Investigating Exercise for Anxiety and Depression Treatment: A Case Report

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PATIENT BACKGROUND

Mr. PB is a 59-year-old married father of four, diagnosed with anxiety and depression in January 2018. His past medical history is significant for coronary artery disease, congestive heart failure, hypertension, hypercholesterolemia, smoking (quit December 2017), and Canadian Cardiovascular Society Class III angina.

He was seen in the Department of Psychology for a screening interview prior to entry into a behavior change program. During the interview he described himself as "quiet and a worrier." His wife described him as a "perfectionist and stubborn." He admitted to sleeping difficulties and feelings of sadness and hopelessness. Psychometric evaluation revealed moderate elevations of psychoticism, anxiety, obsessive-compulsiveness, and severe elevations of somatization and depression. The final impression was Type-A behavior, depressive disorder, and panic disorder.

Due to reports of snoring and sleeplessness, it was recommended that he be evaluated for sleep apnea. To evaluate for depression, a staff psychologist suggested that he be prescribed a selective serotonin reuptake inhibitor (SSRI), and he was encouraged to begin a mild exercise program. He was later prescribed a benzodiazepine for anxiety and a hypnotic for insomnia.

A catheterization performed in March 2018 showed stenoses of 60% in the left main coronary artery and 60% in the left circumflex coronary artery. In addition, there was a complete occlusion at the ostium of the left anterior descending artery, the ostium of the right coronary artery, and both saphenous vein grafts from a prior coronary artery bypass surgery. In April 2018, he had a cardiopulmonary exercise test that revealed ST segment depression consistent with ischemia as well as reported angina at peak exercise. Peak VO_2 was 14.8 $mL \cdot kg^{-1} \cdot min^{-1}$, peak heart rate was 89 $b \cdot min^{-1}$, and peak blood pressure was 118/70 mm Hg.

During an office visit in November 2018, his body mass was 84 kg (184.4 lb), heart rate was 64 $b \cdot min^{-1}$, and blood pressure was 108/56 mm Hg. His medications were isosorbide mononitrate, atenolol, ramipril, simvastatin, zolpidem, and clorazepate.

Mr. PB was encouraged to increase his daily physical activity and to exercise at least 3 days per week. He was instructed to maintain his exercise intensity 10 beats below his ischemia threshold (i.e., <79 $b \cdot min^{-1}$) and to take a prophylactic nitroglycerin if he anticipates that a certain activity will produce angina. Although he continued his attempts to be physically active, he remained markedly limited, secondary to dyspnea and angina.

DISCUSSION

Epidemiology

Mental illnesses, such as depressive and anxiety disorders, are functional impairments due to perturbations of one or more of the following: biological function, psychodynamic adaptation, learned behavior, genetics, and social/environmental conditions (1). Depression is a mood disorder characterized by persistent sadness or depressed mood and loss of interest or pleasure in normal daily activities.

Types of depression include major depression, dysthymia, and bipolar disorder. Common anxiety disorders include generalized anxiety disorder, panic disorder, phobias, and obsessive-compulsive disorder. Symptoms consistent with irrational fear and arousal of the autonomic nervous system are common in anxiety disorders.

Major depressive disorder (MDD) is a highly prevalent condition, affecting over 17 million people annually in the United States, with less than 50% of those affected receiving

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Conflicts of Interest: None.

ELEMENTS IN ANXIETY AND DEPRESSION

- Depression is characterized by persistent sadness or depressed mood and loss of interest or pleasure in normal activities.
- Women are more likely to seek help for treatment for anxiety and depressive disorders than are men.
- The etiology of anxiety and depression resides in genetic, psychological, social, and environmental factors.
- Depression is strongly associated with high rates of sedentary behavior and low levels of physical activity.
- There are other modifiable risk factors that contribute to depression, including poor sleep, smoking, and poor dietary intake.
- Depression is a common comorbidity with other mental disorders and chronic diseases, including diabetes.
- Anxiety is characterized by unpleasant feelings of apprehension and thoughts of worry that are accompanied by sympathetic nervous system activation, which may be mimicked by physiologic pathologies and drugs.
- Onset and severity of symptoms of both anxiety and depression vary between individuals and across time.
- Commonly associated with poor physical health including metabolic syndrome and cardiovascular disease.

treatment. The prevalence of MDD is estimated about 1 in 5 in high-income countries and 1 in 27 in low-income settings (1). Anxiety disorders are also highly prevalent, affecting approximately 19 million Americans, making it the most common type of mental illness. The estimated cost of anxiety disorders is approximately $50 billion annually. Clinically, anxiety and depressive disorders are typically classified as "mild, moderate, or severe" depending on the level of psychosocial impairment.

Both men and women experience anxiety disorders; however, women have a higher incidence. Women are also twice as likely as men to experience clinically significant depression. Anxiety and depression disorders are not mutually exclusive, since some patients with clinically significant depression also experience anxiety.

Additionally, depression among individuals with coronary heart disease is approximately 40%, with the risk of major depression 5-fold greater than in the general population (2). Further, individuals who are diagnosed with either depression or anxiety are at greater risk of all-cause mortality (3).

Etiology

Historically, the causes of anxiety and depression were thought to lie in the psychology of the patient, with treatment focused on understanding and treating the root cause. More recently, however, scientists have gained a greater understanding of the biological basis for these disorders and pursued new avenues of treatment with increasing success.

Depression is known to occur more often in some families and may therefore have a genetic basis. Mental illness is associated with poor cardiometabolic outcomes, with approximately 30% of people with MDD also having metabolic syndrome, which is significantly greater than people without MDD (4,5). Physical illnesses—such as heart disease, cancer, and obstructive lung disease—are also associated with an increased risk for depression.

Men, partly due to stigma and the conversation around mental illness, may be less likely to seek help or report experiencing depression. Women, on the other hand, are twice as likely as men to experience or report experiencing depression.

Anxiety disorders are characterized by unpleasant feelings of apprehension and thoughts of worry. They stem from irrational fears, possibly the result of prior conditioning that established specific neural pathways in the brain. Once established, these pathways are difficult to overcome, and their presence makes normal daily functioning difficult for many and impossible for some. Physiological pathologies such as hyperthyroidism or the use of legal/illegal substances (e.g., cocaine, steroids) may elicit or mimic anxiety. The physiological basis of primary anxiety disorders remains elusive.

In addition, chronic illness commonly presents as a risk factor for major depression. Both depression and anxiety are commonly associated with poor physical health including an increased risk of cardiometabolic diseases such as type 2 diabetes, obesity, and cardiovascular disease (6). These diseases contribute to the significant reduction in life expectancy seen in people living with mental illness (7).

Clinical Manifestations

Onset and severity of symptoms vary across individuals and across time. The more common symptoms of clinical depression are presented in the next section. Not all individuals will experience all symptoms, but clusters of symptoms are frequently evident. The symptoms of anxiety disorders are centered on a patient's fear. Symptoms often depend on the type of anxiety disorders. Table 1 provides a synopsis of symptoms relevant to anxiety disorders.

Diagnosis

A diagnosis of depression usually begins with a physical examination and laboratory tests to rule out medical conditions or medications that may produce similar symptoms. Assuming no illness is identified, a thorough history and interview of the patient is warranted. Quantifying the frequency, duration, and onset of symptoms is important, along with a history of substance abuse and whether there have been thoughts of suicide. Data concerning any family history of depressive disorders are also useful for making a proper diagnosis.

There are several self-report measures to assess the presence and severity of depressive symptoms. These

TABLE 1. Common symptoms of anxiety disorders.

Anxiety Disorders	Symptoms
Panic disorder	Intense fear accompanied by physical symptoms such as chest pain, palpitations, dyspnea, or dizziness.
Obsessive-compulsive disorder	Repeated, unwanted thoughts or compulsive behaviors.
Phobias	Disabling, irrational fear where little danger exists, leading to avoidance of objects or situations. Avoiding social situations for fear of scrutiny, embarrassment, or humiliation.
Generalized anxiety disorder	Constant, exaggerated thoughts about routine life that last 6 months or longer, often accompanied by physical symptoms of fatigue, trembling, or muscle tension.

measures include the Beck Depression Inventory – II (BDI-II)(8), Kessler 10 (K-10) (9), The Patient Health Questionnaire (PHQ-9) (10), Center for Epidemiological Studies Depression Scale (CES-D) (11), and the Hospital Anxiety and Depression Scale (HADS) (12). These measures are not diagnostic tools but may be used to guide decision-making for treatment approaches for allied health professionals.

Symptomatic criteria for the diagnosis of depression include the presence of a depressed mood or a loss of interest or pleasure in normal activities, plus four or more of the symptoms listed in the box below that persist for at least 2 weeks.

SYMPTOMS OF CLINICAL DEPRESSION

- Persistent sadness, anxiousness, or "empty" mood
- Feelings of hopelessness or pessimism
- Feelings of guilt, worthlessness, or helplessness
- Loss of interest or pleasure in hobbies or activities that were once enjoyed, including sex
- Decreased energy, increased fatigue, and feeling "slowed down"
- Difficulty concentrating, remembering, or making decisions
- Insomnia, early-morning awakening, or oversleeping
- Loss or gain of appetite and/or weight
- Thoughts of death or suicide; suicide attempts
- Restlessness or irritability
- Persistent physical symptoms that do not respond to treatment, such as headaches, digestive disorders, and chronic pain (2)

The diagnosis of anxiety disorders often follows a pattern similar to the one used to diagnose depression. Since each anxiety disorder has its own manifestations, readers are referred to the Diagnostic and Statistical Manual of Mental Disorders – 5 (DSM-5) for a comprehensive review (13). Suffice it to say that anxiety symptoms, avoidance behaviors, and increased arousal are common to many of the anxiety disorders.

Treatment

The treatment for depression may include antidepressant medications and/or psychotherapy. Types of medications used to treat depression include monoamine oxidase inhibitors (MAOIs), tricyclic antidepressants (TCAs), selective serotonin reuptake inhibitors (SSRIs), serotonin norepinephrine reuptake inhibitors (SNRIs), and atypical antidepressants.

While MAOIs and TCAs have been used for a longer period of time, the newer SSRIs and SNRIs have fewer side effects and are better tolerated by many patients. Psychotherapy, particularly cognitive-behavioral therapy (CBT) and interpersonal therapy (IPT), have been successful in treating depression.

Coronary artery disease complicates the treatment process of depression. The use of tricyclic antidepressants (TCAs) and monoamine oxidase inhibitors (MAOIs) have been discouraged for patients with cardiac disease due to adverse events (e.g., QT interval prolongation, hyper/hypotension, arrhythmias) (14). Sertraline, an SSRI, is established as a safe medication to treat depression for cardiac patients (15). However, its effectiveness in significantly reducing depressive symptoms is not definite as many patients may not respond to, or tolerate, antidepressants, leading to drop-outs and reductions in adherence to medication.

Anxiety disorders are also treated with psychotherapy and/or pharmacotherapy. Among patients being treated for anxiety, cognitive-behavioral therapies are the most common forms of psychotherapy. Medications used to treat anxiety disorders include benzodiazepines, antidepressants, and buspirone.

CLINICAL EXERCISE IMPLICATIONS

Exercise Testing

Guidelines outlining indications for a graded exercise test should be applied to individuals diagnosed with anxiety or depression who intend to start an exercise program (16). Exercise testing, whether maximal or submaximal, may be useful in developing an exercise prescription, quantifying functional capacity, identifying appropriate exercise-related goals, and providing an outcome measure. Exercise testing may include an aerobic test to determine cardiovascular fitness, strength and balance testing, and functional and flexibility assessments.

Exercise Training

There is an increasing body of evidence supporting the role of exercise for improving mental health outcomes for those

living with mental illness (17). Exercise has been shown to be an effective component of treatment. Blumenthal et al. (18) was the first to compare pharmacotherapy and exercise by randomizing 156 individuals (age = 57 ± 7 y; 28% men) with major depressive disorder to *a*) aerobic exercise training (30 min, 3 d·wk^{-1}), *b*) antidepressants (sertraline), or *c*) combination exercise training and antidepressant (19). Dropout rate was 20% and was similar for all groups. While reductions in depression scores were more rapid among those taking antidepressants, both the combination group and the exercise-alone group showed similar significant reductions in depression scores. Additionally, both intervention groups showed improvements in peak VO_2 (9%–11%) compared to the control group.

Babyak et al. (19) followed up with patients in the above trial by Blumenthal et al. at 6 months after the initial study period. Based on depression scores, patients in the exercise-only group were six times more likely to be partially or fully recovered at 6 months. Additionally, fewer patients in the exercise-only group relapsed after the intervention. Among patients randomized to the other therapy options, exercise was recommended at the end of the clinical trial. Exercise compliance was 64%–66% for both groups using exercise training. Among patients in the medication group, 44% began a home exercise program. At 6 months, home exercise was associated with fewer depression diagnoses.

To compare the effects of exercise training versus a standard drug treatment strategy in patients with panic disorder, Broocks et al. (20) randomized 46 patients to 10 weeks of aerobic exercise training and clomipramine or a placebo. Group dropout rates were 31% for exercise, 27% for placebo, and 0% for clomipramine. In comparison to placebo, both the exercise and clomipramine groups showed significant reductions in symptoms. However, these reductions occurred earlier and were more effective in the clomipramine group.

Trivedi et al. (21) later found that exercise can also be an effective augmentation to treatment for people with treatment-resistant depression. This study reported that for patients performing 12 weeks of structured exercise training at either a high (16 kcal per kg per week expended) or low (4 kcal per kg per week expended) program, there was an increased rate of depression remission, with a trend toward better outcomes in the high-dose group.

Finally, a recent meta-analysis (22) examined 6 randomized controlled trials (20,23–27) on exercise interventions for anxiety and stress related disorders. Of those studies, exercise had a moderate effect on the reduction of anxiety symptoms that was similar in magnitude to medication treatments such as paroxetine, fluoxetine, quetiapine, fluvoxamine, and venlafaxine (28).

Exercise Prescription

There is no one-size-fits-all prescription for people diagnosed with anxiety or depressive disorder. However, most studies suggest that a general aerobic and resistance training program 3 to 5 times per week for 45 to 60 min can improve symptoms of both depression and anxiety (29). That said, it remains unclear whether a threshold of exercise to elicit an antidepressant response exists or whether one type of exercise is superior to another. Foremost, the exercise should be designed to encourage regular participation and foster long-term compliance. It is important to find the type of exercise people enjoy so they are more likely to maintain it. Cardiorespiratory, strength, and flexibility exercises (such as yoga) can all be of benefit for this population.

The overall consensus for effective exercise for the treatment of depression is not substantially different to that of the general population (30). While the current guidelines for the general population recommend 150 min of moderate physical activity per week or 75 min of vigorous activity—any increase in physical activity levels is valuable. In fact, as little as 1 h of exercise per week may help prevent depression (31). It is also important to remember that those with a mental illness usually have low cardiorespiratory fitness, so it would be more feasible starting with low-intensity exercise (such as walking) a few days a week and increasing gradually.

Low mood and stress have been identified as the most prevalent barriers to physical activity in people with severe mental illness, followed by a lack of support (32). It has been suggested that increasing autonomous motivation may be the most important component involved in increasing and maintaining physical activity levels in this population (33). It is recommended that exercise be prescribed with some level of supervision from an exercise professional, at least initially, who can help provide education and set realistic goals.

Since social support is a strong predictor of exercise adoption and maintenance, encouraging people with mental illness to exercise with friends or family or in a group situation may increase reductions in symptoms and increase the chances of maintenance. Finally, encouragement and acknowledgement of progress no matter how small should be promoted.

KEYS TO EXERCISE TESTING AND TRAINING IN PERSONS WITH ANXIETY OR DEPRESSION

- Exercise testing may be useful in developing an exercise prescription, quantifying functional capacity, identifying appropriate exercise-related goals, and providing an outcome measure.
- Persons diagnosed with anxiety or depression should be encouraged to increase their physical activity.
- Cardiorespiratory, strength, and flexibility exercises should be incorporated into the exercise prescription.
- The emphasis should be on regular participation and long-term compliance.
- Identify barriers to exercise, thereby limiting the effects of negative mood changes on compliance.
- Some patients may benefit from tracking of patient-reported mood changes before and after an exercise session.

SUMMARY

People diagnosed with anxiety or depression can benefit both physiologically and psychologically from exercise training. Special consideration should be given to mechanisms that may improve long-term compliance. These people may require additional encouragement, reassurance, and feedback relative to their progress toward identified goals.

REFERENCES

1. Thornicroft G, Chatterji S, Evans-Lacko S, Gruber M, Sampson N, Aguilar-Gaxiola S, Al-Hamzawi A, Alonso J, Andrade L, Borges G, Bruffaerts R, Bunting B, de Almeida JM, Florescu S, de Girolamo G, Gureje O, Haro JM, He Y, Hinkov H, Karam E, Kawakami N, Lee S, Navarro-Mateu F, Piazza M, Posada-Villa J, de Galvis YT, Kessler RC. Undertreatment of people with major depressive disorder in 21 countries. Br J Psychiatry. 2017;210(2):119–24.
2. Carney RM, Freedland KE. Depression in patients with coronary heart disease. Am J Med. 2008;121(11):S20–7.
3. Watkins LL, Koch GG, Sherwood A, Blumenthal JA, Davidson JR, O'Connor C, Sketch MH. Association of anxiety and depression with all-cause mortality in individuals with coronary heart disease. J Am Heart Assoc. 2013;2(2):e000068.
4. Vancampfort D, Correll CU, Wampers M, Sienaert P, Mitchell AJ, De Herdt A, Probst M, Scheewe TW, De Hert M. Metabolic syndrome and metabolic abnormalities in patients with major depressive disorder: a meta-analysis of prevalences and moderating variables. Psychol Med. 2014;44(10):2017–28.
5. Vancampfort D, Correll CU, Galling B, Probst M, De Hert M, Ward PB, Rosenbaum S, Gaughran F, Lally J, Stubbs B. Diabetes mellitus in people with schizophrenia, bipolar disorder and major depressive disorder: a systematic review and large scale meta-analysis. World Psychiatry. 2016; 15(2):166–74.
6. Vancampfort D, Stubbs B, Mitchell AJ, De Hert M, Wampers M, Ward PB, Rosenbaum S, Correll CU. Risk of metabolic syndrome and its components in people with schizophrenia and related psychotic disorders, bipolar disorder and major depressive disorder: a systematic review and meta-analysis. World Psychiatry. 2015;14(3):339–47.
7. Lawrence D, Hancock KJ, Kisely S. The gap in life expectancy from preventable physical illness in psychiatric patients in Western Australia: retrospective analysis of population based registers. Br Med J. 2013;346.
8. Beck AT, Steer RA, Brown GK. Beck depression inventory-II. San Antonio, TX: Psychological Corporation; 1996.
9. Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand SL, Walters EE, Zaslavsky AM. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. Psychol Med. 2002;32(6):959–76.
10. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Int Med. 2001;16(9):606–13.
11. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Appl Psychological Measure. 1977;1(3):385–401.
12. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand. 1983;67(6):361–70.
13. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5). 5th ed. Washington, DC: American Psychiatric Pub; 2013.
14. Waring WS. Clinical use of antidepressant therapy and associated cardiovascular risk. Drug Health Patient Saf. 2012;4:93–101.
15. Glassman AH, O'Connor CM, Califf RM, Swedberg K, Schwartz P, Bigger JT Jr, Krishnan KR, van Zyl LT, Swenson JR, Finkel MS, Landau C, Shapiro PA, Pepine CJ, Mardekian J, Harrison WM, Barton D, Mclvor M; Sertraline Antidepressant Heart Attack Randomized Trial (SADHEART) Group. Sertraline treatment of major depression in patients with acute MI or unstable angina. JAMA. 2002; 288(6):701–9.
16. Riebe D, Ehrman JK, Liguori G, Magal M. ACSM's guidelines for exercise testing and prescription. 10th edition. Philadelphia: Lippincott Williams & Wilkins; 2018.
17. Rosenbaum S, Tiedemann A, Sherrington C, Curtis J, Ward PB. Physical activity interventions for people with mental illness: a systematic review and meta-analysis. J Clin Psychiatry. 2014;75(9):964–74.
18. Blumenthal JA, Babyak MA, Doraiswamy PM, Watkins L, Hoffman BM, Barbour KA, Herman S, Craighead WE, Brosse AL, Waugh R, Hinderliter A, Sherwood A. Exercise and pharmacotherapy in the treatment of major depressive disorder. Psychosom Med. 2007;69(7):587–96.
19. Babyak M, Blumenthal JA, Herman S, Khatri P, Doraiswamy M, Moore K, Craighead WE, Baldewicz TT, Krishnan KR. Exercise treatment for major depression: maintenance of therapeutic benefit at 10 months. Psychosomatic Medicine. 2000;62(5):633–8.
20. Broocks A, Bandelow B, Pekrun G, George A, Meyer T, Bartmann U, Hillmer-Vogel U, Ruther E. Comparison of aerobic exercise, clomipramine, and placebo in the treatment of panic disorder. Am J Psychiatry. 1998;155(5):603–9.
21. Trivedi MH, Greer TL, Church TS, Carmody TJ, Grannemann BD, Galper DI, Dunn AL, Earnest CP, Sunderajan P, Henley SS, Blair SN. Exercise as an augmentation treatment for nonremitted major depressive disorder: a randomized, parallel dose comparison. J Clin Psychiatry. 2011;72(5):677–84.
22. Stubbs B, Vancampfort D, Rosenbaum S, Firth J, Cosco T, Veronese N, Salum GA, Schuch FB. An examination of the anxiolytic effects of exercise for people with anxiety and stress-related disorders: a meta-analysis. Psychiatry Res. 2017;249:102–8.
23. Gaudlitz K, Plag J, Dimeo F, Ströhle AJD. Aerobic exercise training facilitates the effectiveness of cognitive behavioral therapy in panic disorder. Depress Anxiety. 2015;32(3): 221–8.
24. Herring MP, Jacob ML, Suveg C, Dishman RK, O'Connor PJ. Feasibility of exercise training for the short-term treatment of generalized anxiety disorder: a randomized controlled trial. Psychother Psychosom. 2012;81(1):21–8.
25. Merom D, Phongsavan P, Wagner R, Chey T, Marnane C, Steel Z, Silove D, Bauman A. Promoting walking as an adjunct intervention to group cognitive behavioral therapy for anxiety disorders—a pilot group randomized trial. J Anxiety Disord. 2008;22(6):959–68.

26. Powers MB, Medina JL, Burns S, Kauffman BY, Monfils M, Asmundson GJ, Diamond A, McIntyre C, Smits JA. Exercise augmentation of exposure therapy for PTSD: rationale and pilot efficacy data. Cogn Behav Ther. 2015;44(4):314–27.
27. Rosenbaum S, Sherrington C, Tiedemann A. Exercise augmentation compared with usual care for post-traumatic stress disorder: a randomized controlled trial. Acta Psychiatrica Scandinavica. 2014;131(5):350–9.
28. Bandelow B, Reitt M, Röver C, Michaelis S, Görlich Y, Wedekind DJ. Efficacy of treatments for anxiety disorders: a meta-analysis. Int Clin Psychopharmacol. 2015;30(4): 183–92.
29. Rethorst C, Trivedi M. Evidence-based recommendations for the prescription of exercise for major depressive disorder. J Psychiatric Prac. 2013;19(3):204–12.
30. Stanton R, Reaburn P. Exercise and the treatment of depression: a review of the exercise program variables. J Sci Med Sport. 2013;17(2):177–82.
31. Harvey SB, Øverland S, Hatch SL, Wessely S, Mykletun A, Hotopf M. Exercise and the prevention of depression: results of the HUNT cohort study. Am J Psychiatry. 2018;175(1):28.
32. Firth J, Rosenbaum S, Stubbs B, Gorczynski P, Yung AR, Vancampfort D. Motivating factors and barriers towards exercise in severe mental illness: a systematic review and meta-analysis. Psychol Med. 2016;46(14):2869–81.
33. Vancampfort D, Madou T, Moens H, De Backer T, Vanhalst P, Helon C, Naert P, Rosenbaum S, Stubbs B, Probst M. Could autonomous motivation hold the key to successfully implementing lifestyle changes in affective disorders? A multicentre cross sectional study. Psychiatry Res. 2015; 228(1):100–6.