Application of A Classroom-Based Positive Psychology Education Course on Chinese Medical Students to Increase Their Psychological Well-Being: A Pilot Study

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Abstract

Background Anxiety and depression have been on rise in Chinese medical students due to the heavy academic pressure of medical practice and the deteriorating doctor-patient relationship in China. The psychological well-being of the Chinese medical students has become a critical focus of attention for the medical education community. Increasing evidence showed that positive psychology interventions can be effective in the enhancement of psychological well-being, and may help to prevent depressive symptoms in university students. In the present study, we aimed to explore the potential effect of positive psychology education on improving the mental health of Chinese medical students.

Methods An 8-week classroom-based positive psychology intervention workshop, which was set as a selective course embedded in the regular school curriculum, was performed at School of Medicine, South China University of Technology (SCUT), China. Undergraduate medical students of the institute at year-2 or year-3 academic study took part in this training course voluntarily. Self-report data on hope scale, life satisfaction scale, subjective happiness scale, as well as depression and anxiety scale were collected and analyzed at pre-course (n=61) and post-course (n=49) among the participants. The investigation was also validated in an independent cohort of students who enrolled in the course in the following year of the preliminary study.

Results The analyses showed that the psychology well-being of the participants were improved after the intervention. Their mean scores on hope scale, life satisfaction scale and subjective happiness scale were significantly improved (P<0.05), while the symptom levels of depression and anxiety were significantly reduced (P<0.01). Similar trend was also observed in the validation cohort.

Conclusions These preliminary findings suggest that positive psychology education holds promise for improving the psychological well-being among Chinese medical students. Further investigations in larger and well-controlled sample cohorts may yield more convincible and reliable results.

Background

Training in medicine is highly emotional and physical demanding, which has led to prevalent anxiety, depression and distress among medical students worldwide [1-8].

This is especially true for Chinese medical students and young trainees due to the heavy academic pressure and deteriorating doctor-patient relationship in China[8-12]. It has been well known that medical school in China is entered from high school, whereas in the United States and many other countries it is entered after an undergraduate degree, which means that Chinese medical students need complete the general education study as well as professional study within shorter time[13]. Meanwhile, increasing health demand driven by the improving economy during the past decade in China has led to excessive burden on Chinese doctors, which has led to increasing conflicts between patients and doctors [9-12, 14-17]. It has been reported that at least one-third of Chinese doctors have experienced conflicts with patients [8]. The increased emotional and physical exhaustion, together with the depersonalization and low sense of personal achievement have contributed greatly to the increased levels of stress symptoms among Chinese doctors, which has also spread to medical students. It has been reported that over 60% of the Chinese medical students suffered different degrees of depressive symptoms and suicide attempts[18, 19]. Compared with the general population, they were more susceptible to stress, burning out and anxiety, and had less career satisfaction and self-esteem as compared with their counterparts [18-21]. The psychological well-being of the Chinese medical students has become a matter of concern nationally and needs urgent intervention.
To deal with these situations, a series of strategies have been adopted by multiple levels of healthcare administration institutes in China. For example, psychology education has been emphasized more and more in universities\cite{22, 23}, and an increasing number of school consulting offices have also been established\cite{24}. While these interventions provided helpful psychological supports for the few students with existed psychological disorders, they failed to serve the remaining large population of the general students who do not have a diagnosed disorder yet\cite{24}. Moreover, these psychology interventions were more pre-occupied with weakness and disorders, for example the depression, anxiety and stress, but seldom developed virtues and character strength that facilitate individual thriving, such as resilience and grit, which is important for the personal growth of the young people\cite{25, 26}.

An increasing number of studies have shown that positive psychology intervention can enhance psychological well-being and alleviate depressive symptoms among students and the general public\cite{27, 28}. Positive psychology is a new branch of traditional psychology, which focuses on optimal human functioning and strength instead of the weakness and illness that characterize traditional psychology\cite{29-31}. It focuses on the strengths and virtues that facilitate individual thriving through various ways, such as counting blessings, practicing kindness, setting personal goals, expressing gratitude and using personal strength\cite{27, 28}. The incorporation of positive psychology into school education can significantly increase the resilience and psychological well-being of the students and finally improve their academic accomplishments\cite{27, 28, 32-35}. With the unprecedented level of anxiety and depression in Chinese medical students and the far more enough mental health care at school\cite{36}, there is a great need to investigate how insights from the field of positive psychology can help medical students flourish in both their professional studies and personal lives. However, an investigation of positive psychology intervention on Chinese medical students to enhance their psychology well-being has not been reported so far.

In the present study, we aimed to examine the effects of a classroom-based positive psychology intervention workshop on improving the psychology well-being of the undergraduate medical students in our institute. The hope trait scale, life satisfaction scale, subjective happiness scale, as well as depression and anxiety scale of the participants were measured before and after the training course, respectively. Our hypothesis is that the classroom-based positive psychology intervention would increase the psychology well-being and reduce the depressive as well as anxiety symptoms of the medical students.

**Methods**

1. **Study design**

The positive psychology intervention was set as a classroom-based selective course, which was embedded in the regular school curriculum and opened to the medical students at School of Medicine, South China University of Technology (SCUT), Guangzhou, China. The course was open to year-2 and year-3 students only. The attendees who voluntarily consented to participate in the research were asked to complete the questionnaires. They were asked to fill in the questionnaire before and one week after the training course, respectively. All questionnaires were anonymous with the exception of the academic year, gender and age, to avoid participants’ stigmatizing and obtain honest answer as much as possible. No compensation was provided for the participation. To test the effects of the intervention, an identical set of interventions and survey was performed on an independent cohort of students who attended the course voluntarily in the year following the above preliminary study. None of the participants reported any previous experience of positive psychology intervention.

2. **Participants**
A total of 61 undergraduate medical students at their year-2 or year-3 academic study attended the training course voluntarily in the preliminary study. Only the participants who completed the whole course study, assignments, as well as pre- and post-course questionnaires were included in the analysis. According to this inclusion criteria, of the initial 61 participants recruited to the study, 12 dropped out of the program, giving an attrition rate of 19.7% (12/61). For these 12 students who discontinued the study, their common reasons were that they were too busy to finish the assignments or return the post-course questionnaire. For the 49 participants, their ages range from 17 to 22 years old (mean=19.5, SD=0.94). For the validation cohort, there were 52 students taking part in the course initially, and 46 of them who fulfilled the above inclusion criteria were included in the current analysis. 6 ones of them dropped out of the program due to time limitations. The detailed social demographic characteristics of both participant cohorts are described in Table 1.

3. Procedures

The students who participated in the course were first invited to complete a packet of questionnaires (as detailed in the following Measures section and Appendix 1-5) prior to the commencing of the training course. They then would receive the training and finish the related assignments as tutored for 8 continuous weeks (as detailed in the following Interventions section). Finally, in the week following the completion of the course, they would be given an identical packet of questionnaires to complete. The pre- and post-course questionnaires will then be compared and analyzed. At the same time, an independent survey question would be given at the post-course questionnaire by asking them: “Overall, how do you think of this project?”. Participants were asked to rate their response with a four item Likert-type scale from “No useful at all”, “A little useful”, “Useful” to “Very useful”.

4. Interventions

The intervention was set as 1.5-hour class once a week, and lasted for 8 continuous weeks. The protocol of the intervention, which was detailed in Appendix 6, is derived from Dr. Martin Seligman’s theory of PERMA (Positive emotion, Engagement, Relationship, Meaning, Accomplishment) [37] with slight modification. Briefly, in each weekly class, a different topic related to the cultivation of PERMA will be talked, for example, the cultivation of positive emotional states (e.g. gratitude and appreciation), cultivation of intrinsic motivation through ‘flow’, and learning of being in harmony with the bad mood by highlighting the meaning of life. Additionally, multiple topics related to medical professional (e.g. doctor-patient relationships) were also introduced and discussed in class to guide the students to find the thinking traps using positive psychology theory. At the same time, multiple out-of-class exercises were also assigned, for example, writing down good things and identifying key character strengths. One single teacher led and completed the whole intervention, and the teacher has been trained to be qualified at Center for Positive Psychology and Engineering Psychology, School of Social Sciences at Tsinghua University, Beijing, China, before the class.

5. Measures

The following five scales were used to measure the psychology status of the participants before and after the training, respectively, including trait hope scale, life satisfaction scale, subjective happiness scale, as well as depression and anxiety scale (Appendix 1-5). All these questionnaires were first translated from English into Chinese by one of the
authors who were fluent in both Chinese and English. Translations were then checked by another author of the study to ensure the consistency with the original meaning of the scale items. No other adaptations to these scales were made.

5.1 The trait hope scale. The hope trait was measured by using the 12-item Trait Hope Scale[38, 39] (Appendix 1). This questionnaire scale asks respondents to rate their agreement with 12 statements related with hope, which is rated on an 8-point Likert-type scale ranging from 1 (definitely false) to 8 (definitely true) (Cronbach's $\alpha=0.85$). A sample item of the scale is: "I can think of many ways to get the things that are important to me". Amongst, 4 items (item 2, 9, 10 and 12 in the questionnaire) measures the goal-directed energy (which is also called agency thoughts), and 4 items (item 1, 4, 6 and 8 in the questionnaire) measures the plans to meet goals (which is also called pathway thoughts). The total trait hope scale score is derived by summing the four agency and the four pathway items, the possible range of which is 8-64 with high scores reflecting high levels of hope.

5.2 Life satisfaction scale. The life satisfaction was measured by using the 5-item satisfaction scale [40, 41] (Appendix 2). The scale utilizes a 7-point Likert-type response scale ranging from 1 (strongly disagree) to 7 (strongly agree) (Cronbach's $\alpha=0.86$). A sample item of this scale is: "In most ways, my life is close to ideal". The total score is derived by summing all 5 items together, and the possible range of which is 5-35, with a score of 20 representing a neutral point, 5-9 indicating the extreme dissatisfaction with life and 31-35 indicating the extreme satisfaction.

5.3 Subjective happiness scale. The subjective happiness scale is a 4-item scale of global subjective happiness[42, 43] (Appendix 3). Each item is rated on a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree) (Cronbach's $\alpha=0.89$). Amongst, two of the items ask respondents to characterize themselves using both absolute ratings and ratings relative to peers, whereas the other two items offer brief descriptions of happy and unhappy individuals and ask respondents the extent to which each characterization described them. The total score is derived by summing the four items together. The possible range of the total score is 4-28, with a score of 18 to 22 representing an averaging range. The higher score reflects greater happiness.

5.4 Depression and anxiety scale. The symptom levels of depression and anxiety were measured by using the patient-reported outcome measurement information system (PROMIS)[44, 45]. PROMIS, which is a set of online measure systems developed by National Institute of Health (NIH) of United States (US), evaluates multiple physical and mental conditions, including anger, depression, fatigue, anxiety, depression and physical function measures[44, 45]. Both depression and anxiety questionnaires are a five item Likert-type response scale to measure the frequency with which respondents have experienced over the past week. Both of them are a universal symptom screening tool rather than a disease-specific diagnostic one. A sample item from the anxiety scale is: "I felt worried in the past seven days". Participants were asked to rate their agreement with 5 answer choices ranging from "Never" "Rarely" "Sometimes" "Often" to "Always" (Cronbach's $\alpha=0.87$). PROMIS has two different but highly comparable scoring options: short form and computer adaptive test (CAT)[46]. In the short form option, participants are asked to answer a whole set of questions, while the CAT is a response-based scoring system, in which participant's response to the first item will guide the system's choice of subsequent items, and the computer will calculate the sum score automatically[46]. We adopted the combination of both options: the participants were asked to finish the online CAT survey and the score from the CAT report were used for the current analysis. At the same time, they were also asked to answer a paper-version short form survey (12 item included, Appendix 4-5), to enable us know their response to each specific item. For both depression and anxiety in CAT, a score of 50 is the average for the general population. A higher score represents more of the symptom being measured.
6. Data analyses

The data were analyzed by using SPSS (version 18). Independent t tests were used to determine whether there were any differences between the pre- and post-test scores on each outcome measure. Estimated means were used to describe the averaged pre-test and post-test scores on the outcome measures. An alpha level of 0.05 was used to determine the statistical significance of all results.

Results

1. Baseline measurement of hope, life satisfaction, subjective happiness, and symptoms of anxiety and depression of the participants

We first estimated the baseline psychology status of the participants. For the hope scale, the sum scores of the participants ranged from 25 to 59 (the full score is 64), with a mean of 42 and standard deviation (SD) 7.2 (Table 2). As compared with its average value in general population (value is 48), it was found that the score in the present medical student cohort was lower, but we were not able to make clear whether this comparison was statistical significant. For the life satisfaction scale, the total score of the participants ranged from 10 to 33 (the full score is 35), with an average score of 19 (SD=5.5) (Table 2), which was very similar with the neutral point of the scale (value is 20). For the subjective happiness scale, similar findings were observed: the participants’ sum score ranged from 13 to 24 (the full score is 28), with a mean of 18 (SD=2.8; Table 2), and was located in the average period of the general population score (ranging between 18-22). These findings indicate that the life satisfaction and subjective happiness scale of the participants were in the average range of the general population.

For the depression, the mean CAT score of the participants was 66 (ranging from 42 to 72, SD 4.6) (Table 2), higher than the average value 50. By surveying the paper-version short form questionnaire of the participants, it was found that 61.2% (30 of 49) participants reported that they often felt discouraged about the future, and 41% (20 of 49) reported that they often felt emotionally exhausted (data not shown). For the anxiety, the mean CAT score of the participants was 63 (SD 5.2, Table 2). 57.1% (28 of 49) participants reported that they often felt worried, and 30% (15 of 51) reported that many situations made them worry. There were also 51% (25 of 49) of the students reporting trouble in relaxing and 18% (9 of 49) in sleeping (data not shown).

2. Intervention effects of the training program

Before analyzing each of the item in the questionnaire, we first generally asked participants how they subjectively felt about this course by simply asking "Overall, how do you think of this project?" with a four item Likert-type scale (No useful at all, A little useful, useful, Very useful). This survey was also anonymous to enable the respondent to make as honest answer as possible. It was surprised to found that over 95% of the preliminary participants (n=49), and 87% of the validation participants (n=46) reported that they felt this training course is “useful” or “very useful”.

We then analyzed whether and how this positive psychology intervention would change the psychological condition of the participants by comparing the pre- and post-course questionnaire. For the hope trait scale, it was found that the mean overall score of the participants increased from 42 in pre-course (n=61) to 58 in post-course (n=49) (by 38%, P=0.03; Fig.1A, Table 2). For the life satisfaction scale and subjective happiness scale, a similar trend was observed. The mean score of the life satisfaction scale increased from 19 to 24 (P=0.026), and the mean score of the subjective happiness scale increased from 18 to 26 (P=0.009) (Fig.1A, Table 2) after the course, respectively. These findings
suggest the efficacy of positive psychology training on improving the psychology well-being of the Chinese medical students.

For the symptom levels of depression and anxiety, it was found that the respondents had significantly fewer symptoms after the workshop: the mean depression score of respondents decreased from 66 to 31 (P=0.003), and the mean anxiety score dropped from 63 to 32 (P=0.004) after the training program (Fig.1A, Table 2). These findings suggest the potential effects of positive psychology in alleviating depressive symptoms among medical students.

3. Validation of the intervention effects on an independent cohort of students

To confirm our findings, we validated the above measures in an independent cohort of medical students who took part in the course in the next year following the above preliminary study. In consistence with the findings described above, the average overall score of hope, life satisfaction and subjective happiness scale of this testing cohort of respondents also increased (Table 2, Fig.1B). The mean overall score of hope increased from 43 to 54 (P=0.04), life satisfaction from 18 to 22 (P=0.03), and subjective happiness from 20 to 27 (P=0.01) after the training course (Table 2, Fig.1B). For depression and anxiety scale, a reduction from 64 to 38, and 61 to 35 were observed, respectively (Table 2, Fig.1B). When asked the general question “Overall, how do you think of this project?” (four item Likert-type scale: No useful at all, A little useful, useful, Very useful), 87% of the participants reported that they felt this training course is “useful” or “very useful”. These findings suggest again the feasibility of applying positive psychology intervention to improve the psychology well-being of medical students in classroom.

Discussion

In the present study, we tested and validated the potential effect of a classroom-based positive psychology training course on improving psychology well-being and alleviating depressive symptoms of Chinese medicals student. The effects of the intervention seemed promising and encouraging. The hope scale, life satisfaction scale and subjective happiness scale of the participants appeared to improve, while their symptoms of depression and anxiety reduced. These findings suggest the promising effects of positive psychology education on improving the mental well-being of Chinese medical students, and that teaching psychological well-being in school may be feasible and desirable.

Embedding positive psychology into school education

In this study, we set the training program as a selective course embedded in the regular school curriculum based on two reasons. First, course-based training is more cost-effective and can make more students benefited as compared with the traditional one-on-one school counselling service. Moreover, multiple evidences have shown that integrating positive psychology into school education can not only act as an antidote to depression for the general student population, but also as a way to increase their happiness and life satisfaction with diagnostic symptoms \cite{34, 47}. Second, classroom-based training program is more acceptable by the Chinese students as compared to the one-on-one counselling. Different from Western population, Chinese people seldom seek help from psychology doctors even they are in bad mental status. It was once reported that among the people diagnosed with mental illness in China, only less than 10% of them sought help from psychology professionals\cite{48}. The major underlying reason is that in Chinese traditional culture values, seeing psychology doctor is a symbol of weakness and vulnerability. This is also why we kept the questionnaire anonymous in the whole research, although this strategy made the statistical analysis
more difficult and less powerful. The promising results in the pilot study observed here remind us that embedding the positive psychology into the regular school curriculum to improve the psychology status and prevent unprecedented depression and anxiety among the general university students may be practical, but needs further validation in larger populations with control study.

**Positive psychology education among medical students**

We found that positive psychology intervention may improve the psychological well-being of the medical students. Their hope scale, life satisfaction scale and subjective happiness scale were significantly improved, and at the same time, depression and anxiety symptoms were relieved. These findings indicate the possibility and feasibility of positive psychology intervention in increasing the psychological well-being of the medical students. This is in agreement with a series of studies who have shown the effectiveness of positive psychology in optimizing health and well-being in general populations although not in medical professionals[27, 28, 49].

In medical community, researchers have actually proposed that positive psychological concepts, such as resilience, character strength, and mindfulness, could and should be integrated into clinical practice to help clients alleviate suffering and increase wellbeing [50-53]. For example, Friedman SE et al. discussed how insights from the field of positive psychology and social neuroscience can help healthcare providers and their organizations flourish, in both their professional practices and personal lives[51, 52]. However, no direct research evidence was provided so far. The findings in the current study, therefore, may provide insights for the positive psychology intervention among medical professionals in future.

**Limitations and future directions**

While this study provided promising implications for the application of positive psychology education in Chinese medical students to improve their psychological well-being, the following limitations and weakness should be noted.

First, the sample cohorts used in the current study were small, which consisted only 49 students in preliminary study and 51 ones in validation. Moreover, the gender distribution among both participant cohorts were imbalanced, in which female students were more dominant. This may bring bias to the results since females and males have different sensitivity toward psychology. To make the findings more convincible, therefore, a larger participant cohort with balanced gender distribution should be employed in future study.

Second, there was no follow-up data in the current study, and the duration of the training effect should be estimated in the longer future. It would be interesting to check whether those students who received positive psychology training would demonstrate better psychology well-being after they enter into their clinic professionals. Such an investigation would provide more comprehensive evidence for the effects of positive psychology intervention on improving psychology well-being of medical students.

Third, there was no control group in the present study, which may reduce the reliability of the findings. Although we performed a paired comparison for each measured item between the pre- and post-course questionnaire, all of them were on an overall level since the survey was anonymous, which may reduce the statistical power.
Finally, the study design of the current study may bring some biases and exaggerates the positive findings. For example, the project allowed students to enroll and exit voluntarily. It is possible that the students who choose to enroll in the course are more willing to grow emotionally, which may partially or wholly accounts for the measured improvements. At the same time, the questionnaires from the drop-out students were not included in the analysis. Although their official reason was that they were too busy to follow up, there was possibly underlying reason that they did not think the training is useful and lost interest in it. These factors together may raise the possibility that a higher positive result was observed.

Conclusions

In summary, the findings in this preliminary pilot study may bring experience for the classroom-based positive psychology intervention to improve the psychology well-being of medical students in future. Further assessments on a larger sample cohort may yield more significant and reliable results.

Abbreviations

1. SCUT: School of Medicine, South China University of Technology
2. PERMA: Positive emotion, Engagement, Relationship, Meaning, Accomplishment
3. PROMIS: Patient-Reported Outcome Measurement Information System
4. SD: Standard Deviation

Declarations

Ethics approval and consent to participate

The study has been approved by the research ethics committee of the School of Medicine, South China University of Technology (SCUT). All of the participants agreed to participate in the current study, and written informed consent was obtained from all participants.

Consent for publication

Not applicable.

Availability of data and material

The data that support the findings of this study are freely available to any scientist wishing to use them for non-commercial purposes on request (Contact: Dr. Xiao-Qin Zhang, mczhxq@scut.edu.cn).

Competing interests

The authors declare no conflict of interests.
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Authors’ contribution

XQZ designed the project, interpreted the survey results and wrote the manuscript. BSZ and MDW developed the survey and analyzed the data. All authors have read and approved the manuscript.

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Tables

Social demographic characteristics of the medical students enrolled in the study

|                      | Preliminary set | Validation set |
|----------------------|-----------------|----------------|
|                      | Pre-course      | Post-course    | Pre-course      | Post-course    |
|                      | N=61            | N=49*          | N=52            | N=46**         |
| Age, M, SD           | 17-22, 19.4, 0.92 | 17-22, 19.5, 0.94 | 17-21, 18.3, 0.79 | 17-21; 18.5, 0.78 |
| Academic year        |                 |                |                 |                |
| 2                    | 36 (59%)        | 31 (63.3%)     | 52              | 46 (100%)      |
| 3                    | 25 (41%)        | 18 (36.7%)     | 0               | 0              |
| Gender               |                 |                |                 |                |
| Male                 | 43 (70%)        | 36 (73.5%)     | 35 (67.3%)      | 31 (67.4%)     |
| Female               | 18 (30%)        | 13 (26.5%)     | 17 (32.7%)      | 15 (32.6%)     |

5 students discontinued the study, **6 students discontinued the study.

Assessment of psychological well-being among the participant students

|                      | Preliminary set | Validation set |
|----------------------|-----------------|----------------|
|                      | Pre-course      | Post-course    | P value |
|                      | M(SD)           |                |         |
|                      | (N=61)          | (N=49*)        |         |
|                      |                 |                |         |
| Satisfaction         | 42 (7.2)        | 58 (8.3)       | 0.03    |
| Avail of happiness   | 19 (5.5)        | 24 (6.2)       | 0.026   |
| Ion                  | 18 (2.8)        | 26 (3.4)       | 0.009   |
|                      | 66 (4.6)        | 31 (2.8)       | 0.003   |
|                      | 63 (5.2)        | 32 (3.2)       | 0.004   |
|                      |                 |                |         |
|                      | M(SD)           | M(SD)          | P value |
|                      | (N=52)          | (N=46*)        |         |
|                      |                 |                |         |
| Satisfaction         | 43 (8.1)        | 54 (7.9)       | 0.04    |
| Avail of happiness   | 18 (5.3)        | 22 (6.1)       | 0.03    |
| Ion                  | 20 (3.1)        | 27 (4.3)       | 0.01    |
|                      | 64 (4.3)        | 38 (3.1)       | 0.004   |
|                      | 61 (4.8)        | 35 (2.9)       | 0.002   |

5 students discontinued the study, **6 students discontinued the study.

Figures
Figure 1

Intervention effects of the positive psychology course. A. Intervention effects on the preliminary participant cohort. After the 8 weeks of positive psychology training, the hope, life satisfaction and subjective happiness scale of the participants were significantly improved, while the depression and anxiety symptoms were relived. B. Validation of the intervention effects on an independent cohort of students. The intervention effects of the positive psychology course were validated on an independent cohort of students who enrolled in the course in the year following the above preliminary study. A similar trend was observed. In the figure, the average score of the pre-course group was normalized to 1. *P<0.05, **P<0.01.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- AppendixMEEDD1900636revJan152020.docx