

Treating depression

Introduction

This activity is about some of the treatments available to those diagnosed with depression. It considers the theories behind the therapies and looks at research data comparing different therapies using questions, discussion and data analysis.

Resources

[Health Talk Online](#) is a valuable source of personal experiences of depression and treatments.

Additional information can be found in [NICE](#) guidelines on the treatment of depression and [Department of Health](#) guidelines on CBT

The activity

Sensitive discussion should be included at some point in the activity if this was not included in the diagnosing depression activity. Allow students, if they wish, to share their ideas on how they should behave if they suspect that one of their friends is depressed. It is also very important to be aware that there may well be a student with some level of depression in the class. Health Talk Online might be a useful starting point. Part 2 – research into effectiveness of treatments is similar to many exam questions. However students will not have met standard deviation before in this course.

Part 1 Theories and treatments

The whole section is best carried out in pairs or small groups with class discussion of the suggested answers. The first activity is to match cause, treatment and evidence. The evidence and treatment boxes given here can be cut up and given to students to match with the suggested causes on the table in the student sheets. This is a short simple activity but makes the point that there are very different schools of thought in studies of mental illness.

Science explanations

Ja Nerve cells (neurons) are specialised cells, the basic unit of the nervous system. They consist of three parts; branched extensions (dendrites) that receive signals from other cells, a cell body that integrates the signals received from dendrites and a fibre of varying length (axon) that transmits signals to other cells including other neurons.

Jf Serotonin can influence a person's mood. Low serotonin levels are implicated in depression, high levels in schizophrenia. Serotonin levels have an effect throughout the brain

Jh Most drugs that influence brain function work by changing levels of neurotransmitters. Two of the ways they may do this are by mimicking neurotransmitters or by affecting their reuptake at synapses. For example; nicotine mimics acetylcholine, anti-depressants inhibit serotonin uptake. All drugs (medical and recreational) that affect the brain have some undesirable side-effects.

How Science Works

Ad A set of repeat measurements can summarised by stating an average value (mean, median, mode) and an indication of the spread of values (range, inter-quartile range, average deviation, standard deviation).

Bg To investigate the hypothesis that a factor increases the probability of an outcome, scientists compare a sample exposed to the factor with a control sample that is not. This is called a cohort study. The two samples should be selected randomly from each population, or carefully matched on all the other factors that might have an effect. To assess the outcome of a cohort study, scientists compare the number of cases in the two groups after a period of exposure. To judge that a factor does affect the outcome, the difference must be big enough not to be attributable simply to normal variation.

BI We are more likely to accept that there is a correlation between a factor and an outcome – and much more likely to believe that the factor is a cause of the outcome – if we can identify a plausible mechanism that would link them.

Cc An event is often explained by relating it to a particular scientific theory (or theories). A scientific theory proposes an underlying process that results in the observations we have made. Many scientific theories involve objects or properties that cannot be directly observed.

Cd Scientists test an explanation by seeing if specific predictions based upon it are in agreement with data from observation or from an experiment (a deliberate intervention to generate data). If data agree with predictions that are very novel or unexpected, this is particularly influential. The aim is to rule out alternative explanations, and so reach a single explanation that most scientists can agree about.

Suggested cause	Evidence	Treatment
Biochemical Low levels of the neurotransmitters serotonin, noradrenaline or dopamine high levels of the stress hormone cortisol.	In about half of patients with depression drugs that boost levels of serotonin seem to reduce depression	Treatment Selective serotonin reuptake inhibitor, SSRI, drugs increase the level of serotonin in the synapses of the brain
Genetic Some genetic mutations may increase predisposition to depression	First degree relatives of severely depressed patients have a greater risk of depression than a random sample of unrelated people	Treatment Complex cause, no therapy yet available that is based on this possible cause.
Psychological A way of thinking that interprets the world in negative terms.	Self report questionnaires show negative thinking. Experimental studies have shown that negative thinking affects mood.	Treatment Cognitive behaviour therapy, CBT, teaches people to reinterpret events in a more positive/realistic light
Social and environmental Emotional experiences such as bereavement or bad childhood experiences such as violence or abuse	Some correlation between serious life events, including bereavement, and unemployment and the onset of depression. Some correlation between difficult childhood and depression	Treatment Psychoanalysis, an exploration and reinterpretation of the patient's past life and their unconscious feelings

Suggested answers to Questions

Part 1

- Earlier diagnostic criteria for depression attempted to distinguish between endogenous depression, with internal biological causes and exogenous depression, caused by life events. Use what you know about health risks from the AS course to suggest why this division is too simple.
Both internal and external factors interact to determine overall health. For example some individuals have a higher risk of developing a disease, such as CHD, because of a genetic predisposition. However lifestyle factors such as diet interact with the genetic risk factors to determine the outcome. Mental health is similar. Some individuals will survive very difficult environmental conditions without mental illness whilst others will be more vulnerable because of their genetic makeup.
- Read the four suggested causes of depression above. Discuss whether any of them seem to provide a complete explanation for the illness.
The first two causes are biological, the other two consider the whole mind, the thinking brain, and how it is influenced by environmental factors. They represent two very different theoretical approaches to mental health. However a combination of these approaches probably comes nearest to the true explanation of depression. Biological factors may increase vulnerability to bad life events. There are as yet no known genes directly linked to depression.

3. There is another treatment that is sometimes used for major depression, electro-convulsive therapy, ECT. This treatment works for some patients but has at least three different explanations on how it works. Do you think it is acceptable to use therapies when we do not understand why they work? *ECT is known to cause seizures in the brain similar to an epileptic fit. The treatment is very controversial because it seems so violent and may cause some memory loss. However it does work for some very troubled people. We do not fully understand how some drugs work. Provided there is good evidence for effectiveness, and this is judged to balance any adverse effects, most people would argue that we should use what works.*
4. Do you think our current explanations of depression can be considered as scientific? Consider the different sorts of causes that are all the subject of active research. (See section 3.5.1 C in the specification, developing and testing scientific explanations.) *This is a difficult question to which there is no direct simple answer. It is intended to make students think about the nature of a scientific explanation in this context. and to recognise that much of the work on the brain is science in the making.*

Scientific understanding of the brain is still at a very early stage. There is no single theory of depression that is agreed on by most scientists working in the field. People from very different disciplines such as psychoanalysis or genetics have all studied the working of the brain using very different approaches and techniques. Neurotransmission in individual neurones is well understood and can be considered an accepted scientific explanation. The bridge between nerve impulses and thoughts, behaviour and memory is less well understood. This neuroscience approach is difficult to integrate with, for example, evidence from psychological experiments. At the moment there are several hypotheses to explain depression but no single, accepted theory. Some of the hypotheses about the causes of depression lead to predictions and can be tested through experiments.

6. (a) Explain how an SSRI increases the levels of serotonin in the synapses. *Refer to textbook Figure 1.17 p. 14. SSRI acts on the serotonin transporters in a similar way to the cocaine shown.*
- (b) Using your knowledge of the action of serotonin explain why serotonin levels are a factor in depression. Textbook p. 4, 10, 14 (some of the references are to dopamine, serotonin is similar in many ways) *Serotonin acts as a neurotransmitter throughout the brain and is known to affect mood. Low levels of serotonin are associated with negative moods such as anxiety and fear.*

Part 2 Research into effectiveness of treatments

7. Discuss the advantages and disadvantages of the two ways of showing the information in Figure 1 and Figure 2. *The graph is quick and simple to understand, it shows the trends of the data clearly and comparisons can readily be made between treatments. The table provides more information and in separate cells which makes it harder to interpret at a glance. However the graph raises many questions about the data, such as sample size and spread of results about the mean, that are answered in the table. The graph exaggerates the differences and therefore the benefits of treatment by starting the y-axis at the lowest data points. The table gives information about the statistical significance of the apparent differences.*
8. In discussing the effectiveness of the treatments which data will you use to:
- (a) decide whether people's depression gets better without treatment over a 12 week period. *Use the placebo group only. Compare depression rating at baseline, at 6 weeks and at 12 weeks. This is not strictly without treatment as the placebo effect may have an influence on outcome.*

(b) decide whether fluoxetine has an effect in reducing the symptoms of depression over a 12 week period.

The fall in depression rating over 12 weeks for those on fluoxetine compared with the fall for those on placebo.

(c) decide whether CBT alone or fluoxetine alone is more effective at reducing the symptoms of depression.

The fall in depression rating over 12 weeks for those on fluoxetine compared with the fall for those on CBT.

9. Summarise the information in Figure 2 A, Depression in teens

All patients improved over 12 weeks including those on placebo. The improvement was fastest in the first 6 weeks. There was no difference between those on CBT and on placebo. Those on fluoxetine alone or with CBT improved more. The combination was slightly more effective than fluoxetine alone.

10. (a) What do the data in Figure 1, including SD values, tell us about the range of suicidal ideas ratings for the CBT + fluoxetine group at the start of the trials?

The high SD values indicate that there is a wide spread of suicidal ideas ratings. [For example 68% of the CBT + fluoxetine group have suicidal ideas ratings between 8.82 (mean – 1 SD) and 45.84 (mean + 1SD)]. The mean therefore gives us very little information about the suicidal thoughts of this group.

(b) The group receiving CBT plus fluoxetine seems to have the greatest reduction in suicidal thoughts after treatment. Do the data in Figure 1 show that everyone on this treatment has a reduction in suicidal thoughts?

The wide spread of ratings at the start shows that some did not have any suicidal thoughts. [2.5% would have ratings of 0 (27.33 – 2SD)] They would obviously not improve. The data we have does not rule out the possibility of no change or an increase in some individuals. We would need information on the change in individuals to draw firm conclusions.

(c) There are reports that SSRIs may actually increase the risk of suicide in a proportion of adolescents with severe depression. Do the data presented in Figure 1 and Figure 2 help us evaluate such reports?

The sample size is quite small so it may not represent the whole population of depressed adolescents. Only 109 adolescents took fluoxetine alone so the sample may not have included any individuals for whom fluoxetine has this effect.

The overall reduction in suicidal thoughts suggests that any increase in risk of suicide must only affect a minority. However the data gives no information on individual changes, only the mean for whole group at start and after 12 weeks. This might mask unusual individuals. The large standard deviations in both sets of data make it possible that some individuals had an increase in suicidal thoughts. We would need more information to decide whether the reports are compatible with the outcome of these trials.

11. If you were depressed and had to make a choice about which treatment to have what factors would you consider before making your decision?

Effectiveness, side effects of drugs, long term dependency on drugs, balance between seriousness of depression and side effects, time required for CBT,

12. If you were in charge of planning health services for people with depression how would the factors you might consider differ from those of a patient?

Cost-effectiveness more important than small differences in effectiveness. Availability and cost of trained staff for CBT.

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This activity is about some of the treatments available to those diagnosed with depression. It considers the theories behind the therapies and looks at research data comparing different therapies.

Part 1 - Theories and treatments

The causes of depression are not well understood. There are several different models that use different sets of theoretical ideas from diverse disciplines.

Some explanations of depression

Suggested cause	Evidence	Treatment
Biochemical Low levels of the neurotransmitters serotonin, noradrenaline or dopamine high levels of the stress hormone cortisol.		
Genetic Some genetic mutations may increase predisposition to depression.		
Psychological A way of thinking that interprets the world in negative terms.		
Social and environmental Emotional experiences such as bereavement or bad childhood experiences such as violence or abuse.		

You are given two sets of cards, one with the evidence and one with the treatments that are used. You have to complete the table above by matching the evidence and the treatment to the suggested cause.

Questions

1. Earlier diagnostic criteria for depression attempted to distinguish between endogenous depression, with internal biological causes and exogenous depression, caused by life events. Use what you know about health risks from the AS course to suggest why this division is too simple.
2. Read the four suggested causes of depression above. Discuss whether any of them seem to provide a complete explanation.
3. There is another treatment that is sometimes used for major depression, electro-convulsive therapy, ECT. This treatment works for some patients but has at least three different explanations on how it works. Do you think it is acceptable to use therapies when we do not understand why they work?
4. Do you think our current explanations of depression can be considered as scientific? Consider the different sorts of causes that are all the subject of active research. (See section 3.5.1 C in the specification, developing and testing scientific explanations.)

The two most widely used therapies for severe depression are CBT and SSRI drugs.

Cognitive Behaviour Therapy (CBT) is intended to help people change how they think (cognitive) and what they do (behaviour). CBT typically involves weekly sessions for between 6 weeks and 6 months.

The [Royal College of Psychiatrists](#) gives the following example of unhelpful and helpful thoughts and actions in response to a situation.

Situation:	You've had a bad day, feel fed up, so go out shopping. As you walk down the road, someone you know walks by and, apparently, ignores you.	
	Unhelpful	Helpful
Thoughts:	He/she ignored me - they don't like me	He/she looks a bit wrapped up in themselves - I wonder if there's something wrong?
Emotional: Feelings	Low, sad and rejected	Concerned for the other person
Physical:	Stomach cramps, low energy, feel sick	None - feel comfortable
Action:	Go home and avoid them	Get in touch to make sure they're OK

5. Think up an example of your own to illustrate how a depressed and a mentally healthy person might interpret a common situation differently.

Fluoxetine (Prozac) is a commonly prescribed SSRI anti-depressant. It only shows benefit about 2 to 4 weeks after starting the treatment although the reasons for this delay are not well understood. It has some side effects that usually decrease with time.

6. (a) Explain how an SSRI increases the levels of serotonin in the synapses.

(b) Using your knowledge of the action of serotonin explain why serotonin levels are a factor in depression. Textbook p. 4, 10, 14 (some of the references are to dopamine, serotonin is similar in many ways)

Part 2 Research into effectiveness of treatments

In an attempt to decide which of the two treatments is more effective in severely depressed adolescents in the USA a study compared the effects of fluoxetine alone, CBT alone, a placebo and the two treatments combined.

Figure 1 Changes in total scores across 12 weeks of treatment

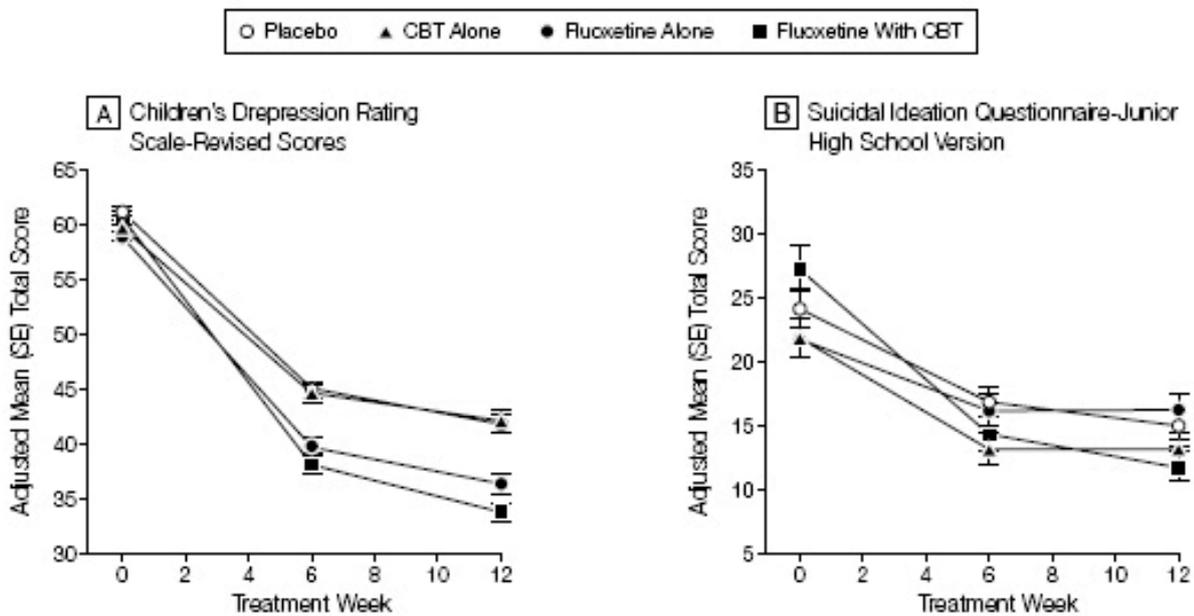
	Number	Mean score on Children's depression rating (Standard deviation, SD)		Mean score on Suicidal ideation rating (Standard deviation, SD)	
		baseline	week 12	baseline	week 12
CBT with fluoxetine	107	60.79 (4.85)	33.79 (8.24)	27.33 (18.51)	11.79 (11.69)
Fluoxetine alone	109	58.94 (4.00)	36.30 (8.18)	21.81 (15.68)	14.44 (11.13)
CBT alone	111	59.64 (4.52)	42.06 (9.18)	21.91 (16.28)	11.40 (10.44)
Placebo	112	61.18 (4.27)	41.77 (7.99)	24.20 (16.46)	15.01 (11.05)

The original paper included data from week 6 as well. This has been left out of Figure 1.

Data from <http://jama.ama-assn.org/cgi/content/full/292/7/807>

The data in Figure 1 are referred to in an article reporting on the research, where they are represented by the graphs in Figure 2.

Figure 2



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7. Discuss the advantages and disadvantages of the two ways of showing the information in Figure 1 and Figure 2.
8. In discussing the effectiveness of the treatments which data will you use to:
 - (a) Decide whether people's depression gets better without treatment over a 12 week period.
 - (b) Decide whether fluoxetine has an effect in reducing the symptoms of depression over a 12 week period.
 - (c) Decide whether CBT alone or fluoxetine alone is more effective at reducing the symptoms of depression.
9. Summarise the information in Figure 2A Depression in teens
10. (a) What do the data in Figure 1, including SD values, tell us about the range of suicidal ideas ratings for the CBT + fluoxetine group at the start of the trials?
 - (b) The group receiving CBT plus fluoxetine seems to have the greatest reduction in suicidal thoughts after treatment. Does this mean that everyone on this treatment has a reduction in suicidal thoughts?
 - (c) There are reports that SSRIs may actually increase the risk of suicide in a proportion of adolescents with severe depression. Do the data presented in Figure 1 and Figure 2 help us evaluate such reports?

Standard deviation is a measure of the spread of values in a data set. Values that are within 1 SD of the mean include 68% of all values, within 2 SD of the mean includes 95% of all values.

If a data set has a large standard deviation this means that many of the results are very different from the mean.

See textbook page 56

11. If you were depressed and had to make a choice about which treatment to have what factors would you consider before making your decision.
12. If you were in charge of planning health services for people with depression how would the factors you might consider differ from those of a patient?