

Feeling physical pain while depressed: The effect of alexithymia

Daniela Smirni, PhD

Department of Psychology, Educational
Science and Human Movement
University of Palermo
Palermo, Italy

Janelle N. Beadle, PhD

Department of Gerontology
University of Nebraska at Omaha
Omaha, Nebraska, USA

Sergio Paradiso, MD, PhD

Institute of Cognitive and
Translational Neuroscience
INECO Foundation
Favaloro University
National Scientific and Technical
Research Council
Buenos Aires, Argentina

BACKGROUND: In the literature, depression and alexithymia are associated with greater pain perception. It is unknown whether depression and alexithymia have additive effects on perceived pain.

METHODS: The present study examined 152 participants (96 women, 56 men). Participants completed the 20-item Toronto Alexithymia Scale, the Hamilton Depression Rating Scale, the Brief Pain Inventory, and the NEO Personality Inventory. There were 49 participants in the active phase of depression with either definite ($n = 15$) or no alexithymia ($n = 34$). One hundred three participants showed no depression with either definite ($n = 14$) or no alexithymia ($n = 89$).

RESULTS: Pain severity showed a small but significant relationship with alexithymia and depression. Pain was greater among without alexithymia individuals who were depressed and among with alexithymia individuals who were not depressed. Individuals with combined presence of depression and alexithymia did not report greater pain than participants with either condition alone. Alexithymia, depression, and pain were significantly correlated with greater neuroticism.

CONCLUSIONS: We did not find a summative effect of depression and alexithymia on perceived pain. One interpretation of this result is that neuroticism (a shared personality factor in both depression and alexithymia) may be partially responsible for the effect on pain.

CORRESPONDENCE

Daniela Smirni, PhD
Department of Psychology, Educational
Science and Human Movement
University of Palermo
viale delle Scienze, Ed.15
90128 Palermo, Italy

E-MAIL

daniela.smirni@unipa.it



INTRODUCTION

In recent years, medical and nursing practices have sought to increase attention to physical pain in hospital and clinic settings. This has led to a growth in population-based pain studies. These studies have shown that chronic pain is a highly prevalent condition with a strong impact on individual health, organization of health care services, and society as a whole.¹⁻³ Data from the 2011 National Health and Aging Trends Study show that 52.9% of US adults age ≥ 65 suffer from significant pain.⁴ In Europe, rates of chronic pain are relatively lower (an estimated 20% of the adult population report chronic pain) for younger adults,⁵ but as soon as the age of population increases (European population age >65), prevalence grows (ie, 27%).⁶ Limiting pain severity is known to reduce associated disability.⁷ Therefore, understanding factors that lead to greater pain may help in clinical management of patients' symptoms.

Research has shown that there are significant interactions between pain and emotion.^{8,9} A role for emotional regulation and awareness in pain perception has been widely suggested in the literature.¹⁰⁻¹² Researchers have found changes in emotion perception, regulation, and awareness in individuals who experience both acute depression and alexithymia.^{13,14} For instance, previous research has shown that depression in the acute phase of illness (but not in remission) is associated with reduced perception of positive emotional stimuli.¹⁵ Consistent with this view, alexithymia has been associated with alterations in regions of the limbic system subserving emotion processing.¹⁶

Alexithymia is defined as a set of associated psychological features that includes difficulty identifying and describing feelings and an externally oriented style of thinking,¹⁷ indicating a person's poor ability to recognize personal emotions and express them to others and to see personal implications in the origin of his/her discomfort. Alexithymia may increase the experience of less-differentiated sensations, including pain¹⁸ and the report of somatic complaints.¹⁹ Several studies have reported that individuals who experience migraine²⁰ or headaches²¹ have greater alexithymia scores relative to volunteers without these conditions. A negative effect of alexithymia on treatment for somatoform disorders (a condition that often includes chronic pain) has been reported.²²

Studies also have shown that there is a relationship between acute-phase depression and chronic pain.²³⁻²⁵ During a clinic visit, patients treated for chronic pain often

fulfill criteria for depression.²⁶⁻²⁹ Furthermore, depression is more common among patients with rheumatoid arthritis,³⁰ chronic myofascial pain,²³ and migraines.³¹⁻³³

In clinical settings, when pain is associated with depression, treatment and recovery of depression are hindered. Comorbidity of pain and depression is a predictor of depression treatment failure, relapse, and the development of a chronic medical problem.^{34,35} Alexithymia and depression have small-to-medium degrees of association depending on the population studied.³⁶⁻³⁹ Therefore, depression and alexithymia, individually or in combination, may worsen severity of pain and complicate treatment.

The purpose of this study is to advance our understanding of the interrelationship between the acute phase of depression, alexithymia, and pain, with the aim of improving treatment. To expand and clarify, we present a likely scenario occurring at a given clinic visit: a patient coming for evaluation of depression reports chronic pain upon screening. The clinician knows that pain is a negative prognostic factor for depression^{34,35,40} and that reducing pain may help to improve this patient's outcome. The clinician also knows that depression and alexithymia may be associated^{39,41} and that alexithymia may increase this patient's perception of pain.^{20,21,42} On assessment, the patient has high alexithymia scores. The clinician knows that clinical observations suggest that alexithymia may be reduced by psychotherapeutic treatment.^{43,44}

The next question is whether alexithymia associated with depression is causing the pain to be worse (than depression alone) in this patient. More broadly put: Is pain greater among patients with alexithymia and depression relative to patients with either condition alone? An evidence-based answer to this question will support decision-making to refer the patient for (psychological) treatment for alexithymia,⁴⁵ with the aim of reducing pain and likely improving the outcome of depression.^{26,46} Clinicians and patients alike know that the decision to undergo psychotherapeutic treatment needs to be carefully considered because such treatment requires commitment of significant effort, time, and money.

The decision to refer this patient for psychotherapy for alexithymia would be warranted if individuals with depression and alexithymia experience greater pain relative to individuals with either condition alone (in this latter case, treatment of pain and depression should be sufficient to improve depression outcome). However, at this stage, this information is missing from the literature.

Therefore, the present study is focused on determining whether depression and alexithymia exert additive effects on pain.

There is some evidence that depression in the acute phase and alexithymia may exert cumulative effects on pain. In depression, pain may result from direct effects of sad mood (ie, a “state” effect) altering perception of bodily sensations by somatosensory amplification or the tendency to experience somatic sensations as intense, noxious, and disturbing⁴⁷ (however, see reference 25 for contrasting evidence). Depression’s altered pain threshold²⁶ also may be linked to changes in emotion processing, as indicated by a reduced perception of positively-valenced material in the acute illness phase.¹⁵ Research studies have found that individuals with alexithymia are less aware of personal emotions than those without alexithymia. Research suggests that at the root of alexithymia may be at least 2 mechanisms: emotion perception dysregulation, and symbolic mislabeling of somatic percepts.^{22,41,48-50} Poor emotion self-awareness may increase pain perception, along with an elevation of resting sympathetic arousal.⁵¹ Based on these observations, it has been hypothesized that individuals with depression and alexithymia may report greater pain relative to participants with depression or alexithymia alone.

As reviewed above, because greater physical pain has been associated with both depression and alexithymia, this suggests mechanistically independent or at least additive effects of depression and alexithymia on pain. While the main hypothesis of our study was that depression and alexithymia do exert an additive effect on pain, we also conducted data analyses addresses secondary objectives that we will describe next. It is widely established that some personality factors, including neuroticism, are related to depression and alexithymia^{52,53} and constitute risk factors for greater bodily pain perception.⁵⁴ Neuroticism consists of a personality trait related to (poor) emotional stability and is an individual’s tendency to experience psychological distress.⁵⁵ High scores on measures of neuroticism are common among many psychiatric conditions involving disturbed mood and emotions.^{56,57} Neuroticism is known to be associated with depression in chronic pain disorder,⁵⁴ fibromyalgia,⁵⁸ and posttraumatic stress disorder.⁵⁹ Neuroticism is also associated with alexithymia in chronic pain⁶⁰ and in obsessive-compulsive disorder.⁶¹

Based on this literature, we planned to examine the associations between neuroticism, depression, alexithymia, and pain. Positive associations between

neuroticism, depression, alexithymia, and pain would provide rationale to explain why there may not be an additive effect of depression and alexithymia on pain. No additive effect may be parsimoniously attributed to the shared variance between depression and alexithymia (identified and measured as neuroticism) on pain. Hence, persons with both conditions would not report greater bodily pain relative to persons with either condition alone because depression and alexithymia identify conditions of emotion perception dysfunction that are similar to each other and to the construct of neuroticism.

METHODS

Residents from eastern Iowa or western Illinois (N = 152; 96 women and 56 men, age range 19 to 90, mean age 51.2) participated in this study. Data collection began in 2009 and ended in 2012. Demographic characteristics, past and present medical and psychiatric histories, a complete clinical rating, and a neurologic assessment were recorded for each participant. All participants screened negative for major neurologic or medical illness or comorbid psychiatric disorder (anxiety excluded).

Participants with unipolar depression were recruited from the University of Iowa Department of Psychiatry, Internal Medicine services and the Iowa City VAMC, whereas healthy volunteers were recruited from advertisement in the local newspaper or magazines. Diagnoses of major depressive disorder (MDD) were made by a trained research assistant with a psychiatrist supervision (SP) using the Structured Clinical Interview for DSM-IV-TR criteria.^{62,63} Participants with unipolar MDD were examined either during the acute phase of the illness or while in remission. There were 49 participants in the acute phase of depression (depressed) and 103 participants who were not depressed. The group of participants who were not depressed (non-depressed) included never-depressed volunteers (n = 36) and individuals with history of depression who were currently in full remission (n = 67).

Alexithymia was assessed using the 20-item Toronto Alexithymia Scale (TAS-20),⁶⁴⁻⁶⁷ a widely-used questionnaire based on a 5-point Likert scale where each value corresponds to a specific statement (1 = completely disagree; 2 = partly disagree; 3 = neither agree nor disagree; 4 = partly agree; 5 = completely agree). The TAS-20 measures difficulty identifying feelings (DIF), difficulty describing feeling (DDF), and externally oriented

thinking (EOT). A sample item of the DIF factor is “I have feelings that I can’t quite identify.” An example of the DDF factor is “It is difficult for me to find the right words for my feelings.” An example of the EOT factor is “I prefer talking to people about their daily activities rather than their feelings.”

Based on an agreed-upon international threshold criteria for alexithymia (TAS-20 total score ≥ 61), 29 participants were categorized as having definite alexithymia, and the remainder ($n = 123$) constituted participants without definite alexithymia. This cutoff threshold was determined by 3 methods used in assessing the sensitivity, specificity, and predictive value of a diagnostic test in relation to a consensus decision by 3 clinicians who used interviews to determine “definite alexithymia” or “no alexithymia.”^{64,65,68}

Severity of depression was assessed using the Hamilton Depression Rating Scale (HAM-D).⁶⁹ The HAM-D is a valid and reliable measure of clinical depression that has been used since the 1960s. A detailed review by Bagby et al⁷⁰ reports the psychometric properties of this instrument, including reliability and validity.

Pain was assessed with the Brief Pain Inventory (BPI),^{71,72} which is based on evaluation of subjective pain during the past 24 hours. A pain score ≤ 4 is considered “mild,” 5 to 6 “moderate,” and ≥ 7 “severe.” This pain assessment instrument was originally developed to assess cancer pain; a study validated its psychometric properties and extended its use for patients with chronic nonmalignant pain.⁷³

All participants also filled the 48-item NEO Personality Inventory (NEO-PI).^{74,75} The NEO-PI provides a concise measure of the 5 basic personality factors: (N) Neuroticism vs Emotional Stability; (E) Extraversion or Surgency; (O) Openness to Experience or Intellect; (A) Agreeableness vs Antagonism; and (C) Conscientiousness or Will Achieve.⁷⁶⁻⁷⁸ The instrument uses a 5-point Likert response format. The NEO-PI has shown validity in a number of different contexts, and it is one of the most widely used measures of the Five-Factor Model.⁷⁹ The NEO-PI has demonstrated good reliability^{55,74} and high internal consistency.^{75,80}

Statistical analysis

Chi-square and independent-sample *t* tests were computed on percentages, means, and standard deviations (SDs) to determine group differences between never-depressed and depression in remission on demographic

data and depression severity. In order to test the effects of alexithymia and depression on pain severity, means and SDs and analysis of variance (ANOVA) with pain severity as dependent variable and alexithymia (definite: present/absent) and depression status (current: present/absent) as independent variables were computed. Least significant difference post-hoc tests were used to test the interaction between alexithymia and depression.

Pearson’s correlations were used to measure the strength of relationship between depression, alexithymia, and pain. A set of planned analyses examining relationships between NEO-PI personality factors N (neuroticism) and E (extraversion) and depression, alexithymia, and pain perception was also computed. A *P* value $< .05$ was set as an indication of statistical significance for all analyses. Data were analyzed using SPSS 19.⁸¹

RESULTS

Comparison between never-depressed and full remission participants showed no significant differences on demographic variables (sex: never-depressed male 52.8%, female 47.2%, remission: male 35.8%, female 64.2%, Chi-square₍₁₎ = 2.77, *P* = .10; age: never-depressed mean 54.97 ± 21.42 years, remission mean 50.09 ± 17.72 years, *t* test₍₁₀₁₎ = 1.24, *P* = .22; education: never-depressed mean 15.36 ± 2.68 years, remission mean 15.42 ± 2.42 years, *t* test₍₁₀₁₎ = -.11, *P* = .91) or on HAM-D scores (never-depressed mean 2.94 ± 2.10 vs remission group 3.95 ± 2.92 , *t* test₍₁₀₁₎ = -1.83, *P* = .07). On the other hand, HAM-D scores were significantly different between acute depressed and remission participants (acute depression mean 20.79 ± 6.10 vs remission mean 3.95 ± 2.92 , *t* test₍₁₁₄₎ = 19.73, *P* < .0001). The average score on the HAM-D of participants in remission was 3.95 ± 2.92 , or below the recommended cutoff score (7) to define remission.⁸² Because this study intended to determine the effect of active depression on pain, based on these findings, participants in remission were conflated with never-depressed in a single non-depressed group.

Study group demographic characteristics are shown in TABLE 1. There were 49 participants in the active phase of depression with either definite ($n = 15$) or no alexithymia ($n = 34$). One-hundred three participants showed no depression with either definite ($n = 14$) or no alexithymia ($n = 89$).

TABLE 1
Demographic characteristics

Group	N	M/F	Age		Education	
			Mean	SD	Mean	SD
No alexithymia/no depression	89	34/55	50.9	19.6	15.6	2.4
No alexithymia/depression	34	8/26	50.2	15.9	14.3	2.6
Alexithymia/no depression	14	9/5	57.1	14.8	15.4	2.5
Alexithymia/depression	15	5/10	48.5	16.9	14.2	2.2
All participants	152	56/96	51.2	18.1	15.3	2.5

M: males; F: females; SD: standard deviation.

Testing for additive effects on pain hypothesis

Mean scores for depression, alexithymia, and pain severity are shown in **TABLE 2**. To test the effect of the presence of alexithymia and depression (as independent dichotomous variables) on pain severity, a 2×2 ANOVA was carried out with pain severity as the dependent continuous variable. The general model was significant ($F_{(3,148)} = 5.37$, $P < .01$, $\eta^2 .098$). There were no significant main effects of alexithymia ($F_{(1,148)} = .91$, $P = .34$, $\eta^2 .006$) and depression ($F_{(1,148)} = 1.59$, $P = .21$, $\eta^2 .011$). However, the interaction term between alexithymia and depression was found to be significant ($F_{(1,148)} = 4.64$, $P < .05$, $\eta^2 .030$) (**FIGURE**). Planned follow-up analyses revealed that, in the absence of definite alexithymia, pain severity was on average greater among individuals with current depression relative to non-depressed individuals ($P < .001$). Additionally, in the absence of depression, pain severity was on average greater among individuals with alexithymia relative to individuals without alexithymia ($P < .05$). All other post-hoc comparisons did not show significant effects.

Relationships between neuroticism, depression, alexithymia, and pain

Depression and pain severity were positively correlated ($r = .25$, $P < .01$). Pain severity showed small positive relationships with TAS-20 total score ($r = .16$, $P < .05$) and with DIF score ($r = .20$, $P < .05$). Difficulty describing feeling ($r = .06$, $P = .44$) and EOT ($r = -.01$, $P = .86$) scores were not significantly associated with reported pain. The correlation between NEO-PI neuroticism and pain was positive ($r = .41$, $P < .001$). As expected, positive correlations were also found between neuroticism and depression ($r = .62$, $P < .0001$), and neuroticism and alexithymia ($r = .51$, $P < .0001$). No significant correlation was found between extraversion and pain perception ($r = -.05$, $P = .54$).

DISCUSSION

In our study, we examined the degree to which depression and alexithymia exerted additive effects on pain severity. This question has clinical relevance because extensive research shows an interaction among depression, alexithymia, and pain potentially affecting clinical outcomes.^{39,83} Four groups of participants were examined: participants with acute-phase depression and alexithymia, participants with acute-phase depression and no alexithymia, participants with alexithymia but no depression, and participants without depression or alexithymia. Non-depressed participants included individuals with a history of depression who were in full remission and never-depressed individuals based on demographic and depression severity data as done in previous research.¹⁵

The primary hypothesis of the present study was that individuals with both active depression and alexithymia would report greater pain than individuals with either condition alone. We were unable to find support for this hypothesis. Analysis of the data showed a significant interaction between depression and alexithymia on pain severity, indicating that pain severity was greater among individuals who are depressed without alexithymia and among individuals with alexithymia but without depression. Correlational analyses showed that depression and alexithymia (and its factor difficulty identifying feelings) had a small positive association with pain perception. Lack of additive effect suggests the presence of a common factor sharing variance with alexithymia and depression and predicting greater pain. Neuroticism was indeed positively correlated with depression, alexithymia, and pain severity, which indicates that this may be a psychological factor common to depression and alexithymia in predicting worse pain perception.

TABLE 2
Depression, alexithymia, and pain scores by groups

Group	Depression		Alexithymia		Pain	
	Mean	SD	Mean	SD	Mean	SD
No alexithymia/no depression	2.7	3.4	41.9	8.9	1.3	1.9
No alexithymia/depression	19.8	5.5	48.8	8.7	2.8	2.7
Alexithymia/no depression	8.4	9.3	65.2	6.1	3.2	2.5
Alexithymia/depression	21.7	5.5	68.1	4.9	2.3	2.1
All participants	8.9	9.4	48.4	12.6	1.9	2.3

SD: standard deviation.

Limitations

Before discussing these results, some limitations of the present study need to be highlighted. First, pain in the present sample was generally mild to moderate. Individuals came for clinic visits with complaints of depressed mood, not primarily for pain. Further studies are needed to observe the extent to which these results extend to individuals who experience more severe pain. Pain assessment referred to pain experienced during the last 24 hours. Further research may include measurement of online pain perception or pain over a longer time span (ie, one week or longer). The analyses in the present study are correlational in nature. No direct cause/effect should be drawn from these analyses. Effects of prior episodes of depression were not included in the analyses because our main interest was to observe the effect of current depressed mood on pain. There is a controversy on the exclusive use of self-reporting tools for the measurement of alexithymia. While this should be kept in mind when evaluating the results of our study, there is evidence that at least in somatoform disorders (autonomic dysfunctions, somatoform pain disorders, or dissociative disorders),⁸⁴ alexithymia assessed with self-report (TAS-20) or interviewer-based measures (Affect Consciousness Interview)⁸⁵ provides converging results.

Pain has been widely studied in depression and alexithymia. Chronic pain is often present among individuals with depression, and vice versa.^{86,87} Rheumatoid arthritis, for instance, is a clinical condition where the association of pain and depression has been well established.^{30,88} Physical pain may be a contributing factor to depression.

Furthermore, depression, anxiety, negative emotions, and catastrophizing beliefs about pain associated with depression may elevate perception of physical pain and negatively impact pain treatment and recovery.^{12,34,35,40,89,90} Physical chronic pain has also been positively associated

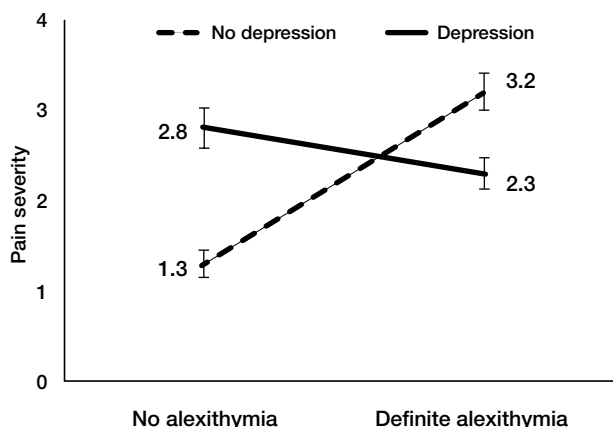
with alexithymia.^{19,91,92} It has been widely shown that alexithymia is greater among patients with several chronic pain conditions, including chronic myofascial pain,²³ low back pain,⁹³ fibromyalgia,⁹⁴ cancer pain,^{95,96} rheumatoid arthritis,⁹⁷ and migraine headaches.⁹⁸

Relative to these findings in the literature, the results of the present study were somewhat counterintuitive. Coexistence of alexithymia and depression was not associated with increased pain perception. In other words, experiencing both depression and alexithymia did not linearly increase bodily pain perception. We found that the highest scores on the pain perception scale were recorded for participants who had depression without alexithymia and participants with alexithymia who showed no current depression. As expected, individuals without alexithymia and no depression reported the lowest pain perception.^{42,98} Consistent with these findings, there were positive relationships between depression, alexithymia, and pain severity (of small effect size).

How can we explain the lack of additive effect of depression and alexithymia on pain? Depression is widely known to increase both the risk for physical pain⁹⁹ and the development of chronic bodily pain.¹⁰⁰ Depression alters emotion processing of positively-valenced material,¹⁵ sensitizing individuals towards more negative experiences and outcomes.¹⁰¹ However, not all studies are consistent with this view.²⁶ Some studies have shown that depression may increase the pain threshold in response to noxious stimulation.²⁵ By this mechanism, some individuals with depression who were included in our sample may have reduced the expected strength of the depression severity/pain relationship.

In the present study, the personality factor neuroticism was significantly associated with both depression and alexithymia, in addition to physical pain severity. Thus, positive

FIGURE

Effects of alexithymia and depression on pain severity

Error bars indicate standard errors. Post-hoc analyses: without alexithymia, pain is on average greater among individuals with depression relative to non-depressed individuals ($P < .001$). Additionally, in the absence of depression, pain is greater among individuals with alexithymia relative to individuals without alexithymia ($P < .05$). All other post-hoc comparisons were not significant.

associations of neuroticism with depression, alexithymia, and pain suggest a parsimonious hypothesis for a common factor linking depression and alexithymia to pain in a non-additive manner. This view is supported by a solid line of research showing the association of neuroticism with alexithymia.^{52,53} People with high neuroticism scores tend to be diagnosed with somatic disorders and often express negative affect, including sadness, embarrassment, and fear.^{55,102} Neuroticism, as a trait of negative affectivity, generally is associated with negative outcomes in many conditions, including poor pain perception and poor quality of life.⁵²

CONCLUSIONS

In summary, while the literature suggests depression and alexithymia may exert effects on pain perception through purportedly differing mechanisms, our study showed that their simultaneous presence was not associated with greater pain report relative to either condition alone. Our results suggest that reduction of alexithymia to lessen pain among individuals with coexistent depression is not needed (treatment of alexithymia may indeed have other effects not examined here). The reason behind the lack of summation effects of depression and alexithymia on pain severity may be the personality trait of neuroticism, which shares a significant amount of variance with depression and alexithymia and is on its own a significant predictor of greater pain perception. Future research is needed to prospectively examine the extent to which therapeutic efforts to reduce neuroticism may also reduce pain. ■

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