



How are Experiential Avoidance and Cognitive Fusion Associated with Alexithymia?

Zekiye Celikbas¹ · Sedat Batmaz¹ · Kaasim Fatih Yavuz² ·
Esma Akpınar Aslan¹ · Nurgul Yesilyaprak³ · Hanife Kocakaya⁴ ·
Meral Oran Demir⁴ · Emrah Songur⁵ · Mesut Yildiz⁶

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Abstract

A transdiagnostic approach to psychiatric disorders presents an opportunity to evaluate the relationship between alexithymia and the concepts of psychopathology according to the psychological flexibility model. This study aimed to investigate the relationship between alexithymia, cognitive fusion and experiential avoidance. A total of 133 outpatient participants were included in this cross-sectional study. Sociodemographic Data Form, Toronto Alexithymia Scale-20, Acceptance and Action Questionnaire-II, Cognitive Fusion Questionnaire, Hospital Anxiety and Depression Scale, and Ten-Item Personality Inventory were used. The non-alexithymic group consisted of 37 participants while the alexithymic group of 26. The alexithymic group had higher scores in terms of depression, anxiety, experiential avoidance, and cognitive fusion. Difficulty in identifying and differentiating feelings and total alexithymia scores had positive correlations with anxiety, experiential avoidance, and cognitive fusion. In hierarchical regression analysis, the only difficulty in identifying feelings was predicted by both experiential avoidance and cognitive fusion. These results revealed that alexithymia might also be conceptualized adopting the psychological flexibility point of view.

Keywords Alexithymia · Cognitive fusion · Experiential avoidance · Psychological flexibility

✉ Sedat Batmaz
sedat.batmaz@gop.edu.tr

¹ Department of Psychiatry, School of Medicine, Tokat Gaziosmanpaşa University, Tokat, Turkey

² Department of Psychology, Istanbul Medipol University, Istanbul, Turkey

³ Psychiatry Clinic, Karaman State Hospital, Karaman, Turkey

⁴ Psychiatry Clinic, Tokat Dr. Cevdet, Aykan Mental Health and Disorders Hospital, Tokat, Turkey

⁵ Psychiatry Clinic, Ankara Kecioren Training and Research Hospital, Ankara, Turkey

⁶ Department of Psychiatry, School of Medicine, Marmara University, Istanbul, Turkey

Introduction

Alexithymia is a transdiagnostic process which may be present in the community. Alexithymia can be defined as a psychological construct that is associated with difficulty in identifying feelings (DIF) and distinguishing them from physical sensations of emotional arousal, difficulty in describing feelings (DDF), and an externally oriented thinking (EOT) with an emphasis on concrete external stimuli rather than internal emotions (Darrow and Follette 2014; Nowakowski et al. 2013; Roh et al. 2011; Taylor 2000). As DIF and DDF refer to emotional awareness and expression, they are considered affect-related. EOT refers to a specific tendency to deal with superficial themes and to avoid emotions. Therefore, it can be considered cognition-related to a greater degree (Grynberg et al. 2010). Alexithymia is not categorized as a discrete psychiatric diagnosis in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM 5)* (American Psychiatric Association 2013). Alexithymia has further been associated with negative medical outcomes, and it may interfere with the psychotherapy process (Ogrodniczuk et al. 2011; Porcelli et al. 2003).

Acceptance and Commitment Therapy (ACT) is an effective treatment method, which has recently been of great interest to many researchers, to improve the psychological traits (Hayes et al. 2004; Zhang et al. 2017). ACT focuses on the construct of psychological inflexibility, which can be explained as the state of being excessively entangled in experiential avoidance (EA) and cognitive fusion (CF). CF is described as excessive regulation of behaviour by cognition, whereby thoughts are viewed as literal truths that dominate emotional and behavioural regulation regardless of other contextual variables. Fusion with difficult thoughts is distressing by itself, but it also fosters EA that can be described as a construct that attempts to control negative internal experiences such as bodily sensations, emotions, cognitions, etc. (Hayes et al. 2012).

While the etiology of alexithymia is complex, with both genetic and environmental factors playing a role, the phenomenology of alexithymia is not sufficiently elucidated. There is a wide range of studies that documented the significant relationship between alexithymia and the regulation of emotion (Taylor 2000) in addition to dysfunctional coping behaviours in emotion regulation processes (Constantinou et al. 2014). Studies have shown that EA, a construct defined as an attempt to control negative internal experiences such as bodily sensations, emotions, cognitions, etc. (Hayes et al. 2012), maybe the mediator of these emotion regulation strategies (Venta et al. 2013). In line with the latter approach to the difficulty in identifying feelings dimension of alexithymia, it has been reported to be strongly correlated with EA in a clinical sample of participants who were mainly diagnosed with obsessive–compulsive disorder (Panayiotou et al. 2015). Furthermore, alexithymia was found to be negatively associated with decentring and self-compassion, and positively with EA in a non-clinical population (Duarte and Pinto-Gouveia 2017). EA has also been reported to overlap with other pathological constructs such as avoidant coping, thought suppression, stress intolerance, and anxiety sensitivity (Karekla and Panayiotou 2011). Research investigating the

effects of alexithymia and EA on other variables demonstrated that individuals with higher levels of alexithymia, perceived stress, and EA also reported severe depression, social dysfunction, anxiety, and somatic problems more frequently (Bardeen and Fergus 2016; Kashdan et al. 2006; Thompson and Waltz 2010). EA was also shown to have a mediating role in the relationship between alexithymia and psychopathology (Leonidou et al. 2019; Carvalho et al. 2015; Zakiei et al. 2017). Duarte and Pinto-Gouveia (2017) found that both decentring, a contrasting term with CF, and EA significantly mediated the relationship between alexithymia and positive emotions. These results suggest that alexithymia may prevent an individual from separating themselves from their emotions and lead them to interpret their internal experiences in a subjective way. In line with these studies, it may be proposed that alexithymia acts as a reactive avoidant coping response to distressing internal experiences and decreased experience of positive emotions. These factors can explain higher levels of psychopathology, such as depression and anxiety in alexithymia. Although these results reveal the relationship between alexithymia and EA, they are obtained from non-clinical samples or from clinical samples with insufficient number of participants. Also, there is no published study investigating the relationship between CF and alexithymia. Therefore, it is necessary to clarify whether there is a similar relationship between alexithymia, CF and EA in a large clinical sample.

We tried to develop a hypothesis on the emergence of alexithymia within the ACT framework. Accordingly, CF, which is another psychological construct related to EA, occurs when an individual's cognitions significantly regulate their behaviour in a counterproductive way. For this reason, individuals may be fused within their cognitions instead of trying to focus on the context of those cognitions. For example, when a particular avoidance-related rule (e.g., "I have to avoid my emotions.") occurs, and the individual's CF levels get higher, then some individuals tend to avoid that emotional experience rather than describe and make sense of it. This dysfunctional process can lead to failure in developing the ability to define emotional experiences and eventually to alexithymia in the long term. Also, an individual's unwillingness to get into contact with their subjective internal experiences, such as changing their relationship with them, maybe further associated with alexithymia. A transdiagnostic approach to psychiatric disorders provides an opportunity to evaluate the relationship between alexithymia and the concepts of psychopathology according to the psychological flexibility model.

In sum, published reports on the investigation of alexithymia within an ACT perspective is limited. Therefore, the association of EA and CF with the dimensions of alexithymia is relatively rarely studied. However, targeting alexithymia using an ACT approach, which focuses on the avoidance of emotions and inflexibility of cognitions, might help alleviate the associated distress. A focused review has led us to this gap in the scientific literature, and we sought to find an answer to whether alexithymia might be targeted via one of the essential components of the ACT approach. This study may be one of the few to directly assess the relationship between alexithymia and EA and/or CF.

This study aims to explore the relationship between alexithymia, CF (the state of acting in compliance with the rules that predispose individuals to avoid

experiencing their emotions), and EA (the tendency to avoid emotional arousals with the relevant rules) from a contextual behavioural viewpoint different than the traditional explanations of alexithymia. The present study hypothesizes that (i) higher levels of CF and EA will have a significant positive predictive effect on alexithymia levels; (ii) depression and anxiety scores will be higher in individuals with alexithymia; (iii) alexithymic traits, especially difficulty in identifying and differentiating feelings, will have positive correlations between EA and CF. The study results will contribute to the literature in elucidating the etiology of alexithymia within the context of ACT.

Methods

Participants

The study was conducted in the Department of Psychiatry at Tokat Gaziosmanpasa University, School of Medicine (Tokat, Turkey). This study included a total of 133 outpatient participants who applied to the outpatient psychiatry clinic but did not receive any psychiatric diagnosis (such as for medical board report or medical report for job application purposes) or those who were diagnosed with a primary psychiatric disorder except individuals with a psychotic disorder, bipolar disorder, major neurocognitive disorder, substance use disorder, mental retardation, and psychiatric disorders due to any medical condition. As alexithymia is not a discrete psychiatric diagnosis in the *DSM 5*, we included participants with various mental disorders in addition to those without a psychiatric diagnosis.

A total of 133 outpatient participants (78.2% female; mean age: 25.69 years; standard deviation: 8.56) were included in this study. According to the cut-off scores specified in the Turkish validity and reliability study on the TAS-20 scale, the alexithymic group (TAS-20 total score ≥ 59) consisted of 26 participants (19.5%) and the non-alexithymic group (TAS-20 total score ≤ 51) consisted of 37 participants (27.8%). The diagnostic categories of the participants in the total sample were as follows: Sixty-eight (51.1%) of the participants had no psychiatric diagnosis, 29 (21.8%) had a major depressive disorder, 20 (15%) had anxiety disorders, 10 (7.5%) had obsessive–compulsive disorder, 4 (3.1%) had somatic symptom disorder, and 2 (1.5%) had posttraumatic stress disorder. Group comparisons, based on the presence of alexithymia, showed no statistically significant difference ($\chi^2(10) = 17.913$, $p = 0.056$) on the psychiatric diagnoses. Eight participants in the alexithymic group had no psychiatric diagnosis, nine had a major depressive disorder, six had anxiety disorders, two had obsessive–compulsive disorder, and one had somatic symptom disorder. Twenty-eight of the participants in the non-alexithymic group did not have any psychiatric diagnosis, and three had a major depressive disorder, anxiety disorders, and obsessive–compulsive disorder. The non-alexithymic group had a higher level of education, while the alexithymic group had a higher presence of psychiatric disorders in the family (Table 1).

Table 1 Demographic and clinical characteristics of the participants, and group comparisons

	Total sample ($N=133$)	Non-Alex- ithymic Group ($n=37$)	Alexithymic Group ($n=26$)	t/χ^2
Age (years)	25.69 (8.56)	24.54 (5.34)	24.15 (7.34)	0.242
Sex, female	104 (78.2)	25 (67.6)	20 (76.9)	0.655
Marital status, married	21 (15.8)	5 (13.5)	5 (19.2)	1.907
Level of education (years)	14.74 (3.59)	16.11 (2.78)	13.88 (3.66)	2.743**
Comorbid medical disorder, present	29 (21.8)	10 (27.0)	3 (11.5)	2.237
Family history of psychiatric disorder, present	33 (24.8)	5 (13.5)	10 (38.5)	5.239*

Results are presented as mean (standard deviation) or frequency (percentage)

* $p < 0.05$, ** $p < 0.01$

Procedure

Participation in the study was voluntary, and participants did not receive any compensation to be enrolled in the study. All the participants gave their written informed consent to participate in the study. The Clinical Research Ethics Committee of Tokat Gaziosmanpasa University approved the study protocol in 2015 (Approval date and number: January 20, 2015–83116987-048). Participants completed self-report scales in the outpatient clinic after being informed of the purpose of the study, and psychiatrists or psychiatry residents with experience of at least two years completed a semi-structured face-to-face diagnostic interview based on the *DSM 5* (American Psychiatric Association 2013) diagnostic criteria.

Materials

Sociodemographic Data Form

Interviewers recorded the participants' age, gender, education level, marital status, and primary psychiatric diagnoses, if any, on this form.

Toronto Alexithymia Scale-20 (TAS-20)

The TAS-20 is used to measure the three dimensions of alexithymia, i.e., difficulty in identifying feelings (DIF), difficulty in describing feelings (DDF), and externally oriented thinking (EOT) (Kauhanen et al. 1992, Bagby et al. 1994). The validity and reliability of the Turkish version of the TAS-20 were established by Gülec et al. (2009). The Turkish TAS-20 also showed a three-factor model: difficulty in identifying feelings (DIF, Factor 1), difficulty in differentiating feelings (DDF, Factor 2), and externally oriented thinking (EOT, Factor 3). The

Cronbach's alpha was 0.78 for the total TAS-20 scale and 0.80, 0.57, and 0.63 for the three subscales (Factors 1–3), respectively. The Turkish population study suggested that the cut-off score should be 59 for the alexithymic group and 51 for the non-alexithymic group (Gülec and Yenel 2010). As a result, we excluded the possible alexithymic group ($n:70$) and analysed the alexithymic (≥ 59 points) and non-alexithymic (≤ 51 points) groups.

Acceptance and Action Questionnaire-II (AAQ-II)

AAQ-II was developed to measure psychological inflexibility levels by assessing EA levels. Participants rate items on a 7-point Likert type scale, and higher scores on the AAQ-II indicate higher levels of psychological inflexibility (Bond et al. 2011). The validity and reliability of the Turkish version were established by Yavuz et al. (2016). The Turkish AAQ-II showed good internal consistency with Cronbach's α coefficient of 0.84.

Cognitive Fusion Questionnaire (CFQ)

The CFQ is a 7-point Likert type self-report scale with 13 items and is used to measure the CF levels. The CFQ has shown excellent internal consistency (total Cronbach's $\alpha=0.86$). Higher scores on the CFQ indicate higher levels of CF (Gillanders et al. 2014). The Turkish validity and reliability study is still ongoing. The internal consistency coefficient (Cronbach's alpha) was calculated as 0.89 according to the preliminary results (Sakarya et al. [in press](#)).

Hospital Anxiety and Depression Scale (HADS)

A total of 14 questions are included in the HADS, seven of them measuring anxiety and seven measuring depression. As a result of the reliability and validity study of the Turkish version, Aydemir et al. 1997 determined the cut-off score to be 10 for the anxiety subscale (HADS-Anx) and 7 for the depression subscale (HADS-Dep) (Aydemir et al. 1997; Zigmond and Snaith 1983). Cronbach's alpha coefficient was 0.852 for the anxiety subscale and 0.778 for the depression subscale. This scale was used because anxiety and depression scores may be a confounding factor in terms of alexithymia levels.

Ten-Item Personality Inventory (TIPI)

The TIPI is a short measurement tool that allows assessing individuals according to the five-factor personality theory, and it measures the dimensions of extraversion, agreeableness, conscientiousness, emotional stability, and openness to experiences. The validity and reliability of the Turkish version were established by Atak (Atak 2013; Gosling et al. 2003). The internal consistency (α s 0.81–0.86) and test–retest stability (r s 0.87–0.89) revealed moderate to acceptable reliabilities in the Turkish version.

Statistical Analysis

Given the analytical methods determined at the planning stage of the study, the data collection process continued until this number exceeded the number of minimum necessary participants. It was calculated that at least 127 participants were required to identify a medium effect size with a statistical power of 80%, allowing for 5% type-I error in the results. The minimum number of participants necessary for the analyses was calculated with *G*Power 3.1.9.4* software (Faul et al. 2009). Alexithymic and non-alexithymic groups were determined according to the cut-off score of the TAS-20, and descriptive statistics were used to report the demographic characteristics of the participants. We used the Shapiro–Wilk test to check the distribution of the data, and the results revealed that the data were normally distributed. Due to the normal distribution of data, the groups were compared with each other by independent samples' *t* test or Chi squared test. Bivariate Pearson correlation analyses examined the relationship between the variables of the study. Hierarchical linear regression analyses were conducted to examine the predictive value of the study variables on the alexithymia scores, i.e., DIF, DDF, EOT, and TAS Total. During the first step of these regression analyses, demographic variables, i.e., age, sex, marital status, and the scores of the psychometric scales, i.e., TIPI scale scores and HADS scale scores, were entered. In the second step of the model, either AAQ-II or CFQ scores were entered. The method for the entry of the relevant data was chosen as the “Enter” method. When multicollinearity statistics were checked, there was no multicollinearity between the variables in the regression model. We checked for missing data and outliers in the responses and removed any datasets missing information or extreme outliers before further analyses. We regrettably do not have the exact number of removed datasets. Unfortunately, we did not record the number of participants who refused to take part in the study or failed to return the questionnaires neither. All statistical analyses were performed using *IBM SPSS 22* (IBM Corp. 2013).

Results

Group Comparisons

We used independent samples' *t*-test to compare the psychometric scales between alexithymic and non-alexithymic groups. Results showed that the alexithymic group had higher scores on HADS-Dep, HADS-Anx, AAQ-II, and CFQ (Table 2). As personality traits can be statistically confounding factors on alexithymia, the TIPI was used. It is important to note that there were no differences between the alexithymic and non-alexithymic groups in this regard.

Table 2 Comparisons of TIPI subscales, HADS-Dep, HADS-Anx, TAS subscales, AAQ-II and CFQ between groups

	Total sample ($N=133$)	Non-Alexithymic Group ($n=37$)	Alexithymic Group ($n=26$)	t
TIPI-O	4.62 (1.22)	4.51 (1.17)	4.54 (1.30)	-0.080
TIPI-C	5.31 (1.18)	5.54 (0.84)	5.16 (1.29)	1.446
TIPI-E	4.38 (1.57)	4.81 (1.79)	4.12 (1.37)	1.666
TIPI-A	5.38 (1.12)	5.35 (1.06)	5.38 (1.06)	-0.123
TIPI-ES	4.43 (1.51)	4.41 (1.26)	4.08 (1.90)	0.828
HADS-Dep	7.56 (3.74)	6.59 (3.12)	9.15 (4.12)	-2.803*
HADS-Anx	11.09 (3.91)	10.65 (3.65)	13.73 (3.57)	-3.327*
AAQ-II	24.12 (12.16)	20.38 (11.25)	30.92 (11.20)	-3.669*
CFQ	26.65 (11.32)	22.49 (10.93)	34.04 (11.29)	-4.075**

Results are presented as mean (standard deviation) or frequency (percentage)

TIPI ten-item personality inventory, *O* openness to experience, *C* conscientiousness, *E* extraversion, *A* agreeableness, *ES* emotional stability, *HADS* hospital anxiety depression scale, *Dep* depression, *Anx* anxiety, *TAS* Toronto alexithymia scale, *DIF* difficulty identifying feelings, *DDF* difficulty differentiating feelings, *EOT* externally oriented thinking, *AAQ-II* acceptance and action questionnaire II, *CFQ* cognitive fusion questionnaire

* $p < 0.01$, ** $p < 0.001$

Correlation Analyses

We continued our analyses by exploring the correlations between key study variables. The Pearson correlations between TAS-20 and other questionnaire scores were calculated and presented in Table 3. When we examined the bivariate correlation analyses between the study variables, DIF scores had positive correlations between the HADS-Depression ($r=0.374$, $p < 0.001$), HADS-Anxiety ($r=0.416$, $p < 0.001$), AAQ-II ($r=0.451$, $p < 0.001$), and CFQ ($r=0.552$, $p < 0.001$) scores. DDF scores also had positive correlations between the HADS-Depression ($r=0.176$, $p < 0.05$), HADS-Anxiety ($r=0.220$, $p < 0.05$), AAQ-II ($r=0.249$, $p < 0.01$), and CFQ ($r=0.249$, $p < 0.001$) levels. EOT scores had negative correlations between the HADS-Depression ($r=-0.273$, $p < 0.001$) and HADS-Anxiety ($r=-0.332$, $p < 0.001$) levels. TAS-Total scores had positive correlations between the HADS-Anxiety ($r=0.262$, $p < 0.001$), AAQ-II ($r=0.274$, $p < 0.001$), and CFQ ($r=0.357$, $p < 0.001$) levels. It is noteworthy that DIF scores showed moderate correlations between HADS-Anx, AAQ-II, and CFQ scores. These results indicate that people with high levels of EA and CF might have more difficulty in identifying and differentiating feelings. Therefore, an unwillingness or inability to get in contact with internal experiences without trying to avoid or control them may be related to alexithymia, as stated in our hypothesis. These findings point out that EA and CF may be more closely associated with difficulty in identifying and differentiating feelings in alexithymia than externally oriented thinking.

Table 3 Bivariate correlations between the study variables

	DIF	DDF	EOT	TAS-Total
Age	-0.063	-0.006	-0.133	-0.111
Sex	-0.095	-0.062	0.050	-0.101
Marital status	0.079	0.023	-0.026	0.015
TIPI-O	-0.015	-0.123	0.042	0.073
TIPI-C	-0.095	-0.203*	-0.093	0.137
TIPI-E	-0.149	-0.264**	-0.111	0.126
TIPI-A	0.028	-0.045	0.015	0.130
TIPI-ES	-0.073	-0.032	0.108	-0.075
HADS-Dep	0.374**	0.176*	-0.273**	0.168
HADS-Anx	0.416**	0.220*	-0.332**	0.262**
AAQ-II	0.451**	0.249**	-0.136	0.274**
CFQ	0.552**	0.249**	-0.153	0.357**

TIPI ten-item personality inventory, *O* openness to experience, *C* conscientiousness, *E* extraversion, *A* agreeableness, *ES* emotional stability, *HADS* hospital anxiety depression scale, *Dep* depression, *Anx* anxiety, *TAS* Toronto alexithymia scale, *DIF* difficulty identifying feelings, *DDF* difficulty differentiating feelings, *EOT* externally oriented thinking, *AAQ-II* acceptance and action questionnaire II, *CFQ* cognitive fusion questionnaire

* $p < 0.01$, ** $p < 0.001$

Regression Analyses

Hierarchical linear regression analyses were conducted to reveal the predictive value of the study variables on the alexithymia scores. HADS-Anx scores predicted DIF ($\beta = 0.220$, $t = 2.243$) and EOT ($\beta = -0.299$, $t = -2.835$) levels. AAQ-II scores predicted DIF ($\beta = 0.293$, $t = 2.926$) levels. Moreover, CFQ scores predicted TAS-Total ($\beta = 0.308$, $t = 3.082$) and DIF ($\beta = 0.449$, $t = 4.822$) levels (Table 4). As can be seen, difficulty in identifying feelings was predicted by both EA and CF. As we hypothesized, if a person's CF level is high, it may be an indicator of the fact that the rules related to emotional avoidance are activated. This dysfunctional process may lead to difficulty in identifying feelings and to alexithymia in the long term. An individual needs to identify their feelings before they can differentiate them. So, the fact that the levels of EA and CF did not predict difficulty in differentiating feelings could be explained by the confounding effect of difficulty in identifying feelings.

Discussion

The current study focused on the relationship between anxiety, depression, EA, CF, and alexithymia in a mixed sample of participants with various mental disorders. The results revealed that the alexithymic group had higher EA and CF levels in comparison with the non-alexithymic group.

Table 4 Hierarchical regression analysis summary of the final steps for experiential avoidance or cognitive fusion levels predicting alexithymia levels

Outcome	Predictors	<i>B</i>	95% CI	β	<i>t</i>	<i>R</i> ²	<i>F</i>	ΔR^2	ΔF
TAS Total	HADS-Anx	0.284	-0.060, 0.628	0.161	1.632	0.094	6.709*	0.025	3.597
	AAQ-II	0.106	-0.005, 0.217	0.187	1.897				
TAS DIF	HADS-Anx	0.302	0.036, 0.568	0.220	2.243*	0.249	14.239**	0.050	8.564**
	HADS-Dep	0.098	-0.198, 0.394	0.068	0.653				
	AAQ-II	0.129	0.042, 0.217	0.293	2.926*				
TAS DDF	HADS-Anx	0.088	-0.063, 0.239	0.127	1.150	0.076	2.091	0.019	2.551
	HADS-Dep	0.007	-0.165, 0.179	0.009	0.077				
	TIPI-C	0.171	-0.325, 0.668	0.075	0.683				
	TIPI-E	-0.055	-0.402, 0.291	-0.032	-0.316				
	AAQ-II	0.044	-0.011, 0.100	0.200	1.597				
TAS EOT	HADS-Anx	-0.238	-0.404, -0.072	-0.299	-2.835*	0.130	6.441**	0.010	1.509
	HADS-Dep	-0.149	-0.334, 0.035	-0.179	-1.603				
	AAQ-II	0.034	-0.021, 0.088	0.132	1.228				
TAS Total	HADS-Anx	0.148	-0.201, 0.496	0.084	0.838	0.132	9.877**	0.063	9.500*
	CFQ	0.187	0.067, 0.307	0.308	3.082*				
TAS DIF	HADS-Anx	0.166	-0.098, 0.429	0.120	1.244	0.321	20.352**	0.122	23.256**
	HADS-Dep	0.090	-0.177, 0.356	0.062	0.666				
	CFQ	0.213	0.126, 0.301	0.449	4.822**				
TAS DDF	HADS-Anx	0.074	-0.083, 0.231	0.107	0.931	0.076	2.095	0.019	2.569
	HADS-Dep	0.029	-0.137, 0.195	0.040	0.348				
	TIPI-C	0.203	-0.303, 0.708	0.088	0.794				
	TIPI-E	-0.096	-0.429, 0.238	-0.056	-0.568				
	CFQ	0.046	-0.011, 0.102	0.191	1.603				

Table 4 (continued)

Outcome	Predictors	<i>B</i>	95% CI	β	<i>t</i>	R^2	<i>F</i>	ΔR^2	ΔF
TAS EOT	HADS-Anx	-0.242	-0.415, -0.069	-0.303	-2.764**	0.127	6.228**	0.006	0.947
	HADS-Dep	-0.126	-0.301, 0.049	-0.152	-1.426				
	CFQ	0.028	-0.029, 0.086	0.103	0.973				

TIPI ten-item personality inventory, *O* openness to experience, *C* conscientiousness, *E* extraversion, *A* agreeableness, *ES* emotional stability, *HADS* hospital anxiety depression scale, *Dep* depression, *Anx* anxiety, *TAS* Toronto alexithymia scale, *DIF* difficulty identifying feelings, *DDF* difficulty differentiating feelings, *EOT* externally oriented thinking, *AAQ-II* acceptance and action questionnaire II, *CFQ* cognitive fusion questionnaire

* $p < 0.01$, ** $p < 0.001$

Bivariate correlation analyses showed that DIF and DDF were significantly correlated ($p < 0.01$) with AAQ-II and CFQ while EOT was not. It should be stated that difficulty in identifying and differentiating feelings are strongly associated. From this point of view, identifying and differentiating feelings seem relatively closely related, since both explicitly refer to emotions. However, externally oriented thinking specifically assesses a style of thinking (Goerling 2018). In the correlation analysis, both AAQ-II and CFQ showed positive correlations with DIF, DDF, and TAS-Total scores. These findings may also indicate that EA and CF may be more strongly associated with difficulty in identifying and differentiating feelings in alexithymia than EOT.

While AAQ-II and CFQ predicted DIF, the predictive effect on DDF was not found in hierarchical regression analyses. It is also important to note that only CFQ predicted TAS-Total scores. The fact that CF predicted the TAS-Total scores while EA level did not can be explained by EOT style. Interestingly enough, EOT had no relationship with EA and CF in both correlation and regression analyses. These results may be related to personality traits observed in alexithymia. Alexithymic people may have certain personality traits. They may be more focused on their relationship with the environment rather than their inner sensations. Therefore, external factors might influence their attitudes and behaviours to a greater extent (Chen et al. 2011). Because alexithymic individuals desire to adapt to their environment, they attach greater importance to environmental expectations and details rather than their feelings. While an increase in EA in these people brings about a difficulty in identifying feelings, EOT and adaptation to society may play a mediating role in reducing the level of EA (Davydov et al. 2013). Therefore, further research is needed to get a deeper understanding of the effects of EOT style on the level of EA and CF and its role in alexithymia.

These findings also suggest that alexithymia may be a concept closely related to EA and CF. There are various studies on EA and alexithymia in the literature, and they reported significant relationships in this regard (Bilotta et al. 2016; Duarte and Pinto-Gouveia 2017; Leonidou et al. 2019; Panayiotou et al. 2015; Venta et al. 2013;

Zakiei et al. 2017; Younesi et al. 2016). Similarly, our research participants experiencing negative internal experiences would avoid that process by showing a pattern of EA, which would result in alexithymia. In this regard, it may be argued that alexithymia cannot directly affect emotion regulation but can lead to EA by increasing the reluctance to experience negative internal experiences and result in emotion-related disorders. In line with previous research results (Bilotta et al. 2016; Venta et al. 2013), current findings showed that EA is closely related to difficulty in identifying feelings. It may be inferred that rigid avoidance patterns of unwanted internal events may interfere with the process of learning to identify emotions, which is an essential skill for healthy emotional regulation. Difficulty in emotion regulation may result in increased depression and anxiety scores. In our study, the alexithymic group had higher anxiety and depression levels. Besides, as alexithymic traits, difficulty in identifying and differentiating feelings had positive correlations with anxiety and depression scores as well as EA and CF levels.

CF, which is another psychological inflexibility process like EA, might also predict difficulty in identifying feelings at a significant level. CF may be conceptualized as the effect of the content of a thought or a verbal stimulus on a particular behaviour of the individual. A person who is fused with their thoughts would exhibit a set of dysfunctional behaviours that is not relevant to the present context but to the direction of their thoughts (i.e., their rules). Given the fact that alexithymic individuals have avoidance-related practices and beliefs, they may be expected to be in fusion with these practices and beliefs. Thus, when negative internal experiences occur, they may exhibit avoidance attitudes instead of identifying them and fail to define their emotions as a result. There are no previously published reports on the impact of CF on alexithymia. However, the current results of the predictive role of CF on alexithymia might provide some confirmatory data to the direction towards dysfunctional avoidant behaviours observed in individuals with alexithymia.

The current study had some limitations. First, the sample size was relatively small, and a larger sample size would allow detecting even more subtle differences. Second, additional scales apart from the ones used in the study, specific to the ACT model might provide a more detailed picture of the relationship between alexithymia and the ACT approach. Third, the results are based on correlational analyses. Therefore, a direct cause-effect result may not be inferred. Fourth, the current study was cross-sectional and a prospective study design, where the participants were offered a course of ACT, would more clearly identify the proposed relationship between alexithymia and psychological inflexibility. Despite these limitations, this study has contributed to the limited number of studies investigating a purely behavioural approach to the phenomenon of alexithymia.

Additionally, the results of the study might also provide data for the psychological treatment of individuals with higher levels of alexithymia, and explicitly focusing on psychological inflexibility in selected individuals might provide clinicians with new ways of dealing with alexithymia and its consequences in therapy. ACT techniques and the model *per se* might help explain the concept of alexithymia in a different manner from the traditional models detailing alexithymia. Therefore, further studies are indicated.

In conclusion, alexithymia may be further conceptualized from the point of view of psychological inflexibility. Additionally, the dimensions of alexithymia may be differentially associated with EA or CF. These results suggest the need for additional research on this subject.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Human Animal Rights 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.

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