelings and

communication of emotions (COMEMO), and (positively) on EOT; of PSS (negatively) on all alexithymia dimensions and (positively) on COMEMO; of NTI (positively) on alexithymia and (negatively) on OE.

2. Methods

2.1. General sample

In this longitudinal experimental design, one hundred and seventy-nine patients (n_{women}=100; n_{men}=79; M_{age}=41.1; SD_{age}=11.5) were initially recruited, on a voluntary basis, starting on their first day of hospitalization. Those who accepted to participate were asked to complete a battery of questionnaires when they started their psychiatric day hospital treatment. The battery of questionnaires was composed of: 1) a demographic questionnaire (age and gender); 2) the Toronto Alexithymia Scale (TAS-20: Bagby et al., 1994a); 3) the Dimensions of Openness to Emotions (DOE-36: Reicherts 2007b); the Multidimensional Scale of Perceived Social Support (MSPSS: Zimet et al., 1988, French adaptation: Denis, Callahan, and Bouvard, 2015); the Negative Treatment Indicators (NTI) subscale from the MMPI-2 (Hathaway et al., 1989) assessing negative attitudes toward treatment; and the 13-item Short Form of the Marlowe-Crowne Social Desirability Scale (MCSD: Ballard, 1992). At another time they completed the TAS-20, the DOE-36, the MSPSS, and the MCSD when their support ended. Within this sample of participants, patients were diagnosed as suffering from the following: mood disorders (n=88); adjustment disorders (n=46); anxiety disorders (n=25); addiction disorders (n=20). Psychiatric diagnoses were given by psychiatrist experts from the psychiatric day hospital based on criteria from the DSM-IV R and semi-structured interviews. At their entrance into the treatment program, their average scores from the Global Assessment Functioning (GAF) Scale (from the *Diagnostic and Statistical Manual of Mental Disorders, fourth version, Text Revision*: DSM-IV-TR; APA, 2000) corresponded to moderate symptoms or moderate difficulties in social, occupational, or school functioning (see Supplementary Materials, Table A). Participants were willing to take part in the psychiatric day hospital treatment, and the stay duration was decided by mutual agreement between the patient and the team members (M = 49.9 days; SD = 19.2; this means that the treatment lasted around 50 days on average). The stay duration mainly depended on the accomplishment of the initial objectives of treatment, which was influenced by factors such as the speed of the patient's progress, motivation, etc. In summary, when the program started, the participant was asked to complete the full battery of questionnaires. S/he then took part in the socio-therapeutic activities, and when the treatment ended s/he retook the four questionnaires (i.e., TAS-20; DOE-36; MSPSS; and MCSD).

2.2. Measurements

Alexithymia. The 20-item Toronto alexithymia questionnaire (TAS-20, Bagby et al., 1994a) assesses alexithymia and contains twenty items that refer to three dimensions (French version: Loas, Fremaux, & Marchand, 1985): difficulty identifying feelings (DIF: seven items, "*when I am upset, I don't know if I am sad, frightened, or angry*"); difficulty describing feelings (DDF: five items, "*I find it hard to describe how I feel about people*"); and an externally-oriented way of thinking (EOT: eight items, "*I prefer talking to people about their daily activities rather than their feelings*"). Five items are negatively keyed. This scale is a self-reported measure with a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree). Many studies have shown good internal consistency and test-retest reliability (Bagby et al., 1994a; Bagby, Taylor, and Parker, 1994b).

Dimensions of Openness to Emotions. The "Dimensions of Openness to Emotions" questionnaire (DOE-36) consists in 36 items that refer to six dimensions (Reicherts 2007b; Reicherts et al., 2012; Reicherts, Genoud, & Zimmermann, 2012): 1) the "*cognitive-conceptual representation of emotions*" (REPCOG: seven items, "*I can easily distinguish between the different ways I am feeling*"), which is made up of monitoring processes focused on the ability to differentiate feelings and corporal sensations; 2) the "*communication of emotions*" (COMEMO: seven items, "*I willingly share my feelings with other people, ever uncomfortable ones*") is based on the processes of emotional expression (i.e., verbal aspects, facial expression, prosody and corporal movements) and involves conscious and intentional aspects of communicating feelings; 3) the "*regulation of emotions*" (REGEMO: six items, "*I manage to calm my feelings even in difficult situations*") represents the regulation of affective states, mood or emotions, and as it is very close to coping models, it has a monitoring function that aims to reduce, stabilize or increase an emotional state; 4 & 5) the "*perception of internal and external bodily indicators of emotions*" (PERINT: four items, "*My strong feelings are accompanied by internal bodily reactions*", and PEREXT: seven items, "*People can read my internal state on my face"*). They refer to somatic sensations linked to emotions or affective states leading to a conscious state (or a perception) of internal (e.g., psycho-physiological and psychomotor indicators of emotional states: an increase or a decrease in cardiac activity; temperature; or gastro-intestinal responses) or external signals (e.g., motor activities involved in preparation for action: facial or vocal expressions, gesture and posture, or muscular activity); 6) the "*normative restrictions of emotions*" (RESNOR: five items, "*I would like feelings to expressed more easily in our society*") refers to social restrictions of affectivity. It describes the individual's sensitivity toward rules and conventions, and their impact on the environment. Participants are asked to respond to each item on a five-point Likert scale, ranging from 0 (not at all) to 4 (extremely). A mean is calculated for each OE dimension. Moderate to good levels of reliability and acceptable stability over a 12-month period were observed (Reicherts, 2007b).

Participant's negative attitudes toward treatment. Participant's negative attitudes toward treatment was assessed through a 26-item subscale of the MMPI-2 (Hathaway et al., 1989): The Negative Treatment Indicators (NTI). People with higher NTI scores believes that no one can help them, and they think that their problems could not be confided to someone. They present negative attitudes toward therapists, a high reluctance to change, and a higher propensity to drop out of their support plan (e.g., "*I hate going to doctors, even when I'm sick*", "*It makes me nervous when people ask me personal questions*"). MMPI-2 (and the NTI subscale) presents good validity and reliability (Hathaway and McKinley, 1996). We measured the NTI levels of participants *before* their psychiatric day hospital treatment.

Perceived social support. The perceived social support (PSS) scale is a 12-item questionnaire (Zimet et al., 1988; French version: Denis et al., 2015) consisting of seven-point Likert scales, ranging from 1 (completely disagree) to 7 (strongly agree).

Social desirability. Social desirability was measured with the 13-item Short Form of the Marlowe-Crowne Social Desirability scale (MCSD: Ballard, 1992). This short version assesses "the tendency of individuals to make themselves look good according to current cultural norms". (Mick, 1996, p106) The short version presents acceptable internal reliability (Reynolds, 1982; French version: Verardi et al., 2009).

Medication. Medication of our participants was taken into account according to four measures referring to drug supra-categories (i.e., antidepressants [AD]; benzodiazepines [BZ]; antipsychotics [AP]; and drugs with anticholinergic effects [AC]). All drugs taken were converted into a referring standard: 1) AD drugs were converted to a fluoxetine standard, represented in mg (*see method in:* Hayasaka et al., 2015); 2) standard diazepam equivalence (in mg) was used to convert all BZ drugs (*see method in:* Taylor, Paton, & Kapur, 2009); 3) AP drugs were converted into olanzapine equivalence (expressed in mg), considered as an AP standard (Davis and Chen, 2004; Gardner, Murphy, O'Donnell, Centorrino, & Baldessarini, 2010); 4) AC effects were measured according to four levels (Boily and Mallet 2008), from 0 (no potential AC effect) to 3 (high AC effects). In summary, for each patient, all drugs taken were referenced then converted according to the standard of the category for that drug (except for drugs with AC effects that were rated according to four levels). A simple addition was then run on all converted scores, giving four main drug scores for each participant.

2.3. Statistical methods

To test the absolute stability hypothesis, we performed M/ANOVAs with repeated measures on alexithymia and OE to show whether significant changes occurred between *before* and *after* psychiatric day hospital treatment. To test

the relative stability hypothesis, Pearson's correlations were run to identify the significant links between *before* versus *after* scores of each dimension of alexithymia and OE.

Hierarchical regression analyses were performed in order to determine the added percentage of variance of each bloc of variables. All the variables were introduced to predict *after* scores of alexithymia and OE dimensions (i.e., scores at the end of the treatment). We divided the analyses into three steps: 1) the "controlled" variables (i.e., social desirability *after* scores and the medication variables (i.e., AD; BZ; AP; AC)); 2) the demographical variables (i.e., gender [coded "0" for women and "1" for men], age, and number of days in treatment (NDT)); and 3) the predictors of interest (i.e., NTI (*before* treatment scores); changes in perceived social support (i.e., *after* minus *before* scores of PSS); and *before* scores of each dimension). Note that all variables were standardized, and all statistical analyses were run using SPSS version 24 (IBM Corp. Released, 2016).

3. Results

Before our targeted analyses, the following investigations were run. An ANOVA was performed in order to determine whether the Global Assessment of Functioning (GAF) scores changed between before and after treatment, with diagnosis as an independent variable (see Supplementary Materials, Tables A & B). We found that GAF significantly increased over time ($F_{(1,172)}$ = 260.7; p < .001), but we did not find a significant interaction between time and diagnosis ($F_{(1,172)}$ = 1.13; p = .339). This significant increase means that, according to the DSM-IV-TR (p.32), at the end of their support plan, participants presented only some mild symptoms or some difficulties in social, occupational, or school functioning. They were generally considered to be functioning pretty well, and they had some meaningful interpersonal relationships. Before their treatment, on average, they were considered as presenting moderate symptoms or difficulties.

We also have pretested whether the significant changes in alexithymia and OE (before and after treatment) differed significantly according to patients' diagnoses, but we did not find any significant effect (see Supplementary Materials, Tables C & D). Therefore, the variable 'Diagnosis' was not integrated in the targeted analyses (M/ANOVAs & hierarchical regression analyses).

3.1 Changes in Alexithymia and OE scores

Alexithymia total scores (see Tables 1 & 2): a significant decrease was found from *before* to *after* psychiatric day hospital treatment for total scores of alexithymia ($F_{(1,178)}$ = 89.6; p < .05). **Alexithymia dimensions** (see Tables 1 &

2): two significant main effects were found for Time (*Wilk* = .969; $F_{(1,176)}$ = 5.54; p < .05) and Dimensions[1] (*Wilk* = .739; $F_{(2,175)}$ = 30.9; p < .001), and a significant interaction between Time and Dimensions (*Wilk* = .958; $F_{(2,175)}$ = 3.86; p < .05). LSD *post-hoc* tests showed that DIF, DDF and EOT presented significant decreases over time (p < .001). **Openness to emotions dimensions** (see Tables 1 & 2): two significant main effects were found for Time (*Wilk* = .927; $F_{(1,176)}$ = 14; p < .001) and Dimensions (*Wilk* = .783; $F_{(5,172)}$ = 9.51; p < .001). No significant interaction effect was found between Time and Dimensions (*Wilk* = .946; $F_{(5,172)}$ = 1.95; p = .09). However, LSD *post-hoc* tests revealed that REPCOG, COMEMO, and REGEMO presented significant improvements over time (p < .001). No significant differences were found between *before* versus *after* scores for PERINT (p = .248), PEREXT (p = .545), and RESNOR (p = .403).

[TABLE 1 HERE]

[TABLE 2 HERE]

Pearson's correlations between *before* and *after* scores of alexithymia and OE (see Supplementary Materials, Table E) revealed significant links between the following: Total scores of alexithymia *before* & *after* (r = .49; p < .005); DIF *before* & *after* (r = .45; p < .001); DDF *before* & *after* (r = .51; p < .001); EOT *before* & *after* (r = .55; p < .001); REPCOG *before* & *after* (r = .50; p < .001); COMEMO *before* & *after* (r = .43; p < .001); REGEMO *before* & *after* (r = .36; p < .001); PERINT *before* & *after* (r = .40; p < .001); PEREXT *before* & *after* (r = .39; p < .001); and RESNOR *before* & *after* (r = .40; p < .001).

3.2 Hierarchical regression analyses of *after* treatment scores for alexithymia and OE

We found that NTI was a significant and positive predictor of all alexithymia dimensions (*after* treatment scores), and ProgPSS a significant negative one (see Table 3). This means that higher levels of NTI predict higher alexithymia scores. Furthermore, the increase in perceived social support (between *before* and *after* psychiatric day treatment) significantly predicted decrease in alexithymia scores. Moreover, all *before* scores of each alexithymia dimension significantly and positively predicted *after* scores, which is indicating that despite all the other predictors, initial alexithymia scores are important predictors of *after* treatment scores. Lastly, age was found to positively and significantly predicted EOT. Social desirability and AP medication were significant predictors,

1 Note: a main effect of "Dimensions" means that a significant score difference is observed between the dimensions. This result is "uninformative" because all dimensions did not have the same number of items or reversed items. Therefore, the score of each dimension systematically leads to significant variations with respect to the other dimensions of the same model.

respectively, for DIF_{after} and DDF_{after} (see Table 3). All models explained between 43 and 46 % of variance (see Table 3).

[TABLE 3 HERE]

We found that the increase in perceived social support (ProgPSS) significantly predicted higher levels of REPCOG, COMEMO and REGEMO *after* treatment. NTI was a negative and significant predictor of COMEMO and a positive and significant predictor of RESNOR. In other words, the results showed that negative attitudes toward treatment predicts lower abilities to communicate emotions and predicts a higher perception that society limits the expression of feelings (RESNOR). Gender was a significant predictor of REGEMO and PERINT, which means that being a man predicts higher abilities in regulation of emotions and lower skills in the perception of internal bodily indicators of emotions. As for alexithymia dimensions, each *before* treatment scores of OE dimensions significantly and positively predicts its *after* treatment scores (see Tables 4A & 4B). Lastly, it was found that social desirability significantly and positively predicted REGEMO, and significantly and negatively predicted PERINT. AP medication significantly and negatively predicted COMEMO. All models were significant and explained between 19 and 41 % of the variance (see Tables 4A & 4B).

[TABLES 4A & 4B HERE]

4. Discussion

4.1 Changes in alexithymia and OE *before* and *after* psychiatric day hospital treatment

Our findings evidenced significant reductions in the total score of alexithymia and in each dimension. Furthermore, significant increases were found in REPCOG, COMEMO, and REGEMO, confirming our initial hypotheses. Our investigation has provided evidence that alexithymia and OE changes occurred, which represents a lack of absolute stability. This suggests that both alexithymia and OE have been modified by therapy. As reported by Cameron and collaborators (2014), their review showed consistent evidence that alexithymia is partly malleable with therapeutic interventions. Results from correlation analyses (i.e., moderate to large) and linear regression analyses on alexithymia dimensions gave us two main information: 1) they support the relative stability of alexithymia; and 2) the correlation levels are lower than those obtained by previous research (Luminet et al., 2001; Mikolajczak and Luminet, 2006; Luminet, Rokbani, Ogez, & Jadoulle, 2007; Stingl et al., 2008). In other words, despite significant change scores, alexithymia after treatment is still predicted by alexithymia measured at the beginning of treatment.

This means that the amplitude of changes is still of a limited extent. Furthermore, complementary analyses (see Supplementary Materials) showed that alexithymia and OE changes were independent of diagnosis, as found by Subic-Wrana et al. (2005). This suggests that whatever the diagnosis, the significant changes of alexithymia and OE were of similar extent. In parallel to alexithymia and OE changes, the patients' global functioning displayed significant improvements after the psychiatric day hospital treatment (symptoms changed from moderate to mild levels).

4.2 Alexithymia and OE *after* treatment: the significant predictors

Regression analyses provided evidence that gender significantly predicted the levels of perception of internal bodily indicators of emotions (being a woman increases the scores); and of regulation of emotions (being a man increases the scores). Reicherts (2007b) found similar results for the regulation of emotions but not for the perception of internal bodily indicators of emotions. These results partly confirm our initial expectation because no gender influences were found on alexithymia in our study, contrary to the results obtained by other authors (Luminet et al., 2016; Levant et al., 2009; Larsen et al., 2006; and Moriguchi et al., 2007). Recently, authors showed that women notice bodily sensations more often than men, and they understand the relationship between those sensations and emotional states better (Grabauskaite, Baranauskas, & Griskova-Bulanova, 2017).

Age significantly and positively predicted the externally-oriented thinking dimension (from alexithymia), meaning that getting older predicts higher levels of *pensée opératoire*. This finding was also reported by other authors (Moriguchi et al., 2007; Lane, Sechrest, & Riedel, 1998). The interpretation is that people getting older tends to be more focus on pragmatic events of life and leaves less space to fantasy (the increasement of responsibilities and commitments might be factors that underlies this effect). However, contrary to the results obtained by Reicherts (2007b), we did not find significant age influences on communication of emotions. Furthermore, as found by Stingl et al. (2008), the stay duration did not significantly predict scores at the end of treatment (i.e., *after* scores). We can cautiously hypothesize that treatment may have a positive influence on alexithymia and OE, *per se*, independently of the duration of therapy.

The negative attitudes toward treatment (NTI) significantly and positively predicted alexithymia and the normative restrictions of affectivity (i.e., higher NTI levels predict higher levels of alexithymia and a greater sensitivity to societal rules and conventions, which impacts emotion expression). Moreover, NTI significantly and negatively predicted the communication and regulation abilities of emotions (i.e., higher NTI levels predict lower skills in communication and regulation of emotions). Therefore, attitudes toward treatment represents a strong variable that interferes with the development of emotional skills in therapy, as found by previous research on alexithymia

(Delbrouck, 2013). An interpretation might be that therapeutic alliance certainly plays a key role in the improvement of emotional abilities.

However, to counterbalance the negative impacts of NTI, the increase in perceived social support (PSS) played a protective role in alexithymia and OE (especially on cognitive representation, communication and regulation of emotions). Therefore, since PSS represents a coping resource (Thoits, 1986), it seems that it acts on alexithymia and OE by creating a security situation with more perceived care, which in turn fosters a reduction of emotional valence and arousal. At the level of the individual, it may promote an improvement of self-monitoring abilities. Leroy et al. (2014) stated that exogenous (which can be associated with perceived social support) and endogenous regulation of emotions are intrinsically linked. We can assume that the increase in social support gave a more important resource of exogenous emotion regulation to patients, and thus more endogenous abilities of regulation. As a therapeutic care framework working on interpersonal interactions, psychiatric day hospital treatment appears to be a fertile ground for the improvement of perceived social support.

Antipsychotics significantly predicted lower abilities in communication of emotions (COMEMO and DDF). In addition, social desirability significantly predicted difficulty identifying feelings, the perception of internal bodily indicators of emotions, and regulation of emotions. In other words, having a higher propensity in social desirability predicts higher emotional regulation skills, lower abilities in the perception of internal bodily indicators of emotions, and lower difficulty identifying feelings. This indicates that antipsychotic medication and social desirability should be mainly considered in experimental exploration of communication and regulation of emotions and of difficulty identifying feelings. However, it is important to note that the part of variance explained by these variables varies from 2% to 13%.

Lastly, a brief word is given to the relations found between alexithymia and OE (see Table E). The Pearson's correlations revealed the following dyads are strongly interrelated: difficulty identifying feelings and cognitive representation of emotions; and difficulty describing feelings and communication. This suggests that these constructs, even if they are independent, assess similar domains. Furthermore, regulation of emotions was significantly related with alexithymia (especially with DIF), which indicates that these constructs should be worked concomitantly in therapy, in order to empower the treatment effects.

In summary, gender was a predictor of regulation of emotions and perception of internal bodily indicators of emotions; age predicted more externally-oriented way of thinking. Lastly, with respect to the predictions of alexithymia and OE factors at the end of the treatment, the results reveal that in addition to the alexithymia and OE factors scores at the beginning of the treatment (which always were the strongest predictors), two other categories of variables are important to consider. The first one is the negative attitudes toward treatment (NTI), and the second

one is the progression score variable of perceived social support (ProgPSS) which were systematically found as predictors of alexithymia and specific OE dimensions.

5. Conclusions

With respect to alexithymia and debates on its nature, authors had proposed different assumptions to explain significant changes: absolute *versus* relative stability. Our results showed that analyses on correlation/regression levels support the relative stability assumption, which means that alexithymia and OE can be considered as dynamical traits modulable by therapy. Is it therefore reasonable to believe that changes in alexithymia and openness to emotions have occurred? From an optimist's perspective, yes (despite the initial diagnosis). However, therapy is a long road for patients, and negative attitudes toward treatment might play an important role in thwarting the therapeutic process. For patients with higher NTI levels, a priority objective could be to work on therapeutic alliance prior to emotional skills. Like other forms of group therapy, psychiatric day hospital treatment appears to be a fertile ground favouring new strategies that improved social relationships. In this study, we provide indirect evidence that clinical settings working on emotional abilities can modulate the magnitude of dynamical traits such as alexithymia and OE. Authors have argued that: "*support group interventions are based on the assumption that social comparison among similar peers can improve coping and foster adaptation*" (Mallinckrodt, King, & Coble, 1998, p.541). Social comparison seems to facilitate the expression of negative affect, to offer new social identities and roles, and to reduce the perceived threatening feeling about stressors (Mallinckrodt et al., 1998). Hence, as reported in this study, we can conclude that improvement of perceived social support was a key factor in the modulation of alexithymia and openness to emotions.

Considering all of these, the perspective provided by this study seeks to foster patients' recovery by offering therapists who treat difficulties linked to emotions a more concrete array of factors that could either promote or subvert that recovery.

5.1. Limitations

The main limitations were: 1) the absence of a control group: assessing patients who present various difficulties without offering them any treatment presents deontological problems that are difficult to get around; 2) the failure to apply a random controlled trial paradigm on activities. The policy of the institution is to consider patients as actors in their own treatment. Therefore, letting them freely schedule their activities every week is also part of their support plan. However, further studies could consider an inventory of different activities in order to investigate

whether score changes are activity-dependent; 3) the experimental design was correlational, which does not allow for causality inferences.

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Ethics approval

The study was approved by the "Hospitalo-Facultaire Universitaire" Ethics Committee of Liège. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Conflict of interests

The authors declare that they have no conflict of interest.

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Table 1. Descriptive statistics of all variables.

Names	N	Min	Max	Mean	SD
Demographic variables					
Age	179	18	72	41.1	11.5
NDT	179	5	99	49.9	19.2
Alexithymia, scores *before* & *after* treatment					
Total$_{before}$	179	29	84	57.7	11.2
Total$_{after}$	179	25	83	49.3	12.1
DIF$_{before}$	179	7	34	21.9	5.84
DIF$_{after}$	179	7	34	17.7	5.91
DDF$_{before}$	179	5	25	16.4	4.26
DDF$_{after}$	179	5	25	13.7	4.31
EOT$_{before}$	179	9	33	19.4	4.84
EOT$_{after}$	179	9	28	18	4.14
OE dimensions, scores *before* & *after* treatment					
REPCOG$_{before}$	179	0	4	1.96	0.86
REPCOG$_{after}$	179	0	4	2.39	0.72
COMEMO$_{before}$	179	0	4	1.65	0.77
COMEMO$_{after}$	179	0	4	2.15	0.67
REGEMO$_{before}$	179	0	4	1.33	0.83
REGEMO$_{after}$	179	0	4	1.95	0.77
PERINT$_{before}$	179	0	4	2.33	0.69
PERINT$_{after}$	179	0	4	2.26	0.70
PEREXT$_{before}$	179	0	4	2.23	0.82
PEREXT$_{after}$	179	0	4	2.19	0.65
RESNOR$_{before}$	179	0	4	2.46	0.72
RESNOR$_{after}$	179	0	4	2.41	0.71
PSS, SD & MMPI-2					
PSS$_{before}$	179	12	84	54.9	15.7
PSS$_{after}$	179	12	84	57.3	17.8
ProgPSS	179	-73	38	2.29	15.3
SD	179	0	13	6.95	2.44
NTI	179	33	102	68.4	15.2
Medication					
AD	179	0	153,3	37.3	33
BZ	179	0	85,7	11.1	15
AP	179	0	34	2.99	5.34
AC	179	0	9	1.70	1.84

Abbreviations: NDT (Number of days of treatment); DIF$_{before/after}$ (Difficulties identifying feelings, *before/after* scores); DDF$_{before/after}$ (Difficulties describing feelings, *before/after* scores); EOT$_{before/after}$ (externally-oriented thinking, *before/after* scores); REPCOG$_{before/after}$ (Cognitive representation of emotions, *before/after* scores); COMEMO$_{before/after}$ (Communication of emotions, *before/after* scores); REGEMO$_{before/after}$ (Regulation of emotions, *before/after*

scores); $PERINT_{before/after}$ & $PEREXT_{before/after}$ (the perception of internal and external bodily indicators of emotions, *before/after* scores); and $RESNOR_{before/after}$ (the normative restriction of emotions, *before/after* scores); $PSS_{before/after}$ (Perceived Social Support, *before/after* scores); ProgPSS (Progression score variable of perceived social support: PSS_{after} *minus* PSS_{before}); SD (social desirability); NTI (Negative treatment indicator); AD (Antidepressants); BZ (Benzodiazepines); AP (Antipsychotics); AC (Drugs with anticholinergic effects).

Table 2. General table of M/ANOVAs with repeated measures (*before* and *after* treatment).

Names	Λ Value	F	df	df_{error}	p value
Total alexithymia scores					
Time	-	89.6	1	178	.000
Alexithymia dimensions					
Time	.969	5.54	1	176	.020
Dimensions	.739	30.9	2	175	.000
Times * Dimensions	.958	3.86	2	175	.023
OE dimensions					
Time	.927	14	1	176	.000
Dimensions	.783	9.51	5	172	.000
Times * Dimensions	.946	1.95	5	172	.088

This table displays all main the main effects and interaction effects of the M/ANOVAS analyses performed on alexithymia and OE.

Table 3. Hierarchical regression analyses of alexithymia scores, after treatment.

Names	Final B	F	df	p value	R^2	R^2_{adj}	R^2_{var}
DIF_{after}							
Step 1: controlled variables		4.93	5,173	.000	.125	.10	.125
AD	.034			.598			
BZ	.001			.990			
AP	.020			.750			
AC	.010			.889			
SD	-.157			.010			
Step 2: demographical variables		.605	3,170	.612	.13	.09	.01
Gender	-.002			.983			
Age	-.004			.941			
NDT	-.065			.290			
Step 3: Predictors of interest		32.8	3,167	< .001	.46	.42	.32
NTI	.424			.000			
ProgPSS	-.227			.000			
DIF_{before}	.211			.002			
DDF_{after}							
Step 1: controlled variables		2.63	5,173	.026	.07	.04	.07
AD	.033			.615			
BZ	-.032			.655			
AP	.126			.048			
AC	-.003			.966			
SD	-.065			.284			
Step 2: demographical variables		2	3,170	.115	.10	.06	.03
Gender	.166			.171			
Age	.101			.106			
NDT	-.042			.502			
Step 3: Predictors of interest		32.6	3,167	< .001	.43	.40	.33
NTI	.299			.000			
ProgPSS	-.147			.017			
DDF_{before}	.422			.000			
EOT_{after}							
Step 1: controlled variables		2.44	5,173	.036	.07	.04	.07
AD	.126			.054			
BZ	.037			.600			
AP	.029			.652			
AC	.019			.788			
SD	-.048			.432			
Step 2: demographical variables		2.53	3,170	.059	.11	.06	.04
Gender	.102			.398			
Age	.144			.021			
NDT	-.092			.149			
Step 3: Predictors of interest		32.1	3,167	< .001	.43	.40	.33

NTI	.180			.008			
ProgPSS	-.183			.003			
EOT_{before}	.498			.000			

This table display all hierarchical regression analyses performed on alexithymia dimensions, *after* treatment. Abbreviations: $DIF_{after/before}$ (Difficulty identifying feelings, *after/before* scores); $DDF_{after/before}$ (Difficulty describing feelings, *after/before* scores); $EOT_{after/before}$ (externally-oriented thinking, *after/before* scores); AD (Antidepressants); BZ (Benzodiazepines); AP (Antipsychotics); AC (Drugs with anticholinergic effects); SD (social desirability); NDT (Number of days of treatment); NTI (Negative treatment indicator); ProgPSS (Progression score variable of perceived social support: PSS_{after} *minus* PSS_{before}).

Table 4A. Hierarchical regression analyses of OE scores, after treatment.

Names	**Final B**	**F**	**df**	**p value**	**R^2**	**R^2_{adj}**	**R^2_{var}**
$REPCOG_{after}$							
Step 1: controlled variables		4.97	5,173	.000	.13	.10	.13
AD	-.137			.055			
BZ	.058			.448			
AP	-.013			.856			
AC	-.059			.436			
SD	.096			.150			
Step 2: demographical variables		1.42	3,170	.240	.15	.11	.02
Gender	-.131			.319			
Age	.050			.468			
NDT	.011			.873			
Step 3: Predictors of interest		16.8	3,167	< .001	.35	.30	.20
NTI	-.114			.102			
ProgPSS	.178			.007			
$REPCOG_{before}$	.421			.002			
$COMEMO_{after}$							
Step 1: controlled variables		3.31	5,173	.007	.09	.06	.09
AD	-.037			.581			
BZ	-.027			.713			
AP	-.142			.030			
AC	-.013			.860			
SD	.046			.461			
Step 2: demographical variables		3.14	3,170	.027	.14	.10	.05
Gender	-.195			.118			
Age	-.083			.188			
NDT	.052			.431			
Step 3: Predictors of interest		25.4	3,167	< .001	.41	.37	.27
NTI	-.208			.002			
ProgPSS	.304			.000			
$COMEMO_{before}$	.413			.000			
$REGEMO_{after}$							
Step 1: covariates		3.65	5,173	.004	.10	.07	.10
AD	-.010			.890			
BZ	-.041			.595			
AP	-.048			.482			
AC	.024			.754			
SD	.218			.001			
Step 2: demographical variables		5.07	3,170	.002	.17	.13	.07
Gender	.400			.003			
Age	-.108			.109			
NDT	-.005			.937			
Step 3: Predictors of interest		13.4	3,167	< .001	.33	.29	.16
NTI	-.231			.001			

ProgPSS	.170			.010			
REGEMO$_{before}$	.254			.000			

This table display all hierarchical regression analyses performed on OE dimensions, *after* treatment. Abbreviations: REPCOG$_{after/before}$ (Cognitive representation of emotions, *after*/*before* scores); COMEMO$_{after/before}$ (Communication of emotions, *after*/*before* scores); REGEMO$_{after/before}$ (Regulation of emotions, *after*/*before* scores); AD (Antidepressants); BZ (Benzodiazepines); AP (Antipsychotics); AC (Drugs with anticholinergic effects); SD (social desirability); NDT (Number of days of treatment); NTI (Negative treatment indicator); ProgPSS (Progression score variable of perceived social support: PSS$_{after}$ *minus* PSS$_{before}$).

Table 4B. Hierarchical regression analyses of OE scores, after treatment.

Names	**Final B**	**F**	**df**	**p value**	**R^2**	**R^2_{adj}**	**R^2_{var}**
PERINT$_{after}$							
Step 1: controlled variables		1.53	5,173	.184	.04	.02	.04
AD	-.095			.208			
BZ	.039			.634			
AP	-.013			.861			
AC	.004			.960			
SD	-.179			.012			
Step 2: demographical variables		3.96	3,170	.009	.11	.06	.06
Gender	-.332			.019			
Age	.106			.145			
NDT	-.032			.668			
Step 3: Predictors of interest		9.97	3,167	< .001	.24	.19	.14
NTI	.084			.258			
ProgPSS	.120			.087			
PERINT$_{before}$	.353			.000			
PEREXT$_{after}$							
Step 1: controlled variables		.701	5,173	.623	.02	-.01	.02
AD	-.062			.428			
BZ	-.029			.731			
AP	.002			.981			
AC	-.061			.468			
SD	-.108			.140			
Step 2: demographical variables		2.18	3,170	.093	.06	.01	.04
Gender	-.274			-.274			
Age	.091			.091			
NDT	.079			.079			
Step 3: Predictors of interest		9.39	3,167	< .001	.19	.14	.14
NTI	.013			.863			
ProgPSS	.023			.755			
PEREXT$_{before}$	.381			.000			
RESNOR$_{after}$							
Step 1: covariates		.822	5,173	.535	.02	-.01	.02
AD	-.024			.754			
BZ	.096			.246			
AP	-.066			.375			
AC	-.084			.309			
SD	-.087			.226			
Step 2: demographical variables		.768	3,170	.513	.04	-.01	.01
Gender	-.088			.532			
Age	-.048			.525			
NDT	.040			.584			
Step 3: Predictors of interest		13.3	3,167	< .001	.22	.17	.19
NTI	.176			.021			
ProgPSS	-.027			.707			

$RESNOR_{before}$	.396		.000

This table display all hierarchical regression analyses performed on OE dimensions, *after* treatment. Abbreviations: $PERINT_{after/before}$ & $PEREXT_{after/before}$ (the perception of internal and external bodily indicators of emotions, *after/before* scores); and $RESNOR_{after/before}$ (the normative restriction of emotions, *after/before* scores); AD (Antidepressants); BZ (Benzodiazepines); AP (Antipsychotics); AC (Drugs with anticholinergic effects); SD (social desirability); NDT (Number of days of treatment); NTI (Negative treatment indicator); ProgPSS (Progression score variable of perceived social support: PSS_{after} *minus* PSS_{before}).

Supplementary materials:

Table A. Descriptive table for the Global Assessment Functioning (GAF) Scale according to 'diagnosis'

VARIABLES	DIAGNOSIS	*M*	*SD*	*N*
GAF_{BEFORE}	Mood Disorders	50.5	10.39	87
	Adjustment Disorders	51.7	8.55	44
	Anxiety Disorders	52.1	9.36	25
	Addiction Disorders	52.4	7.17	20
TOTAL		51.3	9.45	176
GAF_{AFTER}	Mood Disorders	63.5	12.2	87
	Adjustment Disorders	63.1	10.5	44
	Anxiety Disorders	66.6	11.5	25
	Addiction Disorders	62.9	9.1	20
TOTAL		63.8	11.4	176

Note that GAF scores were missing for three participants.

Table B. ANOVA with repeated measures (*before* and *after* treatment) on Global Assessment Functioning (GAF) Scale with diagnosis as an independent variable

Variables	F	df	p value	η^2
TIME	260.7	1,172	.000	0.602
TIME*DIAGNOSIS	1.13	3,172	.339	0.019

Table C. MANOVA performed on alexithymia dimensions with diagnosis and gender as independent variables

Variables	∧ VALUE	F	df	p value	η^2
TIME	0.758	54.6	1,171	.000	0.242
TIME*DIAGNO	0.979	1.23	3,171	.302	0.021
TIME*GENDER	0.996	.748	1,171	.388	0.004
TIME*DIAGNO*GENDER	0.994	.337	3,171	.798	0.006
DIMENSIONS	0.428	113.5	2,170	.000	0.572
DIMENSIONS*DIAGNO	0.964	1.04	6,340	.402	0.018

DIM*GENDER	0.995	.439	2,170	.645	0.005
DIM*DIAGNO*GENDER	0.984	.471	6,340	.83	0.008
TIME*DIM	0.861	13.7	2,170	.000	0.139
TIME*DIM*DIAGNO	0.973	.792	6,340	.577	0.014
TIME*DIM*GENDER	0.992	.676	2,170	.51	0.008
TIME*DIM*DIAGNO*GENDER	0.989	.306	6,340	.934	0.005

Abbreviations: "DIM" stands for dimensions and "DIAGNO" for diagnosis.

Table D. MANOVA performed on OE dimensions with diagnosis and gender as independent variables

Variables	**ʌ VALUE**	**F**	**df**	**p value**	**η²**
TIME	0.765	52.6	1,171	.000	0.235
TIME*DIAGNO	0.981	1.11	3,171	.345	0.019
TIME*GENDER	0.993	1.13	1,171	.289	0.007
TIME*DIAGNO*GENDER	0.970	1.78	3,171	.153	0.030
DIMENSIONS	0.620	20.5	5,167	.000	0.380
DIMENSIONS*DIAGNO	0.884	1.41	15,461	.138	0.040
DIM*GENDER	0.880	4.57	5,171	.001	0.120
DIM*DIAGNO*GENDER	0.903	1.16	15,461	.305	0.033
TIME*DIM	0.782	9.33	5,167	.000	0.218
TIME*DIM*DIAGNO	0.897	1.24	15,461	.241	0.036
TIME*DIM*GENDER	0.987	.451	5,167	.812	0.013
TIME*DIM*DIAGNO*GENDER	0.913	1.03	15,461	.427	0.030

Abbreviations: "DIM" stands for dimensions and "DIAGNO" for diagnosis.

Table E. Correlation table between alexithymia and OE, scores *before* and *after* treatment

Names	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17	18	19	20
1. DIF_b	-																		
2. DDF_b	.48**	-																	
3. EOT_b	.22**	.34**	-																
4. TOT_alex_b	.80**	.78**	.68**	-															
5. DIF_a	.45**	.33**	.10	.40**	-														
6. DDF_a	.28**	.51**	.21**	.43**	.68**	-													
7. EOT_a	.14	.26**	.55**	.41**	.47**	.50**	-												
8. TOT_alex_a	.37**	.44**	.31**	.49**	.89**	.86**	.75**	-											
9. $REPCOG_b$	-.61**	-.52**	-.06	-.54**	-.34	-.28**	-.06	-.29**	-										
10. $COMEMO_b$	-.15*	-.47**	-.28**	-.38**	-.05	-.29**	-.20**	-.20**	.18*	-									
11. $REGEMO_b$	-.29**	-.01	.08	-.12	-.09	.04	.05	-.01	.17*	-.07									
12. $PERINT_b$	.12	-.14	-.21**	-.08	-.05	-.17*	-.10	-.12	.11	.14	-								
13. $PEREXT_b$	.14	-.05	-.05	.03	.04	-.04	.07	.03	.05	.24**	.34**	-							
14. $RESNOR_b$	.15*	-.03	-.13	.01	.06	-.03	-.02	.01	.02	.09	.24	.15*	-						
15. $REPCOG_a$	-.38**	-.30**	.07	-.28**	-.62**	-.57**	-.26**	-.60**	.50**	.08	0.14	.00	-.02	-					
16. $COMEMO_a$	-.16*	-.34**	-.21**	-.31**	-.44**	-.64**	-.43**	-.59**	.18*	.43**	.16	.13	-.03	.36**	-				
17. $REGEMO_a$	-.27**	-.08	.08	-.14	-.58**	-.43**	-.23**	-.51**	.16*	-.09	-.05	-.08	-.04	.50**	.20**	-			
18. $PERINT_a$	.19*	.05	-.10	.08	.15*	.10	-.02	.10	0.00	.08	.40**	.10	.03	.11	.08	-.31**	-		
19. $PEREXT_a$	.01	-.14	-.08	-.08	.01	-.01	-.07	-.02	0.13	.09	.28**	.39**	-.13	.09	.16	-.24**	.42**	-	
20. $RESNOR_a$	.15*	.13	-.04	.11	.27**	.23	.02	.22**	-.05	.02	0.08	.02	.40**	-.10	-.09	-.27**	.35**	.20**	-

*Abbreviations: $DIF_{b/a}$ (Difficulty identifying feelings, scores before/after treatment); $DDF_{b/a}$ (Difficulty describing feelings, scores before/after treatment); $EOT_{b/a}$ (externally-oriented way of thinking, scores before/after treatment); $TOT\_alex_{b/a}$ (Total scores of alexithymia, scores before/after treatment); $REPCOG_{b/a}$ (cognitive-conceptual representation of emotions, scores before/after treatment); $COMEMO_{b/a}$ (communication of emotions, scores before/after treatment); $REGEMO_{b/a}$ (regulation of emotions, scores before/after treatment); $PERINT_{b/a}$ & $PEREXT_{b/a}$ (perception of internal and external bodily indicators of emotions, scores before/after treatment); $RESNOR_{b/a}$ (normative restrictions of affectivity, scores before/after treatment). *: $p < .05$; **: $p < .005$.*