

## Randomized study of different anti-stigma media

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### Abstract

**Objective:** We designed our study to assess if computer-assisted anti-stigma interventions can be effective in reducing the level of psychiatric stigma in a sample of special education university students.

**Methods:** We enrolled 193 graduate students. They had two study visits with an interval of 6 months. The participants were randomly distributed into three study groups: 76 students read anti-stigma printed materials (reading group, RG), and 69 studied an anti-stigma computer program (program group, PG), and 48 students were in a control group (CG) and received no intervention. We used the Bogardus scale of social distance (BSSD), the community attitudes toward the mentally ill (CAMI) questionnaire, and the psychiatric knowledge survey (PKS) as the main outcome measures.

**Results:** After the intervention BSSD, CAMI and PKS scores significantly improved both in RG and PG. After 6 months in RG two out of three CAMI subscales and PKS scores were not different from the baseline. In PG all stigma and knowledge changes remained significant.

**Conclusions:** This study demonstrated that computers can be an effective mean in changing attitudes of students toward psychiatric patients.

**Practice implications:** A computer-mediated intervention has the potential for educating graduate students about mental disease and for reducing psychiatric stigma.

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**Keywords:** Computer-assisted education; Psychiatric stigma; Special education

### 1. Introduction

Stigma is a negative label that people frequently attach to groups or persons who differ from social norms in some respect, such as race, appearance, physical, or mental health. Stigma is often connected with discrimination, i.e., treating the stigmatized group differently than other people, denying them personal and civil rights [1]. The stigma of psychiatric diseases is a barrier to the rehabilitation of mentally ill patients and their effective functioning in society. Many professionals who work with psychiatric patients themselves have negative beliefs and attitudes about their clients [2–4].

Some approaches that can be effective in reducing psychiatric stigma include media campaigns [5], workshops for professionals interacting with people suffering from psychiatric disorders [6], lectures [7] and computer-assisted

education [8,9]. Numerous accounts of conventional anti-stigma education have been published [10,11]. Single-session education, for example, that included patient contact, lecture, discussion, and a film improved the attitudes of a sample of Turkish general practitioners and medical students toward people with schizophrenia [12,13]. Attitudes of Japanese [14] and Hong Kong [15] medical students toward mental disorders changed favorably after a 1-h seminar. Direct personal contact may be one of the most efficient approaches to diminish psychiatric stigma [16]. Although there is a lot of research data available on anti-stigma interventions, there is an evident lack of randomized trials assessing different anti-stigma education media and the stability and duration of their effects.

Special education students are being trained to work with children suffering from speech, hearing, and vision disabilities, intellectual disability and other mental health problems. These children and their family members are frequently stigmatized [17,18]. Ironically, teachers themselves are the source of the stigmatization. It significantly undermines their efforts to educate and socialize disadvantaged pupils [19]. We designed our study to answer the following questions: (1) can computer-

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assisted anti-stigma intervention be effective in reducing level of psychiatric stigma in a sample of special education university students?; (2) is the effect of computer-assisted education durable as assessed 6 months after the intervention?

**2. Methods**

*2.1. Design of the study*

We enrolled 193 graduate students from the Herzen Russian State Pedagogic University (St. Petersburg), School of Special Education. One of the requirements of the university where enrollment took place was strict confidentiality of the students. Because of that we did not collect any data that could potentially be used for identification of the subjects. The intervention was provided as an elective part of educational curriculum and its evaluation. To ensure that students participated on their free will no records of students who decided not to participate in the study were made. The students had two study visits with an interval of 6 months (see Fig. 1). The second study visit was completed by 153 students due to

student turnover and absence from classes. The samples at visit one and visit two were not statistically different in relation to age, gender, and psychosocial history.

At the time of their first visit the age of the participants was  $19.1 \pm 1.7$  years. Ninety-nine percent were females, and 1% (2 persons) were males, reflecting the gender distribution of the school. All students in the sample had just completed a 1-year, eight-credit psychiatry course taught by experienced faculty, mainly consisting of medical doctors. The students were finishing the 2nd year of a 5-year university program for special education teachers. Special education teachers in Russia work with children with learning disabilities and/or intellectual disability and/or other mental health problems. In addition, they also can specialize in teaching children with speech and hearing disorders. The participants were randomly distributed into three study groups. Seventy-six students read two articles and a World Health Organization brochure (reading group, RG) devoted to the problem of psychiatric stigma, and 69 studied an anti-stigma computer program (program group, PG), created at the University of Maryland in collaboration with the St. Petersburg State University. Forty-eight students were in a

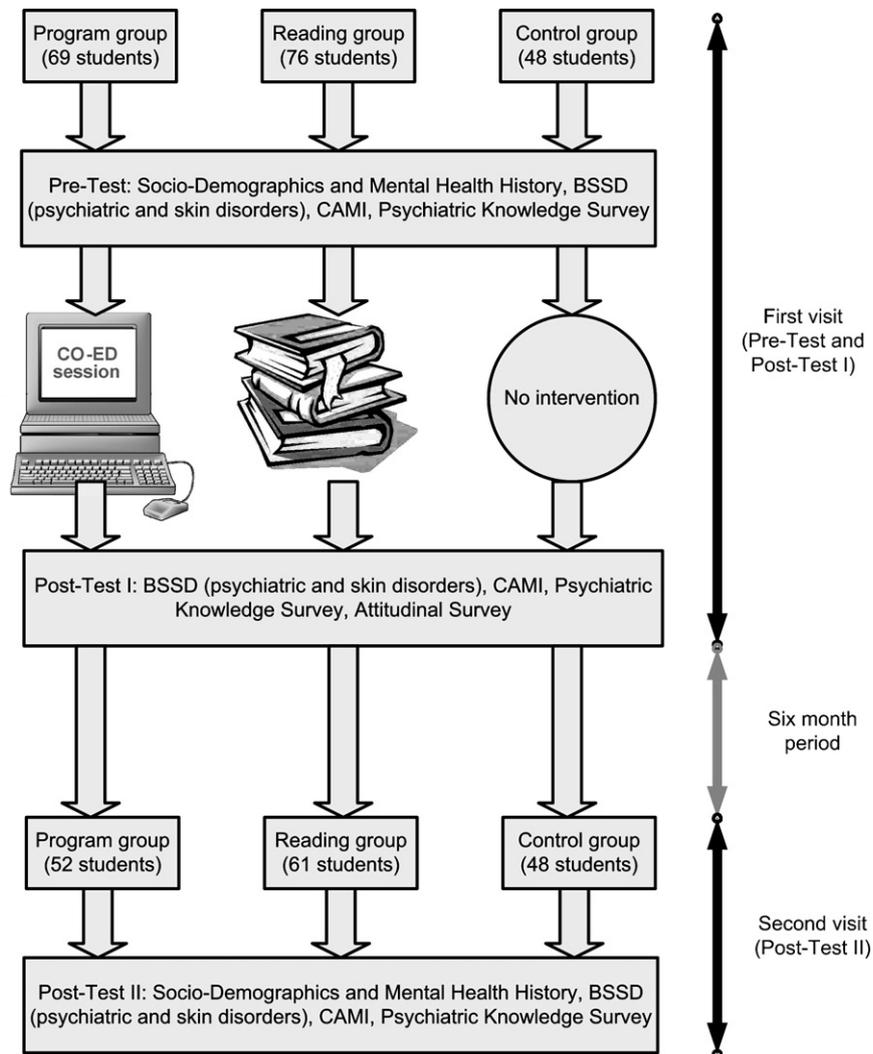


Fig. 1. The research model used in the study.

control group (CG) and received no intervention. The methods of anti-stigma education were chosen to avoid personal influence of a lecturer and any fluctuations in the content of educational sessions across groups of students.

We used effect size estimates from our previous study on the stigma of depression [20]. Based on this study, the change in the Bogardus scale of social distance (BSSD) scores in 6 months was projected to be at least  $2.4 \pm 4.2$  for intervention groups, and the difference between an intervention group and a control group at post-test II was projected to be  $3.0 \pm 4.2$ . For  $\alpha = 0.05$  and power = 0.80, and assuming 50% attrition rate, sample size for each intervention group was estimated to be 76 subjects and for the control group—54 subjects. Simple randomization has been used. Since the baseline characteristics of the study subjects were not available at the time of enrollment and participant assignment, no allocation concealment was utilized. The study received ethics clearance from a University-based ethics committee.

## 2.2. Educational media

For computer-based education we used the **Computer-assisted Education system (CO-ED)** which we described previously [21,22]. The CO-ED system provides self-paced interactive education driven by adult learning theories [20,23–25]. The educational program provided a sequence of short educational messages with each message followed by a multiple-choice question. The educational curriculum was divided into a set of sections with a quiz after each section. The curriculum addressed three components of stigma: cognitive (lack of knowledge or untrue beliefs about psychiatric disorders), emotional (feelings toward people with these conditions and its treatment), and behavioral (behavior toward people with mental health problems). We designed the content of the program both to induce strong emotional response in learners and to provide information about the most common misconceptions about psychiatric patients. The educational content of the program addressed mainly severe mental disorders, such as schizophrenia, bipolar disorder, and major depression.

The selection of the reading materials was based on the following criteria: (1) unbiased texts prepared for professionals with corresponding level of factual information and analysis; (2) containing necessary introductory facts about psychiatric disorders and stigma; and (3) containing the same amount and

set of data (see Table 1) compared with the computer program content. It was difficult to find one publication that would satisfy all these criteria, therefore the WHO brochure on the problems of psychiatric stigma [26], one article by a Russian psychiatrist [27] and one article by his British colleague [28] were used.

## 2.3. Outcome measures

We collected socio-demographic information and mental health histories of the participants before the intervention. To measure the level of stigma before and after the intervention, we used the BSSD and the community attitudes toward the mentally ill (CAMI) questionnaire. BSSD mainly measures the emotional and partly the behavioral components of stigma. It ranges from 0 (the lowest level of stigma) to 21 (the highest level of stigma). The reliability and validity of the Bogardus scale of social distance was established by Link et al. [29]. Cronbach alpha of the scale was reported to be 0.92. The scale allows measurement of stigma toward people with different stigmatized conditions. The students were given copies of the BSSD with the vignettes on severe skin and psychiatric disease, correspondingly. This was done to control the Hawthorne effect, the possibility that study subjects change their responses because they are aware they are participating in research [30].

The CAMI scale was used to evaluate the cognitive component of psychiatric stigma [31]. We used three subscales of this scale: authoritarianism (CAMI-A), benevolence (CAMI-B), and social restrictiveness (CAMI-SR). Each of the subscales had ten statements, and the participants were to choose one of five options that corresponded to their reaction to them (from fully agree to fully disagree). The first of the subscales (authoritarianism) measured negative attitudes toward psychiatric patients, i.e., when one considers patients as inferiors, requiring coercion. The Benevolence subscale reflects paternalistic and sympathetic attitudes. The Social Restrictiveness subscale contains statements describing people with psychiatric disorders as dangerous and threatening to society. The larger score on CAMI-A and CAMI-SR means a higher level of stigma, and on CAMI-B—a lower level of stigma. The CAMI scale has internal consistency ranging from 0.68 to 0.80 for different subscales [32].

A fourth CAMI subscale (Community mental health ideology) was omitted, because it assesses attitudes to planned

Table 1  
Topics covered in the educational media used in the study

Psychiatric stigma CO-ED	WHO brochure and articles
<ul style="list-style-type: none"> <li>• What is stigma?</li> <li>• How widespread are psychiatric disorders?</li> <li>• Causes and treatment of psychiatric disorders</li> <li>• Are psychiatric patients dangerous?</li> <li>• Story of Helen (story of a real person with schizophrenia who was able to live an active and fruitful life)</li> <li>• Myths and reality (most common misconceptions about psychiatric patients)</li> <li>• Euthanasia action (mass killing of psychiatric patients in Nazi Germany)</li> <li>• What can I do?</li> </ul>	<ul style="list-style-type: none"> <li>• What is psychiatric stigma?</li> <li>• Basic facts about epidemiology of psychiatric disorders</li> <li>• Causes of psychiatric stigma in society</li> <li>• Common misconceptions about psychiatric disorders</li> <li>• Psychiatric stigma and discrimination</li> <li>• Consequences of stigma</li> <li>• Main ways to help psychiatric patients</li> <li>• Different approaches and programs to decrease psychiatric stigma in society and their examples</li> </ul>

Table 2  
Demographic, mental health history, and familiarity with mental disease

Parameters	Reading group	Program group	Control group	p-Value
Number of subjects in the group	76	69	48	
Age, full years (average and S.D.)	18.9 ± 1.4	19.1 ± 2.0	19.3 ± 1.6	0.47 <sup>a</sup>
Sex (females)	98.7% (75)	98.5% (68)	100.0% (48)	1.00 <sup>c</sup>
Self-reported mental health problems for more than 2 weeks in the past	36.8% (28)	27.5% (19)	47.9% (23)	0.08 <sup>b</sup>
Considering visiting a mental health specialist in the past	31.6% (24)	34.8% (24)	43.8% (21)	0.38 <sup>b</sup>
Visited a mental health specialist	2.6% (2)	4.4% (3)	8.3% (4)	0.34 <sup>c</sup>
Underwent mental health treatment	4.0% (3)	5.8% (4)	2.1% (1)	0.74 <sup>c</sup>
Self-reported serious mental health disorder in the past	22.4% (17)	15.9% (11)	25.0% (12)	0.44 <sup>b</sup>
Current self-reported severe mental illness	0.0% (0)	1.5% (1)	2.1% (1)	0.52 <sup>c</sup>
Having a friend with severe mental disease	18.4% (14)	34.8% (24)	29.2% (14)	0.08 <sup>b</sup>
Living at the same apartment with a person with severe mental disease	6.6% (5)	8.7% (6)	10.4% (5)	0.74 <sup>b</sup>
Saw people with psychiatric diseases during university classes	21.0% (16)	36.2% (25)	33.3% (16)	0.11 <sup>b</sup>
Job involves providing services for persons with a severe mental illness	19.7% (15)	17.4% (12)	20.8% (10)	0.89 <sup>b</sup>

<sup>a</sup> ANOVA.

<sup>b</sup> Chi-square.

<sup>c</sup> Fisher's exact test.

or occurred deinstitutionalization. Deinstitutionalization is the process of shifting the responsibility of mental health care from large psychiatric hospitals to community mental health services. This process has not been actively introduced in Russia, and both the general public and the majority of mental health professionals are unaware of its influence on mental health services. Because there is no noticeable discussion regarding moving psychiatric care into the community level in Russia, we believed that asking students about their attitudes toward that would be confusing and would not contribute additional information for the purpose of this study.

The psychiatric knowledge survey (PKS) was modeled after a mental health awareness epidemiologic survey [33], and a depression literacy survey [34]. Both were successfully used for psychiatric knowledge evaluation in previous studies [35]. The PKS consisted of 24 multiple-choice questions on the main issues related to psychiatric stigma, such as epidemiology (5 questions), etiology (5 questions), treatment (5 questions), prognosis (5 questions), and perceived dangerousness of psychiatric patients (4 questions). After scoring, the results revealed a correct answer range from 0 to 24. The percentage of correct answers was calculated for further analysis.

Attitudinal surveys and semi-structured, focused, qualitative interviews were administered immediately after the intervention to assess the opinions of the participants about the computer program, and printed materials. The attitudinal survey was aimed at grading subjects' acceptance, perceptions on usability, and user-friendliness of educational media. The attitudinal survey was successfully used in our previous

evaluation studies [36,37]. The semi-structured qualitative interview was used to elicit subjects' perceived limitations and concerns about the CO-ED program, and to identify directions for future improvements. The qualitative interviews were transcribed and analyzed using the framework approach [38]. The high utility of qualitative interviews in assessing barriers for using new technology in healthcare has been shown previously [39,40].

### 3. Results

#### 3.1. Demographic characteristics and mental health history

Table 2 represents the demographic and mental health history data. In the study sample, 36.3% (70 subjects) mentioned that they had experienced feelings of depression or anxiety for more than 2 weeks in the past. Nine subjects (4.7%) underwent psychiatric treatment, and 1.0% (2) considered themselves as currently having a severe psychiatric disease. Thirty-five people (18.1%) had relatives with psychiatric diseases, and for 19.2% (37) of the students current work included rendering services for people with psychiatric disorders. These results suggest that many students were familiar with mental disorders either in their personal or their professional lives. Socio-demographic parameters and mental health history did not statistically differ between the reading, computer and control groups, or between pre-test and post-test II samples. The baseline characteristics in the study groups were not statistically different.

Table 3  
Computer experience in the sample

Frequency	Internet use	Computer use at home	Computer use at university/work
Daily	12.4% (24)	47.6% (91)	3.1% (6)
Weekly	37.3% (72)	28.8% (55)	43.7% (84)
Monthly or less often	42.0% (81)	12.6% (24)	39.1% (75)
Never	8.3% (16)	11.0% (21)	14.1% (27)

Table 4  
Psychiatric knowledge survey: percent of correct answers and Chi-square *p*-values

Groups	Psychiatric knowledge survey sub-domains	% of correct answers			Chi-square <i>p</i> -values (pre-test vs. post-test I)	Chi-square <i>p</i> -value (pre-test vs. post-test II)
		Pre-test	Post-test I	Post-test II		
Reading	Epidemiology	42.9%	48.7%	42.7%	0.11	0.96
	Causes	54.2%	56.6%	56.5%	0.51	0.56
	Treatment	51.3%	62.4%	54.6%	0.002	0.41
	Prognosis	49.0%	61.6%	49.2%	0.0005	0.94
	Dangerousness	37.8%	51.0%	43.8%	0.001	0.18
	Total	47.4%	56.3%	49.6%	<0.0001	0.24
Program	Epidemiology	42.6%	95.9%	57.3%	<0.0001	0.0002
	Causes	55.9%	95.9%	70.7%	<0.0001	0.0001
	Treatment	48.4%	89.9%	72.7%	<0.0001	<0.0001
	Prognosis	42.0%	85.8%	67.3%	<0.0001	<0.0001
	Dangerousness	39.1%	83.7%	58.3%	<0.0001	<0.0001
	Total	45.9%	90.5%	65.6%	<0.0001	<0.0001
Control	Epidemiology	44.6%	NA	42.4%	NA	0.65
	Causes	52.1%	NA	54.2%	NA	0.66
	Treatment	48.3%	NA	57.6%	NA	0.052
	Prognosis	39.2%	NA	46.3%	NA	0.13
	Dangerousness	33.3%	NA	32.3%	NA	0.84
	Total	43.9%	NA	47.2%	NA	0.13
Difference between the total percentage of correct answers across the groups (Chi-square <i>p</i> -values)		0.17	<0.0001	<0.0001		

3.2. Computer experience

The level of computer experience among the students varied (Table 3), with about a third of the sample using a computer once a month or less, and 47.6% (91 students) using a computer daily. We did not find any statistically significant difference between the groups regarding their computer experience.

3.3. Mental health literacy

Students were asked to evaluate their knowledge of psychiatric disorders on a 5-point Likert scale (very bad, bad, moderate, good, and very good). One student reported her knowledge as very good (0.5%), 29.5% (57) graded their

knowledge as good, 50.8% (98)—as moderate, 17.1% (33)—as bad, and 2.1% (4)—as very bad. The self-reported knowledge was not associated with the psychiatric knowledge survey score.

The psychiatric knowledge survey scores were not significantly different among the groups at pre-test (Table 4). Less than half of the questions were answered correctly (46.0%) The groups scored lowest on knowledge of dangerousness of psychiatric patients (37.2% of correct answers), and prognosis of mental disorders (44.0%). Most students, however, scored highest on epidemiology (43.2% of correct answers), treatment (49.5%), and causes of mental disorders (54.3%). After the intervention the PKS scores increased both in the reading and program groups. The difference between the

Table 5  
Community attitudes toward mentally ill (CAMI) questionnaire: scores and ANOVA or *t*-test *p*-values of differences between the groups and between pre- and post-test scores

Subscales	Groups	Pre-test	Post-test I	Post-test II	Pre-test vs. post-test I	Pre-test vs. post-test II
Authoritarianism	Reading	24.7 ± 4.5	21.6 ± 4.9	23.0 ± 4.9	<i>p</i> < 0.0001	<i>p</i> = 0.04
	Program	24.6 ± 3.9	18.9 ± 4.1	21.1 ± 4.4	<i>p</i> < 0.0001	<i>p</i> < 0.0001
	Control	25.0 ± 3.8	NA	24.0 ± 4.1	NA	<i>p</i> = 0.2
	Difference between the groups	<i>p</i> = 0.84	<i>p</i> = 0.0004	<i>p</i> = 0.005	–	–
Benevolence	Reading	41.1 ± 4.2	42.7 ± 4.4	40.7 ± 4.0	<i>p</i> = 0.0001	<i>p</i> = 0.63
	Program	41.8 ± 4.1	45.3 ± 4.0	43.5 ± 4.1	<i>p</i> < 0.0001	<i>p</i> = 0.02
	Control	40.9 ± 4.7	NA	41.0 ± 4.2	NA	<i>p</i> = 0.92
	Difference between the groups	<i>p</i> = 0.49	<i>p</i> = 0.0003	<i>p</i> = 0.0007	–	–
Social restrictiveness	Reading	25.1 ± 4.4	21.6 ± 5.2	24.3 ± 5.0	<i>p</i> < 0.0001	<i>p</i> = 0.37
	Program	25.1 ± 4.2	18.9 ± 4.7	22.2 ± 5.6	<i>p</i> < 0.0001	<i>p</i> = 0.0008
	Control	26.3 ± 4.1	NA	26.1 ± 4.8	NA	<i>p</i> = 0.88
	Difference between the groups	<i>p</i> = 0.24	<i>p</i> = 0.0015	<i>p</i> = 0.0008	–	–

Table 6

Bogardus scale of social distance: scores and ANOVA or *t*-test *p*-values for differences between the groups and between pre- and post-test scores

Vignette	Groups	Pre-test	Post-test I	Post-test II	Pre-test vs. post-test I	Pre-test vs. post-test II
Mental disorder	Reading	11.6 ± 4.2	5.9 ± 4.4	9.6 ± 4.6	<i>p</i> < 0.0001	<i>p</i> = 0.01
	Program	11.4 ± 4.0	4.9 ± 4.4	9.2 ± 4.2	<i>p</i> < 0.0001	<i>p</i> = 0.003
	Control	12.7 ± 4.0	NA	11.7 ± 4.4	NA	<i>p</i> = 0.26
	Difference between the groups	<i>p</i> = 0.2	<i>p</i> = 0.15	<i>p</i> = 0.01	–	–
Skin disease	Reading	7.6 ± 5.4	6.3 ± 4.9	6.6 ± 5.1	<i>p</i> = 0.0004	<i>p</i> = 0.26
	Program	7.2 ± 5.0	5.3 ± 4.8	5.7 ± 5.7	<i>p</i> < 0.0001	<i>p</i> = 0.11
	Control	8.3 ± 5.1	NA	7.4 ± 5.6	NA	<i>p</i> = 0.44
	Difference between the groups	<i>p</i> = 0.57	0.23	0.32	–	–

groups was significant with the program group displaying the larger knowledge gain (Chi-square between the groups *p*-value < 0.0001). After 6 months only the knowledge gained by the program group remained significant when compared to baseline (*p* < 0.0001).

3.4. Level of psychiatric stigma according to CAMI questionnaire and BSSD

After the educational session the CAMI scores significantly improved in both intervention groups (Table 5). The CAMI scores in the program group both at post-test I and post-test II were significantly better than the scores in the reading group. After 6 months, only the CAMI authoritarianism subscale remained significantly different from baseline in the reading group. All CAMI subscale scores were significantly better than baseline in the program group.

The effect of the intervention on the BSSD scores was more uniform (Table 6). In both the reading and program groups scores significantly dropped, reflecting a decreased level of psychiatric stigma. These changes remained significant at post-test II.

The skin disease stigma changes were also significant at post-test I, reflecting the non-specific effects of the intervention

and questionnaire administration noted earlier. The *p*-values indicating significant differences in program and reading group psychiatric disease BSSD scores (pre-test vs. post-test II) were at the level *p* < 0.001 when controlled for the change in the BSSD skin disease stigma score using multiple linear regression. At post-test II the level of skin disease stigma was not statistically different from baseline.

Multiple linear regression models were utilized to check whether adjustment for the baseline characteristics, such as age, computer experience, and mental health history, affects study results. After the adjustment, our intervention still had significant effect on the main study outcomes.

3.5. Acceptability of the program

After the intervention the students from the program and reading groups were asked to evaluate their educational experience (Table 7). They were asked to answer 7 questions, by selecting ‘yes’, ‘probably yes’, ‘not sure’, ‘probably no’, or ‘no’. Our results show that the program group evaluated the program content as more useful, interesting, and easier to understand. They also liked the presentation of the information more than the students in the reading group. We asked additional questions specifically aimed at the assessment of

Table 7

The feedback of the students in the reading and program groups

Items	Program group (N = 69)	Reading group (N = 76)	Chi-square test, <i>p</i> -value
1. Liked the educational experience in general (answered ‘Yes’ and ‘Probably Yes’)	97.1% (67)	89.3% (67)	0.07
2. The topic is important (answered ‘Yes’ and ‘Probably Yes’)	100.0% (69)	97.4% (74)	0.17
3. The content is useful (answered ‘Yes’ and ‘Probably Yes’)	98.6% (68)	90.7% (68)	0.04
4. The content is interesting (answered ‘Yes’ and ‘Probably Yes’)	100.0% (69)	86.8% (66)	0.002
5. The content is unpleasant (answered ‘No’ and ‘Probably No’)	81.2% (56)	73.3% (55)	0.26
6. The content was difficult to understand (answered ‘No’ and ‘Probably No’)	89.9% (62)	61.8% (47)	<0.0001
7. Liked the way information presented (answered ‘Yes’ and ‘Probably Yes’)	87.0% (60)	60.5% (46)	0.0003

Table 8

The feedback of the students on the educational computer program (%)

Questions	Yes	Maybe yes	Not sure	Maybe no	No
Liked the way the program works	46.4	44.9	7.3	1.4	0
Easy to read from the screen	39.1	42.0	10.2	8.7	0
Liked the design of the program	44.9	44.9	7.3	2.9	0
Program is difficult to use	0	0	0	41.2	58.8
Feedback was useful	62.3	31.9	2.9	1.4	1.5

working with the computer program (Table 8). Students mostly liked the way the program worked, its design, and its ability to provide feedback. No students had problems operating the program.

Semi-structured interviews were used to compliment information obtained in the attitudinal surveys regarding acceptance, feasibility, and personal attitudes toward the anti-stigma education the students underwent. In the semi-structured interviews we provided the students with an opportunity to report in an open-ended format what they liked and disliked about their educational experience, what they would improve, and what they considered good features or problem areas of the computer program. After analyzing the data collected in these interviews, we identified three major areas for future improvements: the content of the program, its user interface, and the structure of the learning process (efficiency of the training and relevance of the program for the user). We used the qualitative analysis program HyperResearch 2.7 to select the main and repeated topics in the interviews.

With regard to content, the participants mentioned that the information was provided succinctly, and informed them of many interesting facts. The personal story presented in the program was especially important for many students because it allowed them to look at mental disorders and problems from the patient's perspective. Some students advised us to include more personal stories.

Attitudes regarding the amount of information given in the program differed. Most of the students who raised this issue felt that it was adequate. Some, however, felt it was too much, and 2 students mentioned that it offered nothing new and was just boring. The language of the program was simple and easily understandable as it was commented by 3 students, although 1 student said she had difficulty in understanding the content and had to read the text 2–3 times.

All study subjects found user interface self-explanatory and easy to use. Regarding program structure, students liked the reasonable length of the study sections, and the program's ease of use. As one of the study participants stated, "the structure of the program is simple in work, allows to be guided quickly in various sections and answers to questions." Many students mentioned that feedback given by the computer was useful, and was an incentive to read the messages more carefully. Some, however, felt there were too many questions, or that the answer choices in some questions were too similar. Regarding the interface, students liked the images in the program and would like to see more audio–visual content. Generally, students concluded that this method of education is promising, interesting, and worth duplicating in similar programs.

All participants except one liked the feedback provided by the computer, stating, "It helped me to really understand the material" and "I like the way that I got feedback right away." When asked about multiple-choice questions, most of the participants found them useful. The typical response was: "It (multiple choice questions) helped me to retain the information." For 11 participants, our educational model (a short educational message followed immediately by a multiple-choice question) was not the best way to study for different

reasons. Some of the reasons given were, "because it gave you the answer, and then asked the question (too soon after the educational message)" and "it became a little long and repetitive." The majority were comfortable with repeating the whole section if they answered one of the quiz questions incorrectly: "I thought it was somewhat helpful. I passed all tests, so it was not a problem." One participant proposed that we repeat a modified section with new examples that were worded differently.

When asked to compare this web-based education with other kinds of health education (brochures, internet, videotape, and healthcare provider), 23 subjects (54.8%) said that they would prefer a program like the one they had just used. For example, the students stated that "this is the shortest way to get the right information", "it is more effective because of the feedback", "this is better. . . interactive", "this one is more interactive and fun", "more straight forward, easy to remember the information", and "the session is more welcoming. . . the questions help me and prompt me to learn and remember tips." None of the participants had significant problems with operating the computer. They stated that; "It was very easy to operate this computer" and "I thought, it was easy and straightforward."

No adverse effects, such as an increase of stigma as a result of the intervention, were identified.

## 4. Discussion and conclusions

### 4.1. Discussion

In this study we found that both computer-assisted instruction and reading of printed educational materials were effective tools for reducing the level of psychiatric stigma and increasing the knowledge about psychiatric disorders immediately after the intervention. In 6 months, however, the effect of the reading program leveled off as indicated by several important outcome measures: knowledge score and two of four measures of psychiatric stigma that were used in this study (CAMI-B and CAMI-SR). These last two measures showed a significantly higher level of stigma in the reading group when compared with the program group. An absolute majority of previous studies evaluated only immediate effect of anti-stigma interventions while our study evaluated long-term effects of two anti-stigma interventions. In our study, the effect of conventional education (reading) was moderate and decreased substantially in 6 months. This suggests that simply conveying a message, that it is inappropriate to stigmatize psychiatric patients together with providing supporting factual information, is insufficient to reduce stigmatizing attitudes. Learners should be emotionally involved and active in the process of education.

According to recently published research data, one of the most effective ways to combat psychiatric stigma is to provide a live contact with a representative person with a psychiatric disease, who successfully struggles with his or her condition and lives an accomplished life [41]. Direct contact with psychiatric patients and knowledge enhancement of mental disorders during a psychiatric internship may not, however,

affect students' attitudes toward psychiatric conditions [42,43]. Students often see mostly acute hospital patients, frequently represented by socially disadvantaged individuals with florid psychopathology. In many instances, stigma is not regarded as an important issue in psychiatric curriculum, and contacts with patients are formal. Using our computer program we tried to simulate a live contact with a representative person suffering from a psychiatric disorder. We adapted this technique by introducing a true story of a young woman with schizophrenia. In our program she talks about her life and her disease, and how despite her disease she was able to graduate from a university and work as a mental health counselor.

Though contact-based approaches may be one of the most efficient means to diminish psychiatric stigma [16], widespread implementation of direct contact with psychiatric patients for general public education may not always be feasible. Corrigan et al. [44] showed that “the filmed version of contact led to greater stigma improvement compared to education.” In addition, many previous studies demonstrated that active involvement of a learner in a study process facilitates the learning process. Active learning, however, neither necessitates direct personal contact nor requires challenging one's stigmatizing beliefs in person. Modern computer technology can be easily utilized for interactive virtual contact with a “representative” psychiatric patient as well as for an active interaction of a computer user with a training program. In our computer-assisted intervention, the study subjects encountered a virtual contact with psychiatric patients that included familiarizing themselves with the patients' personal stories and actively responding to the provided educational material. Thus, our computer-mediated educational intervention supported both fact-based and contact-based modalities of a comprehensive anti-stigma program coupled with active involvement of learners in the educational process. We believe that these features resulted in better outcomes of the computer-mediated program as compared to a reading program. Our results are supported by the study of Corrigan et al. [45] stating that “approaches to social change that increase public familiarity with serious mental illness will decrease stigma.” Our study supported the notion that an educational intervention requiring active participation of a student is more effective than passive learning. Other studies also demonstrated great

potential of interactive computer-mediated education in delivering mental health information [8] and affecting stigmatizing attitudes to depression [34]. Another possible advantage of computer-mediated education, especially in the area of mental health, may be the fact that these tools allow maintain anonymity as compared to face-to-face encounters. According to Leach et al. [8], “anonymity may be preferred by those who choose to or find themselves dealing with mental illness alone.”

As it was indicated in the Methods section, both printed materials, used in the reading group, and the CO-ED curriculum, used in the program group, covered the same range of factual information. Both the printed materials and the computer program had stories or short vignettes about persons discriminated for their psychiatric disorders. Printed materials, however, tended to be written for professionals dealing with the problem of stigma rather than for individuals actually prejudiced toward people with psychiatric disorders. We adapted our educational program for both the layperson and for the prospective professional training to work with stigmatized people.

A comprehensive literature review allowed us to identify the issues of most concern to those encountering persons with mental health disorders. Our program content was built around these issues. The most important problem from our point of view is dangerousness of psychiatric patient that contributes the larger part of the fear and avoidance that constitute stigma what was shown in a sample of college students by Corrigan et al. [45]. Simply saying that psychiatric patients are less dangerous than mentally healthy people is ineffective, because this is not true. Some groups of psychiatric patients are more dangerous. Most people with mental health problems, however, demonstrate the same or lower level of violence as people without them [46,47]. We think that providing correct information is important even when facts partly support stigmatizing beliefs. The problem of violence, in particular, demands special attention when providing anti-stigma education.

We used multiple strategies to make this educational intervention effective when designing our program. First, we made the program simple and introduced a self-explanatory user-friendly interface. In the computer group 16.7% of the students (5 persons) never used a computer at home and 18.7%

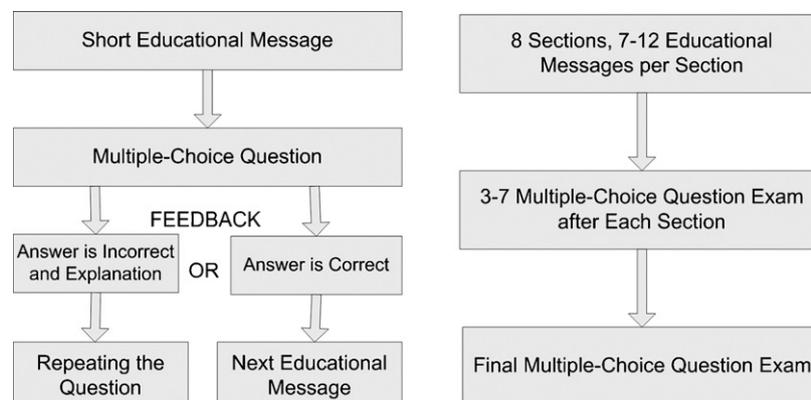


Fig. 2. The structure of the educational unit (left) and general structure of the educational curriculum.

(6) never used a computer at university or work. At the same time 30.0% (9 persons) used a computer daily. Because, the level of computer literacy among the students was very different we made the program's interface intuitive and the program navigation straightforward (see Fig. 2), minimizing number of steps necessary to operate the program successfully. We also kept the number of sections and messages in the range of 5–12, so students did not get lost or tired, according to the Information Processing Theory (G. Miller) [48].

Second, we focused on the interactivity of the program, the main element in its design. The main advantage of using computer technologies versus printed educational materials or even face-to-face group instruction is the ability to follow the learner's success and provide immediate feedback on every important piece of information. Interactivity is commonly used in computer-mediated educational programs [49–52]. One of the specific features of our educational program was the ability to imitate a live discussion to the highest degree possible while keeping the program simple. The questions provided by the computer program were frequently used not only as a means to check knowledge acquisition, but also to ask students to express their opinion, and predict the real situation compared with commonly held beliefs.

We tried to elicit a strong emotional reaction from the learners. Extensive case histories of real people and events were presented. They were both positive (a story of a girl with schizophrenia who graduated from university and now helps other people with psychiatric disorders) and negative (the story of the murder of people with psychiatric problems in Nazi Germany, when more than 250,000 people were systematically killed).

An 'intention-to-treat' analysis was not performed since we believed it was not suitable for this study. Intention-to-treat principle is utilized in analysis of clinical trials to account for patients who have not adhered to the allocated management strategy because of non-compliance, premature death, withdrawal from the study, loss to follow-up, or other reasons. The subjects in our study had 100% compliance with the study intervention since they underwent allocated intervention immediately after enrollment. All study subjects completed the first visit including the pre/post questionnaires and the prescribed intervention. Therefore, we did not have to employ intention-to-treat analysis to account for non-compliance with our intervention. Another reason intention-to-treat analysis is used by some researchers is to deal with loss to follow-up. We had loss to follow-up at the second study visit due to student turnover and absence from classes. We believe that this loss to follow-up was not associated with our intervention and was completely random. The samples at the visit one and visit two were not statistically different in relation to age, gender, and psychosocial history in all study groups. In addition, as it was shown in the recent article by Montori and Guyatt [53], "intention-to-treat analysis cannot minimize bias introduced by loss to follow-up, that is, patients whose outcome status is unknown.

Though our study was not blinded, we do not believe that the lack of blinding introduced bias in our study. Subject allocation

to the study group was carried out by research staff who was not aware about the baseline characteristics of the study subjects and did not have any prior relationships with the study subjects. Therefore the group allocation bias could not be exercised even on a subconscious level. The main study outcomes were represented by objective parameters eliminating possibility of subjectivity in assessment. Finally, we employed blind outcome assessment methodology to prevent risk of expectation bias of particular findings. This was achieved by coding group assignments in the study database and employing a statistician for the study analysis who was unaware which group was expected to be affected by the intervention.

#### 4.2. Conclusions

We think that providing anti-stigma interventions is not as simple as it sometimes seems. In many cases holding special face-to-face classes or training sessions is impossible or impractical. Simply reading prepared printed materials can be ineffective as our relatively short-term prospective study shows. Computer-assisted education can be an effective alternative. However, two questions should be asked before implementing this approach in the real world: (1) does an educational computer program effectively change attitudes, or just provide factual information? and (2) is the effect of such education sustained? This study demonstrated that a computer-mediated anti-stigma program could be an effective tool in changing attitudes of students toward psychiatric patients. In our case, the change in the level of stigma remained significant at least 6 months after the intervention. Finally, most importantly, one should ask whether the intervention is effective in changing subjects' behavior in real life. Our intervention had a beneficial effect on changing stigmatizing attitudes, and this, in accordance to previous studies [45], should have corresponding influence on behavior, although its extent and sustainability remained to be established.

#### 4.3. Practical implications

Computer-assisted education was effective in reducing psychiatric stigma and increasing knowledge about depressive disorders. A computer-mediated intervention has the potential for educating graduate students about mental disease and for reducing psychiatric stigma.

In this study we tested an interactive technology which utilized certain models of stigma and adult learning. Since the testing was successful we will significantly extend theoretical basis and interactivity of the program in the future. From attitudinal surveys and qualitative interviews we obtained very valuable feedback which should be utilized in the next version of the program.

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