

Changing Middle Schoolers' Attitudes About Mental Illness Through Education

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Abstract

The field test of *The Science of Mental Illness* curriculum supplement for middle school (grades 6–8) children provided an opportunity to assess knowledge and attitudes about mental illness in more than 1,500 middle school students throughout the United States and to evaluate the impact of an educational intervention on stigma-related attitudes. Two primary questions were examined: (1) what are the baseline knowledge and attitudes about mental illness in this sample of middle school students, and (2) does participation in a curriculum about the science of mental illness increase knowledge and improve attitudes about mental illness? Consistent with findings from other studies, results indicate that students had some understanding of mental illness as a problem of the brain with biological and psychosocial causes; however, they lacked knowledge about treatment and overall were “not sure” about many aspects of mental illness. The students did not strongly endorse negative attitudes about mental illness at baseline. The curriculum produced significant improvements in both knowledge and attitudes at posttest and was most effective in improving attitudes among those with more negative baseline attitudes. These findings suggest that a brief educational program can be an effective intervention to increase knowledge and improve attitudes about mental illness.

Keywords: Mental illness, stigma, science education, adolescents, attitudes.

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The Surgeon General's *Report on Mental Illness* (U.S. Department of Health and Human Services 1999) and the White House Conference on Mental Health, held in 1999, brought to the forefront the impact of the stigma and discrimination associated with mental illness. The Surgeon General's report noted that despite the existence of effective treatments for mental disorders, the fear of

stigmatization often deters individuals from acknowledging their illness, and from seeking help and remaining in treatment. Among the aims of the report were to reduce such stigma and discrimination by providing accurate information about mental illness and its treatment, and to encourage the development and evaluation of fresh approaches to the reduction of stigma. The findings of the President's New Freedom Commission on Mental Health (2003) underscored the impact of stigma on access to care and care seeking among individuals with mental illness and their families, and recommended action at every level of government and in the private sector to reduce the stigma surrounding mental illness.

Numerous studies support the concern that adults hold stereotyped and generally negative attitudes about persons with mental illness. These studies have found that persons with mental illness are viewed as incompetent, irresponsible, dangerous, unpredictable, at fault for their illness, and/or unlikely to recover (e.g., Taylor and Dear 1981; Hyler et al. 1991; Brockington et al. 1993; Wahl 1995; Farina 1998; Link et al. 1999; Pescosolido et al. 1999; Corrigan et al. 2000; Martin et al. 2000; Phelan et al. 2000).

A smaller number of studies have focused on children's conception of mental illness (e.g., Weiss 1985, 1986, 1994; Poster et al. 1986; Poster 1992; Spitzer and Cameron 1995; Adler and Wahl 1998; Secker et al. 1999; Ng and Chan 2000; Schulze et al. 2003). In a review of research in this area conducted since 1980, Wahl et al. (2002) noted that most of those concerned with the problem of mental illness stigma believe that the negative attitudes expressed by adults have their roots in early childhood. Although considerable variation in the language used to describe mental illness, in the measurement techniques employed, and in the age group studied make com-

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parisons difficult, Wahl found some consistency in the findings across studies he reviewed. He concluded that, overall, the research suggests that while younger children lack clear conceptualizations of mental illness and associated characteristics, older children have a more sophisticated understanding of mental illnesses as disturbances of thoughts and emotions and of the causes and treatments of mental disorders. Further, most studies found evidence of negative attitudes toward mental illness in the earliest age groups studied, and that these negative attitudes increased with age. Consistent with Wahl's conclusions, most of the studies reviewed here found limited knowledge about mental illness, especially about treatment, among children (Poster et al. 1986; Weiss 1986; Poster 1992; Weiss 1994; Spitzer and Cameron 1995; Adler and Wahl 1998); and negative attitudes, especially toward behavior associated with more serious mental illness (Spitzer and Cameron 1995). Some studies, however, found evidence of more positive attitudes, especially when children could relate to the behaviors associated with the mental illness through their own or friends' experiences (Secker et al. 1999; Ng and Chan 2000; Schulze et al. 2003).

Evidence from studies of educational programs about mental illness suggests that adults with a better understanding of mental illness are less likely to endorse stigma and discrimination (Roman and Floyd 1981; Link and Cullen 1986; Link et al. 1987; Brockington et al. 1993) and that education programs have been shown to produce short-term improvements in attitudes (Morrison and Teta 1980; Keane 1991; Penn et al. 1994, 1999; Holmes et al. 1999; Corrigan et al. 2001, 2002). Evaluations of educational programs aimed at young people (Esters et al. 1998; Ng and Chan 2002; Pinfold et al. 2003; Schulze et al. 2003) suggest that education is also a valuable strategy for improving attitudes about mental illness and about seeking help for mental health problems in children, particularly when they incorporate contact with a person with mental illness (Pinfold et al. 2003; Schulze et al. 2003). With the exception of the study by Esters et al. (1998), the existing studies of the effectiveness of stigma reduction programs for children were conducted outside of the United States.

Consistent with the imperatives set forth by the Surgeon General and the New Freedom Commission and as part of the National Institutes of Health (NIH) response to the *National Science Education Standards* released by the National Academy of Sciences (NRC 1996), the NIH Office of Science Education and the National Institute of Mental Health (NIMH) sponsored the development of a curriculum supplement, *The Science of Mental Illness*, for middle school (grades 6–8) children. The field test of the curriculum supplement provided the opportunity to assess the knowledge and attitudes about mental illness in over 1,500 middle school students throughout the United States

and to evaluate the impact of an educational intervention on stigma-related attitudes. Two primary questions were examined: (1) what are the baseline knowledge and attitudes about mental illness in this sample of middle school students; and (2) does participation in a curriculum about the science of mental illness increase knowledge and improve attitudes about mental illness? The present study adds to the limited research on children's and adolescents' knowledge and attitudes about mental illness, and the impact of age-appropriate approaches to increasing knowledge and changing negative attitudes.

Methods

Educational Program. *The Science of Mental Illness* curriculum supplement for middle school science classes (grades 6–8) is one of a series supported by the NIH Office of Science Education, in collaboration with NIH institutes, and developed by Biological Sciences Curriculum Study (BSCS), an internationally recognized nonprofit professional science curriculum development organization. The series is designed to comply with the *National Science Education Standards* released by the National Academy of Sciences (NRC 1996) to improve science literacy in both children and adults. A second aim of the series is to attract young people to careers in medical and behavioral science.

The curriculum supplements combine cutting-edge scientific discoveries, accurate scientific data, and actual case studies in the application of methods of scientific inquiry with state-of-the-art instructional materials to help students better understand the links between both basic and clinical scientific discoveries and health care decisions. The supplements contain extensive background information for teachers and use inquiry-based, collaborative learning strategies to engage students in active learning and in applying creative and critical thinking. The modules include both print-based classroom activities and Web-based activities, such as scenarios, simulations, animations, and videos. The supplements, each of which is composed of five to six lessons designed to fit into 45 minutes of classroom time, are written in the form of lesson plans that can be easily implemented by teachers without special training.¹

¹ The curriculum supplements are free of charge to science teachers and school administrators and are available in a print version that includes Web-based or CD-ROM-based activities. The complete materials are also available in an online version. Nine curricula targeted to 1st through 12th grade are currently available (<http://science.education.nih.gov/customers.nsf>), including Emerging and Re-emerging Infectious Diseases (high school); Human Genetic Variation (high school); How Your Brain Understands What Your Ear Hears (middle school); and Open Wide and Trek Inside (elementary school, grades 1–2). Additional units are in development.

The Science of Mental Illness curriculum supplement (available in early 2005) was developed by BSCS, in collaboration with NIH and NIMH. The curriculum development process involved an advisory board, an external design team, an internal writing team, and an internal evaluation team. The internal evaluators provided formative evaluation input to modify and improve the module (Lamb and McGarrigle 2003). The advisory board and the design team were made up of scientists who investigate the biology of mental illness, psychiatrists, mental health awareness specialists, middle school teachers, multimedia developers, and curriculum developers.

The Science of Mental Illness has two primary educational goals. The first goal is to help students understand that, like chronic physical diseases or illnesses, mental illness has a biological basis and can be diagnosed and effectively treated. The second goal is to increase students' awareness and understanding of the biological, psychological, and social aspects of mental illness. As a consequence of students' increased knowledge, it is anticipated that negative attitudes and misunderstandings about mental illness and its treatment will be reduced. Prior research on the effect of educational programs about mental illness suggests that focusing solely on biological explanations can increase some negative attitudes (Mehta and Farina 1997; Phelan 2002; Walker and Read 2002). In an effort to avoid this pitfall and provide a more holistic explanation of mental illness, information about psychosocial risk factors and treatments was incorporated into the curriculum. The supplement's five lessons (table 1) cover such topics as the basic functions of the brain as

the body organ that controls thinking, moods, and behavior; the approaches scientists take to studying the brain; the importance of recognizing symptoms for the diagnosis of types of mental illness (depression, attention deficit hyperactivity disorder, and schizophrenia), which result when the brain malfunctions; the potential causes of types of mental illness; the factors that increase or decrease a person's risk for developing mental illness; and the role of medications and psychotherapy for effective treatment of mental illness.

Field Test. In spring 2003, a field test of the curriculum supplement using a pre- and posttest design was conducted to assess the curriculum's effectiveness in achieving learning outcomes and to ensure that the lesson plans could be easily implemented. To assess the effect of the curriculum on students' attitudes about mental illness, an attitudinal measure was added to the planned pre- and postintervention educational assessment.

Teachers for the field test were recruited by several methods, including announcements in the BSCS news magazine (a publication with a circulation of 15,000); the BSCS Web site; the National Association of Biology Teachers publication *The Biology Teacher*; and the National Science Teachers Association publication *NSTA Reports!* BSCS also sent letters to teachers who had participated in previous BSCS field tests to solicit their interest. Interested teachers completed an application that provided information about their school, student population demographics, and teaching experience. They also indicated whether they had the necessary computer resources

Table 1. Instructional modules and major conceptual focus¹

Lesson (no. of class sessions)	Major concepts
Lesson 1, The Brain: Control Central (1 class session)	The brain is the body organ that controls feelings, behaviors, and thoughts. Changes in the brain's activity result in changes in each of these responses. These changes can be either short term or long term. A mental illness is a health condition that changes a person's thinking, emotions, or behaviors (or all three) and that causes the person distress and difficulty in functioning.
Lesson 2, What's Wrong? (2 class sessions)	Mental illnesses, including depression, are illnesses of the brain. Like illnesses that affect other parts of the body, mental illnesses are diagnosed by identifying characteristic symptoms.
Lesson 3, Mental Illness: Could It Happen to Me? (2 class sessions)	Everyone has some risk for becoming mentally ill. Factors such as genetics, environment, and social influences interact to increase or decrease a person's risk for developing a mental illness.
Lesson 4, Treatment Works! (1 class session)	Most mental illnesses can be treated effectively. Treatments may include the use of medications and psychotherapies.
Lesson 5, You're the Expert Now (2 class sessions)	Learning the facts about mental illness can dispel misconceptions. The ability to evaluate scientific and health-related information is an important skill for students that they can apply throughout their lives.

¹ Taken from the Implementing the Module section of *The Science of Mental Illness* curriculum supplement.

to use the Web-based component of the curriculum. Teachers had to agree that they and their students would complete the evaluation materials during the field test. BSCS selected schools from various geographic regions of the country as field test sites. Schools in urban, suburban, and rural settings were included, as well as a mix of public and private schools. Different ethnicities and cultures were represented. The field test selection criteria also included the teachers' experience so that both novice and experienced teachers were represented. Fourteen teachers selected as the primary field test teachers were brought to BSCS for a 2-day field test orientation and received honoraria following the completion of the field test. Nine additional teachers were the secondary field test teachers. These teachers did not participate in the field test orientation workshop and did not receive honoraria. They agreed to conduct the field test according to the procedures specified in the curriculum supplement and to return evaluation materials completed by themselves and their students. This second group provided a useful test of the way the materials would be used by most teachers.

Measures. As part of the curriculum evaluation, students completed pre- and posttest measures of knowledge and attitudes about mental illness. The Knowledge Test, which included 13 true or false (or "not sure") items, and a set of five open-ended questions were developed specifically for the field test and reflected the learning objectives of the curriculum. Attitudes about mental illness were measured with the r-AQ, a short form of the Attribution Questionnaire (Corrigan et al. 2002, 2003) modified for use with children. The first eight items represent the constructs in the attribution and dangerousness models of mental illness stigma developed by Corrigan et al. (2002): responsibility/blame, anger, pity, help, dangerousness, fear, avoidance, and segregation. Participants were asked to respond to these items in reference to a new student whom they had heard had a mental illness. Item 9 addresses an additional issue related to stigma in children; whether they will they seek mental health treatment if they are in need.

Data Analysis. SPSS 11.0 (2003) was used to examine frequencies and means for student demographics and responses to the Knowledge Test and the r-AQ. We use paired sample *t* tests to examine pre- and posttest differences in knowledge and attitudes. Post hoc analyses were conducted using paired sample *t* tests to examine pre- and posttest differences on individual items of the Knowledge Test and the r-AQ. Additional post hoc analyses were conducted using independent sample *t* tests to examine differences between primary and secondary field test sites on pre- and posttest knowledge and attitudes, and attitude

and knowledge change scores, and between students with high stigma pretest scores and the rest of the students on knowledge and attitude change.

Results

Sample. Twenty-three teachers from schools in 16 states (Arizona, California, Colorado, Connecticut, Indiana, Iowa, Maryland, Massachusetts, Michigan, Montana, New Jersey, New York, Oregon, South Dakota, Tennessee, and Texas) and the District of Columbia participated in the field test and provided evaluation data from a total of 1,566 students. The sample was 52.1 percent female (table 2). Students were drawn from three grades: sixth grade (14.5% of the sample), seventh grade (55.9%), and eighth grade (29.6%). Census Bureau categories were used to identify the ethnic diversity of the student population and resulted in the following breakdown: 1.9 percent of research participants reported themselves as Asian-American, 2.6 percent African-American, 16.3 percent Hispanic, 1.2 percent Native American, 0.4 percent Pacific Islander, and 69.8 percent white. The remaining 7.8 percent identified with two or more ethnic groups.

Pretest Knowledge. To understand the students' initial knowledge about mental illness, frequencies for individual knowledge test items (true, false, not sure) were examined. The "not sure" option was used to decrease the tendency for students to guess on items they do not know. These are listed in table 3. The majority of students seemed to be aware that mental illness is a problem in the brain and that people cannot necessarily just get over it. Most also seemed to understand that people with mental

Table 2. Student demographics

	Frequency	Valid %
Gender		
Male	747	47.9
Female	812	52.1
Grade		
Sixth	225	14.5
Seventh	866	55.9
Eighth	459	29.6
Race/ethnicity		
White	1,081	69.8
African-American	40	2.6
Hispanic	252	16.3
Asian-American	29	1.9
Native American	19	1.2
Pacific Islander	6	0.4
2 or more races	121	7.8

Table 3. Knowledge pretest and posttest scores

Knowledge Items ¹	Pretest		Posttest	
	Correct	Not sure	Correct	Not sure
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Depression is the same thing as being sad. (F)	636 (45.4)	98 (7.0)	1,024 (69.8)	55 (3.8)
Mental illness is like other diseases because a person who has it has symptoms that a doctor can diagnose. (T)	477 (34.1)	456 (32.6)	994 (67.8)	174 (11.9)
Individuals who have a family member with a mental illness are more likely to have a mental illness themselves. (T)	416 (29.7)	288 (20.6)	1,222 (83.5)	86 (5.9)
The brain of a healthy person works the same as that of a mentally ill person. (F)	1,015 (72.5)	253 (18.1)	1,300 (88.7)	84 (5.7)
A person who does not get treatment for depression may feel better after a while, but there may be some long-lasting effects. (T)	762 (54.5)	371 (26.5)	827 (56.5)	158 (10.8)
How bad a person's mental illness is depends on many things, including his or her genes and family environment. (T)	801 (57.2)	356 (25.4)	1,082 (74.0)	206 (14.1)
A person uses his or her brain to learn, but the heart controls a person's feelings. (F)	894 (61.4)	172 (12.3)	1,035 (89.5)	152 (10.4)
Most people with mental illness can do normal things like go to school or work at a job. (T)	856 (61.3)	258 (18.5)	1,087 (74.6)	114 (7.8)
Treating mental illness can change the way the brain works. (T)	655 (46.9)	508 (36.3)	993 (68)	234 (16)
People with depression don't need to see a doctor—they just get over it. (F)	1,038 (74.4)	156 (11.2)	1,306 (89.2)	48 (3.3)
Depression is a disease. (T)	397 (28.4)	277 (19.8)	1,013 (69.3)	119 (8.1)
There are no treatments that work for most mental illnesses. (F)	473 (33.9)	492 (35.3)	1,040 (71.1)	190 (13)
Students and other people who have a mental illness can't learn. (F)	1,179 (84.3)	120 (8.6)	1,268 (86.8)	70 (4.8)
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Total knowledge score*	6.87	2.30	9.75	2.41

Note.—SD = standard deviation.

¹ The correct response for each item follows the statement in parentheses: (T) stands for true, and (F) for false.

* $p < 0.001$

illness can learn and participate in normal activities. However, students had difficulty with a number of the items and relied heavily on the “not sure” category. The knowledge pretest alpha (Kuder-Richardson Formula 20 [Thorndike and Hagen 1977]) was 0.50, and at posttest it was 0.65. The mean number correct out of 13 on the knowledge pretest was 6.87 (standard deviation 2.30).

Pretest Attitudes. Initial attitudes about mental illness were examined by looking at individual item and sum-

mary scores for the r-AQ pretest. Frequencies and means for r-AQ items are listed in table 4. Responses suggest that the students' attitudes were not extremely stigmatizing. Means for all of the items were on the less stigmatizing side (above or below depending on direction of scoring) of the midpoint of the 7-point scale. To obtain summary attitude scores, r-AQ items 1, 2, 5, 7, and 9 were reverse-coded and then the nine items summed. Higher scores indicate more stigmatizing attitudes. The pre- and posttest r-AQ summary score alphas (Cronbach) were

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Table 4. Pretest and posttest attitude scores

	Pretest, mean (SD)	Posttest, mean (SD)
Attitude score**	22.57 (7.55)	21.99 (7.88)
Attitude items ¹		
1. The new student is not dangerous. ^{2**}	4.86 (1.64)	5.14 (1.78)
2. I feel sorry for the new student. ^{2*}	4.91 (1.83)	4.82 (2.00)
3. The new student should be locked in a mental hospital.	1.74 (1.35)	1.82 (1.42)
4. I will try to stay away from the new student.	2.80 (1.68)	2.77 (1.63)
5. It is not the student's fault he or she has a mental illness. ²	6.28 (2.25)	6.10 (1.60)
6. The new student makes me angry.	2.26 (2.38)	2.16 (1.52)
7. I would help the new student. ²	5.00 (1.76)	5.08 (1.70)
8. I am scared of the new student.	2.37 (1.60)	2.31 (1.55)
9. If I thought I had a mental illness, I would talk to my parents about taking me to a doctor or counselor. ^{2**}	5.41 (1.87)	5.85 (1.69)

Note.—SD = standard deviation.

¹ Items scored on 7-point scale, disagree to agree.

² On items 1, 2, 5, 7, and 9, a higher posttest score indicates less stigmatizing attitudes postintervention; on all other items and the total score, a lower posttest score indicates less stigmatizing attitudes postintervention.

* Bonferroni inequality of means $p < 0.05/9 = 0.006$

** $p < 0.001/9 = 0.0001$

both 0.65. The mean pretest r-AQ summary score was 22.57 (7.55).

Changes in Knowledge and Attitudes. Paired sample *t* tests were conducted to examine pre- to posttest changes in knowledge (table 3) and attitudes (table 4). Several significant changes were noted. There was a significant improvement in knowledge about mental illness. The mean total score increased from 6.87 (2.30) correct to 9.75 (2.41) correct, $t(1,249) -44.575, p = 0.000$. Summary attitude scores decreased significantly from 22.57 (7.55) to 21.99 (7.88), $t(1,249) 2.821, p = 0.005$. Post hoc analy-

sis using the Bonferroni inequality standard ($p < 0.05/9$ items = 0.006) indicates several significant changes from pre- to posttest in individual attitude items. At posttest, students were more likely to endorse that the new student is *not* dangerous $t(1,284) -4.640, p = 0.000$, and were less likely to endorse pity or feeling sorry for the student $t(1,285) 2.762, p = 0.006$. Of particular importance, students' willingness to ask their parents to take them to a doctor or counselor if they thought they had a mental illness increased from 5.41 (1.87) to 5.85 (1.69). This change was significant $t(1283) -8.457, p = 0.000$.

While, in general, students' initial attitudes about mental illness were not as negative as we had expected they would be, we wanted to examine the effect of the program on the attitudes and knowledge of students in the subgroup with the most stigmatizing attitudes (table 5). To do so, we conducted a post hoc analysis using independent sample *t* tests to compare the subgroup of students scoring more than one standard deviation above the mean (30.12, $n = 202$) on the attitude summary score at baseline with the remaining group of students scoring below 30.28 ($n = 1,171$). Students in the high-negative-attitudes group had significantly lower pretest knowledge scores $t(1,325) -4.686, p = 0.000$. We also examined differences in the magnitude of change between the two groups. To do so, we first calculated difference scores for the Knowledge Test by subtracting the pretest score from the posttest score. Thus, the larger the change score, the greater the gain in knowledge. For the attitude summary score, we subtracted the posttest from the pretest score. Thus, the larger the change score, the greater the reduction in negative attitudes.

Difference scores, rather than residualized change scores, were used because preliminary analysis failed to show significant correlations between difference and total scores (pre + post). Independent sample *t* tests indicate that students in the high-negative-attitudes group experienced significantly larger improvements in attitudes than the rest of the students $t(1,248) -13.072, p = 0.000$. There was no significant difference in knowledge change scores between the two groups.

Differences Between Primary and Secondary Field Test Sites. A post hoc analysis was conducted to examine differences between primary and secondary field test sites on pretest, posttest, and change scores (table 6). Independent sample *t* tests indicate that students from the secondary sites scored higher on the knowledge pretest $t(1,352) -4.686, p = 0.000$ and the knowledge posttest $t(1,422) -5.735, p = 0.000$. Knowledge change scores were not significantly different. Pre- and posttest attitude scores were not significantly different between the primary and secondary field test sites; however, students from the secondary sites had significantly larger improve-

Table 5. Knowledge and attitude change between subgroups¹

Subgroup ²	Pretest knowledge** mean score (SD)	Knowledge change mean score (SD)	Attitude change** mean score (SD)
Most stigmatizing attitudes (attitude score ≥ 30.12)	6.16 (2.38)	2.84 (2.48)	6.73 (9.31)
Less stigmatizing attitudes (attitude score < 30.12)	7.0 (2.26)	2.98 (2.28)	0.46 (6.35)

Note.—SD = standard deviation.

¹ A lower attitude score indicates less stigmatizing attitudes.

² Students with the most stigmatizing attitudes scored more than one SD above the mean on the initial attitude test.

** $p < 0.001$

Table 6. Comparisons between primary and secondary field test sites

	Mean	SD	t (df)	p
Pretest knowledge			-4.686 (1352)	0.000
Primary	6.62	2.32		
Secondary	7.21	2.23		
Posttest knowledge			-5.735 (1422)	0.000
Primary	9.43	2.58		
Secondary	10.46	2.09		
Knowledge change			-0.022 (1248)	0.983
Primary	2.96	2.39		
Secondary	2.96	2.28		
Pretest attitudes			-0.554 (1371)	0.579
Primary	22.56	7.72		
Secondary	22.79	7.38		
Posttest attitudes			1.851 (1403)	0.064
Primary	22.37	8.37		
Secondary	21.58	7.35		
Attitude change			-2.31 (1248)	0.021
Primary	0.18	7.91		
Secondary	1.15	6.34		

Note.—SD = standard deviation.

ments (attitude change scores) in attitudes $t(1,248) -2.31$, $p = 0.021$.

Discussion

The purpose of this study was to assess the knowledge and attitudes about mental illness in 1,566 middle school students who participated in the field test of an educational program, *The Science of Mental Illness*, and to evaluate the impact of the program on both knowledge and stigma-related attitudes. Consistent with prior studies of middle school students' knowledge and attitudes about mental illness, we found that prior to participating in the curriculum, the students had some understanding of mental illness as a problem of the brain with both biological

and psychosocial causes. However, they lacked knowledge about treatment and overall were "not sure" about many aspects of mental illness. The curriculum was effective in improving the students' knowledge about mental illness (table 3).

Similar to findings from a study of secondary students (Schulze et al. 2003), the middle school students did not strongly endorse negative attitudes about mental illness at baseline. Students seemed to be most willing to endorse the stereotype that a student with mental illness is dangerous, which is perhaps the most pernicious stigma attached to mental illness. Students were less likely to endorse feeling sorry for the new student at posttest. At face value, this appears to be a negative effect on attitudes. However, if students interpreted "feeling sorry" as

paternalistic concern, it could be argued that less sympathy is an improvement. Overall, the curriculum produced small but significant improvements in attitudes at posttest (table 4) and was most effective in reducing negative attitudes among those with the most stigmatizing attitudes at baseline (table 5). There may be a statistical floor effect for other students who generally held nonstigmatizing attitudes. Of particular relevance for this age group, at posttest students indicated more willingness to seek help if they felt they had a mental health problem (table 4).

The comparisons between the primary and secondary field test sites indicate that the curriculum can be effectively delivered by teachers without special training other than that provided by the teacher background materials included in the curriculum supplement. It should be noted that both sets of teachers self-selected into the evaluation and may not be representative of middle school biology teachers. Teachers in the study may have been particularly motivated and interested in mental health issues.

While the results of this study are encouraging, several limitations should be noted. It was not feasible to include a control group in the field test; thus, we cannot assume that the improvements in knowledge and attitudes were a direct result of the curriculum. Additionally, we did not have the opportunity to conduct followup assessments to determine whether the improvements were maintained or dissipated over time. Evidence from other studies of education programs for children suggests that improvements in attitudes may be maintained in the short term (up to 1 month) (Pinfold et al. 2003; Schulze et al. 2003) but dissipate over longer periods of time. Finally, while our results suggest that the program increased students' willingness to access treatment if needed, we are unable to determine whether the program had an impact on actual behavior.

Conclusions

Our findings suggest that while middle school students may have limited knowledge about mental illness, their attitudes about people with mental illness are not as negative as might be expected based on prior research findings in both children and adults. Clearly, changing children's attitudes about mental illness is complex, as our data on "pity" would suggest. Just determining whether changes are improvements is not straightforward. However, time-limited educational programs such as *The Science of Mental Illness* can be effective for improving knowledge, attitudes, and willingness to seek treatment. As part of larger antistigma efforts, well-crafted educational strategies hold great promise. Reducing negative attitudes about mental illness and its treatment via educational interventions may remove barriers to accessing services for children experiencing emotional and behavioral prob-

lems. For many children, this could eliminate or reduce many of the collateral social and educational difficulties related to untreated mental illnesses.²

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² The NIMH Web site, Brief Notes on the Mental Health of Children and Adolescents (<http://www.nimh.nih.gov/publicat/childnotes.cfm>), provides data indicating that in 1999 almost 21 percent of children in the United States between the ages of 9 and 17 had a diagnosable mental or addictive disorder that caused some functional impairment but fewer than one in five receives treatment within any 1 year. Further data indicate that in 1999, suicide was the third leading cause of death in 15- to 24-year-olds and the fourth leading cause of death in 10- to 14-year-olds.

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