Reducing the stigma of depression through neurobiology-based psychoeducation: A randomized controlled trial

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Aims: Attribution theory claims that people who are stigmatized experience more negative emotional and behavioral reactions from others when they are thought to be responsible for their problems. Accordingly, this study proposed a neurobiology-based psychoeducational intervention, which attempted to reduce people’s blameworthy attitudes toward and social distance from depressed individuals.

Methods: One hundred and thirty-two college students were randomly assigned to an experimental and control group. Participants in the experimental group received a 30-min lecture on neurobiology-based psychoeducation for depressive disorders, and were asked to fill out questionnaires before and 2 weeks after the intervention. The control group, with no intervention, also filled out the same questionnaires before and 2 weeks after the experiment. The main contents of the neurobiology-based psychoeducation concerned the neurotransmission processes and biological mechanisms of depression, in order to emphasize the biological attribution of depression.

Results: An ANCOVA indicated that the neurobiology-based psychoeducational intervention significantly elevated the biological attribution of depression and reduced the social distance from depressed individuals. Psychological blameworthy attitudes toward depression, however, did not significantly change.

Conclusions: Through a brief psychoeducation program about depression, knowledge of neuroscience could lead to positive benefits. Public awareness that depression can be effectively prevented and treated may be a way in which people can accept depressed individuals. Further studies are needed to certify the mechanisms of the effect of neurobiology-based psychoeducation.

Key words: depression, neuroscience, psychoeducation, social distance, stigma.
Social distance that was the most common index used to assess public stigma toward particular groups is defined as a willingness to engage in relationships of varying levels of intimacy with a person. Taking psychiatric disorders as an example, determining whether people are willing to rent a house to depressed individuals, hire them as a nanny, or date them, and so on are part of assessing social distance. According to Weiner’s attribution theory, stigma sufferers experience more negative emotional and behavioral reactions from others when they are thought to be responsible for their problems. In the early years of anti-stigma campaigns, many people claimed that attributing depression to biological causes might reduce its stigma. For instance, the National Alliance on Mental Illness conveys information about depression with medical and biological terms in its brochure, and even points out that ‘scientific research has firmly established that mental illnesses like major depression are biologically based brain diseases.’ Basically, the logic behind this is the proposition that once psychological attribution can be substituted by biological and genetic attributions, psychological blameworthy attitudes and social distances toward depressed individuals would be reduced. It was also found that the more people think depression is caused by a lack of willpower and poor cognitive outlook, the less willing they are to have a close relationship with depressed individuals in their daily lives.

Whether adopting biological attribution indeed indicates a lower degree of stigma, however, is not necessarily supported by correlational studies. One study showed that for people living in western Germany, the greater the extent there was to attribute depression to biological causes and heredity, the greater the social distance was. In contrast, there was no significant correlation for people in eastern Germany. In addition, some studies found there was no significant correlation between the extent of biological attribution and social distance. Another large-scale community study found that, comparing 10-year changes in public attitudes toward depression, possessing a neurobiological concept of depression increased the likelihood of support for treatment but was unrelated to social distance. Therefore, correlational studies show inconsistent conclusions.

In a further review of results of experimental studies, we found that several studies on social distance adopted a method of controlling ‘the extent of attributing depression to genetic heredity’. In her study, Phelan found that social distance to the protagonist was no greater when attributing depression to genetic causes; however, social distances to siblings of the protagonist were significantly greater. Breheny found that social distance significantly increased when attributing depression to genetic factors; however, social distance obviously lessened when attributing schizophrenia to genetic factors. So far, no consistent conclusions have been reached from accumulated experimental studies.

The two above-mentioned experimental studies focused solely on the ‘genetic contribution’ as an independent variable. This manner, deliberately attributing depression to genetic heredity as the only cause, however, may arbitrarily oversimplify the etiology of depression. It ignores the importance of psychosocial influences, and also the interactive processes of stress coping and neurobiological plasticity. It is reasonable that participants in such experiments would change their attribution as to the cause of depression in scenarios through manipulation of some crucial terms. Nevertheless, in real life, it is difficult to convince people that depression is only caused by genetic heredity, and its effect in reducing social distance is uncertain.

In an effort to reduce the stigma of depression, the present study proposes a neurobiological-based psychoeducational program. The rationale to adopt neurobiological knowledge is that people can overcome their stereotype that depression is purely caused by factors like ‘thinking too much’ or ‘not being strong enough,’ to decrease people’s blameworthy attitudes toward depressed individuals and reduce social distances. The contents of the psychoeducational program would potentially make people view depression from the perspective of current neurobiological knowledge, using a concrete and comprehensible method to explain the causes of depression. The main points include the amygdala overreacting when an external stress is judged to be threatening by the frontal lobe, and changes in the body hormones, neurotransmitters, and membrane structure of brain cells. These manifest as sadness, a lack of interest, changes in the diet and sleep, concentration difficulties, and other symptoms of depression. This approach does not ignore the influences of daily life events, nor deny individual differences caused by personal depressive diathesis; however, it puts more emphasis on biochemical re-balancing and the gradual recovery of the neurobiological structure.
through ideal medicine, psychotherapy, stress management, emotion control training, and so on. In this model, depression is reframed as a disease induced by stress and affected by neurobiological and psychological processes, based on neurobiological evidence.

The present study hypothesized that with neurobiology-based psychoeducation, people’s blameworthy attitudes toward depressive individuals and social distances would be lessened after understanding neurobiological explanations of the symptoms, etiologies, and treatments of depression. This study adopted neurobiology-based psychoeducation as a manipulation to increase people’s biological attribution of depression, and to explore its effects on psychological blameworthy attitudes and social distance through a randomized controlled trial.

**METHODS**

**Participants**

Participants in this study were drawn from a university in northern Taiwan. In total, 353 students enrolled in Introduction to Psychology courses were invited, and 132 students joined the study, including 66 in the experimental group and 66 in the control group, 48 of whom were male and 84 female. The average age of participants was 19.6 (standard deviation, 1.6; range, 17–25) years.

**Materials and instruments**

**Neurobiology-based psychoeducation**

Using visual aids of computer presentation software, the program consisted of a 30-min lecture on psychoeducation, including an illustration of symptoms, courses, prognoses, treatments, and help-seeking resources for major depressive disorders. The lecturer (D.Y.H.) was a 5-year licensed clinical psychologist in the department of psychiatry of a general hospital, and was also in the third year of the Ph.D. program of Clinical Psychology at National Taiwan University. The participants were all college students, and the vignette of a typical depressive college client was briefly introduced to help participants understand the symptoms and courses of depression. Second, the lecturer explained possible neurobiological mechanisms and neurotransmitter processes of depressive disorders under long-term life stresses to reframe participants’ concepts of depressive disorders through knowledge of modern neuroscience. Specifically, we showed and illuminated the hypothalamus–pituitary–adrenal axis, neuronal damage induced by long-term stress, the mechanisms of selective serotonin reuptake inhibitors that increase neurotrophic growth factors, the importance of neuroplasticity in recovering from symptoms, changes in brain imaging before and after therapy, and other information which emphasized the disease entity of major depression. Further, current medical and psychological treatments and prevention strategies of depression were illustrated, as well as the effective neurobiological foundations of those interventions. Finally, the lecturer demonstrated available resources from mental-health professionals, and gave participants a note with websites and phone numbers of related mental-health organizations. As mechanisms of brain functioning were mentioned in the presentation, a literacy level of about grade 12 is required to comprehend the psychoeducation program.

**Biological Attribution Scale**

In order to examine whether the psychoeducational intervention achieved a manipulation effect, we adopted the Biological Attribution Scale (BAS) to measure attitudes toward biological attribution to depression. The BAS includes five items on a 5-point Likert-type scale (from 1 [strongly disagree] to 5 [strongly agree]). Examples of the items include ‘Depressive disorder is caused by an imbalance of neurotransmitters in the brain’. The averaged 5-item BAS represents the extent to which participants regard depression as having biological causes. The formal sample of the present study showed a Cronbach’s α of 0.74, and in the sample of the control group, it showed test–retest reliability at an interval of 2 weeks of 0.75.

**Psychological Blame Scale**

In order to examine whether the psychoeducational intervention reduced psychological blame, we adopted the Psychological Blame Scale (PBS) to measure attitudes of psychological blame toward depressive individuals. The questionnaire consists of five items on a 5-point Likert-type scale (from 1 [strongly disagree] to 5 [strongly agree]). Examples of items include ‘Depressive disorder is caused by a mind that is not strong enough’. The averaged 5-item
PBS represents the extent to which participants regard depression as the psychological fault of the depressed individual. The formal sample of the present study showed a Cronbach’s $\alpha$ of 0.72, and in the sample of the control group, it showed test–retest reliability at an interval of 2 weeks of 0.74.

** Desired Social Distance**

Public stigma was assessed by the Desired Social Distance (DSD) questionnaire. Goldstein and Rosselli developed the original questionnaire with eight items on a 7-point Likert-type scale (from 1 [definitely less likely] to 7 [definitely more likely]) to measure the willingness to date, marry, live with, and work on a project with a depressed, compared to a non-depressed, individual. Participants also rated the willingness to have a depressed, compared to a non-depressed, individual as a parent, child, sibling, and friend. The original scale was translated and back-translated to ensure the accuracy of the Chinese version. After all items were averaged, a score of the desired social distance was obtained, with a higher score indicating a greater willingness to approach a depressed individual. Cronbach’s $\alpha$ of the original DSD was 0.87. In the present study, Cronbach’s $\alpha$ of the Chinese translated DSD was 0.89, and the test–retest reliability after an interval of 2 weeks was 0.84.

**Procedures**

The study was approved by the Ethics Committee of the Department of Psychology, National Taiwan University, and participant anonymity was preserved. The study was conducted in October and November 2005. At the beginning of the semester, 353 students enrolled in Introduction to Psychology courses were invited to join the study by email. They were told the title of the study, ‘The Concepts of Depression and Attitudes Toward Depressed Individuals’, and the aims of exploring the correlation between concepts of depression and attitudes toward depressed individuals were explained. Participants would get 2 extra points of the course credit after they completed the study. Participants were randomly assigned to the experimental group ($n = 66$) or control group ($n = 66$) depending on whether their serial number was odd or even. A flowchart of the study is shown in Figure 1. Participants who read and signed an informed consent document in the experimental group were asked to complete the DSD, PBS, and BAS. Next, they received a 30-min neurobiology-based psychoeducational intervention. A lecturer...
addressed all 66 participants of the experimental group at the same time in a classroom at the university. Participants who read and signed an informed consent document in the control group were also asked to complete the same three measures, but received no intervention. At the 2-week follow up, all participants, except four drop-outs in the control group, were re-tested with the same set of questionnaires by an assistant. The reasons that the four individuals dropped out of the study are unknown, but no significant difference in sex, age, BAS, PBS, or DSD existed between the four drop-outs and the other 62 participants who completed the entire study.

Statistical analysis

Computation of all variables was performed with SPSS for Windows 17.0 (SPSS, Chicago, IL, USA). Differences between the experimental and control groups before the intervention were checked by a $t$-test, $\chi^2$ and $F$-test. Moreover, the manipulation effect of the neurobiology-based psychoeducation on the BAS was checked by a dependent $t$-test. Then, an analysis of covariance (ANCOVA) was used to examine whether the intervention effectively changed responses to the PBS and DSD. Two-tailed $Ps < 0.05, 0.01, \text{and} 0.001$ were considered to indicate statistical significance.

RESULTS

Baseline scores on the BAS, PBS, and DSD in Table 1 show that participants favored a biological attribution perspective of depression rather than one that assigned psychological blame, and their willingness to approach a depressed individual tended to be low. Before the intervention, there was no significant difference between the experimental and control groups in any variable except the variable DSD, given the randomization process adopted. Comparing scores of the BAS before and after the intervention, it was found that participants in the experimental group had a significantly higher score at follow up ($t_{[65]} = 4.21, P < 0.001$), while scores of those in the control group did not show a significant change ($t_{[61]} = 0.51, P = 0.62$). These results showed that the neurobiology-based psychoeducation achieved the

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<th>Table 1. Sociodemographic characteristics and comparisons of variables between the experimental and control groups</th>
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<td>Age (mean ± SD; years)</td>
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<td>Desired social distance¶ – Time 2§ (mean ± SD score)</td>
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* $P < 0.05 \quad ** P < 0.01 \quad *** P < 0.001.$
†As measured by the Biological Attribution Scale. Possible scores range from 1 to 5, with a higher score indicating greater biological attribution.
‡The variable, Time 1, was the covariate.
§As measured by the Psychological Blame Scale. Possible scores range from 1 to 5, with a higher score indicating greater psychological blame.
¶As measured by the Desired Social Distance questionnaire. Possible scores range from 1 to 7, with a higher score indicating greater willingness to approach a depressed individual.
goal of manipulation, that is, the extent of biological attribution of depression in the experimental group increased.

As for psychological blame, results showed that there was no significant difference between scores of the psychological blame scale after 2 weeks (PBS-Time 2) of those who underwent the neurobiology-based psychoeducation and those who did not, when scores of the psychological blame scale in the beginning (PBS-Time 1) were used as the covariate. This indicates that participants did not change their psychological blameworthy attitude toward depressed individuals, despite receiving the neurobiology-based psychoeducation.

For those who received the neurobiology-based psychoeducation, DSD-Time 2 was significantly lower than that of the control group after 2 weeks when DSD-Time 1 was used as the covariate. This demonstrates that the neurobiology-based psychoeducation enhanced the willingness of participants to approach depressed individuals. We further explored whether sex was a variable that moderated the effect of psychoeducation on social distance, and found that an interaction between sex (male or female) and group (experimental or control) indeed existed \((F[1, 123] = 7.05, P = 0.009)\). It showed that women benefited from the psychoeducation more than men.

**DISCUSSION**

The results demonstrated that the 30-min neurobiology-based psychoeducation increased participants’ biological attribution of depression 2 weeks after the intervention. Through a brief presentation, concrete scientific evidence indeed made people more greatly attribute depression to biological sources. A previous study also showed that an educational program replaced people’s myths about depression with accurate scientific concepts.\(^7\) Based on concepts of behavioral and cognitive theories, another web-based depression stigma program for graduate medical students and healthcare professionals successfully decreased both the emotional and cognitive components of the stigma associated with depression.\(^25\) A meta-analytical study further demonstrated psychoeducation to be an effective strategy to decrease public stigma toward depression.\(^9\) Therefore, we believe that the way people frame depression can be changed by providing neurobiological knowledge through group psychoeducation.

In contrast to previous findings,\(^{11, 15–18}\) we adopted a randomized experimental design, and the present study found that neurobiology-based psychoeducation could decrease the social distance associated with depression. Previous approaches focused on the genetic attribution,\(^{19, 20}\) by oversimplifying the causes of depression and also making people believe that the disease is difficult to cure,\(^{26}\) leading to an unwillingness to have close relationships with depressed individuals. Adopting a manner through which participants can understand the diagnoses, causes, treatments, and prognoses of major depression, the present study demonstrated a practical program of psychoeducation that effectively reduced the social distance 2 weeks after the implementation.

The program, however, did not achieve the goal of reducing psychological blameworthy attitudes. A previous study found that biological and psychological attributions are not two end-points of a single axis, but two independent constructs.\(^{27}\) It also showed that both biological attribution and psychological attribution increased during the ‘Defeat Depression Campaign’ in England.\(^{28}\) Thus, although people more often attributed depressive disorders to biological sources after the intervention, the extent of psychological attribution did not necessarily decrease. This may be one of the reasons why the psychological blameworthy attitude did not decrease with an elevation of biological attribution. Apparently, there are other variables that may influence the processes between biological attribution and stigma reduction. Further studies are therefore needed to determine these factors, among which, disease persistence may be the most crucial.\(^{19}\) According to Jones’ stigma theory, a stigma should be weakened when the original stigmatized problem becomes less serious.\(^{29}\) Therefore, it is speculated that after understanding neurobiological explanations, people would regard depression as a disease that can be prevented and cured, and then increase their willingness to approach depressed individuals. Breheny’s point also supported this speculation. She alleged that explaining the genetic properties of depression makes people think depression is incurable, and this reduces their acceptance.\(^{20}\) Another study also showed a slightly negative effect of a biomedical model immediately following the educational program.\(^{30}\) However, at the beginning of the study, this possible influential variable was not included. We suggest that the hypothesis still needs to be tested by future studies.
There are some limitations to this study. The sample was composed of college students, so results might not be fully applicable to the general public. Due to differences in educational levels, the effect of neurobiology-based psychoeducation for community residents might not be as effective as that for college students. Despite the score of the DSD decreasing after 2 weeks, it is unknown how long this effect would be maintained, and whether it can increase acceptance in real life. Thus, future studies would benefit from collecting long-term data and assessing behavioral changes. In addition, as only three variables were included in the study, whether neurobiology-based psychoeducation might lead to other positive or negative effects still needs to be examined. Because women benefited from the psychoeducation more than men, we suggest that strategies other than psychoeducation should be developed for men to decrease public stigma about depression.

Regardless of the above-mentioned limitations, one important implication of the study should be highlighted. As our world is entering a neurobiological age, it is encouraging to note that providing a brief educational presentation like that used in the present study, knowledge of neurosciences could have considerable positive impacts on decreasing people’s social distance toward depressed individuals.

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REFERENCES