

Effects of Character Strength-Based Intervention vs Group Counseling on Post-Traumatic Growth, Well-Being, and Depression Among University Students During the COVID-19 Pandemic in Guangdong, China: A Non-Inferiority Trial

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Purpose: This study assessed the effects of character strengths-based invention (CSI) vs group counseling (GC) on mental health outcomes (ie, post-traumatic growth, well-being, and depression) among university students in Guangdong Province, China.

Materials and Methods: We conducted a randomized non-inferiority trial among 124 undergraduates at a medical university during the COVID-19 pandemic. We randomly allocated students to receive either CSI (n=62) or GC (n=62). A qualified psychologist delivered both activities on campus during two consecutive weekends with a total of 7.5 hours and also gave assignments to students during weekdays. We measured the outcomes at pre-intervention, post-intervention, and 1-month follow-up. We then analyzed data using descriptive statistics and a general linear mixed model.

Results: CSI and GC groups had similar baseline characteristics. Both CSI and GC experienced an increase in post-traumatic growth and well-being. The mean±SD scores for post-traumatic growth were significantly higher in CSI compared to GC groups (87.70±14.22 vs 78.15±20.72, respectively), whereas well-being scores were similar between CSI and GC (82.58±16.57 vs 83.68±15.59, respectively). Neither CSI nor GC experienced a reduction in depression scores.

Conclusion: CSI had non-inferior effects compared to GC with regards to improvement of post-traumatic growth and well-being during the COVID-19 pandemic. However, caveats regarding lack of blinding of investigator and limited generalizability should be considered in the interpretation of the study findings.

Keywords: character strength-based intervention, post-traumatic growth, well-being, depression, university student

Introduction

Changes associated with the coronavirus disease 2019 (COVID-19) pandemic have affected public mental health worldwide.¹ University students have also been affected by COVID-related prevention and control measures, which function as sources of stress in addition to academic pressure and stresses related to relationships, health, and safety.²⁻⁴ In China, university students must strictly comply to COVID-19 prevention and control regulations, with mandatory isolation for those who tested positive for the disease. The campus of the infected individual would be closed. Students and staff would subsequently be prohibited from leaving their rooms, and all in-person classes and activities would be replaced with virtual classes and activities until the government approved the campus's re-opening. Previous studies increased anxiety (26.60–71.75%), depression (42.32–80.57%), and stress (71.26%) among university

students,^{3,5,6} as well as a significant decrease in well-being⁷ during the early COVID-19 pandemic. These students may need mental health interventions such as group counseling (GC), an effective method for improving psychological growth, self-esteem, well-being, and mental health,^{8–13} and reducing depression.⁸

However, GC requires the use of high-qualified leaders, such as specialized psychologists,¹⁴ and these professionals are commonly seconded to details supporting frontline health personnel and clients undergoing isolation. GC is thus difficult to access during the COVID-19 pandemic. Moreover, GC cannot support a large number of participants in each session,^{15–17} making scale-up for large populations difficult.

Character strengths-based intervention (CSI) is an intervention in positive psychology that aims to identify, use, and develop character strengths,^{18,19} and has been shown to protect against negative adversarial outcomes.^{20,21} Character strengths are defined as positive, trait-like capacities for thinking, feeling, and behaving in ways that benefit oneself and others.²² Everyone possesses all 24 character-strengths (such as zest, hope, love, kindness) in different degrees, so each person has a truly unique character strengths profile. These character strengths can be classified into six broad virtue categories (wisdom and knowledge, humanity, courage, transcendence, temperance, justice) across cultures and nations.²³ Roughly three-to-five character-strengths fall into one virtue. CSI may help to promote hope, engagement,^{24,25} self-efficacy and self-esteem,²⁶ class cohesion²⁷ and reduce negative emotion or behavior,²⁸ although some studies showed no significant effect on some negative mental health outcomes.¹⁸

Unlike GC, CSI does not require trained psychologists to be conducted. It can be conducted by a teacher or a healthcare worker given a manual to follow or having received training.^{29,30} It can even be administered by the participants themselves via completing exercises.³¹ Similar effects were also found in virtual CSI^{24,32,33} in which participants were trained according to tasks assigned by researchers. CSI can be administered to anywhere from 10 participants³⁴ to 577 participants³³ or more. CSI may provide a viable alternative to GC with regard to both access and scalability.

However, there is limited empirical evidence on the extent that CSI is at least non-inferior to GC. Character strengths were thought to be connected with positive outcomes and against negative outcomes^{20,21,35} in mental health. Well-being, including happiness, subjective well-being, and psychological well-being, is the second most common positive outcome related to CSI,¹⁸ while depression is the most common negative outcome related.²⁰ Although the early COVID-19 pandemic brought much negative outcome on individuals,^{3,5,6} some have post-traumatic growth³⁶ which refers to positive changes that share a common factor of struggling with trauma, adversity, or stress.^{37–40} The objective of our study was to assess non-inferiority of CSI compared to GC with regard to changes in post-traumatic growth, well-being, and depression among university students during the COVID-19 pandemic. Such information can provide needed empirical data in support of the use of CSI as an alternative to GC in resource-constrained settings and situations.

Materials and Methods

Study Design and Setting

We conducted a randomized non-inferiority trial at a medical university in Dongguan City, Guangdong Province, China, during February to July 2021. There was no positive case of COVID-19 in Dongguan City during the preparation, participant recruitment, and pre-testing phases of this study. However, two students at another university in Dongguan tested positive after the pre-testing phase. The COVID-19 prevention and control policy was then reinforced throughout the city. Students and staff underwent four screening tests of COVID-19, and all classes were to be discontinued if any positive case was detected. Except the investigators of this study, all other campus psychologists and counselors were seconded to serve those living in isolation.

Sample Size Calculation

We calculated the sample size by n4Studies application⁴¹ for this non-inferiority trial based on the assumed intervention vs control marginal differences. According to a similar randomized controlled trial, -6.0 points was for post-traumatic growth mean score.⁴² Based on a systematic review, -8.0 points was for well-being mean score,⁴³ and -1.9 points was for depression mean score according to previous literature.⁴⁴ We also assumed a 20% loss of follow-up, and made the

calculation at 95% level of confidence and 80% power. Sample size calculation yielded the requirement of 62 participants in each group, ie, 124 participants in total for the study.

Study Participants

Our study participants included first and second year undergraduate students. The students were required to live on campus. Students above second years usually have practicum or internship rotation away from the university and thus they are inaccessible during the study period. Inclusion criterion was to be over the age of 18 years. Exclusion criteria included: 1) self-reported history of psychological crisis or psychiatric illness; and 2) self-reported history of receiving any treatment for psychiatric illness or mental health problems. We invited 140 students to participate in the study, among whom 124 students were eligible.

Interventions

The contents of character strengths-based intervention (CSI) included “signature strengths (top five character-strengths)”^{33,45} and “growth strengths”. Growth strengths refer to five character-strengths: 1) zest; 2) hope; 3) love of learning; 4) leadership; and 5) perspective, all of which showed a strong correlation with positive growth in a previous study.³⁶ The structure of CSI was based on a character strengths-based “aware-explore-apply” model (AEA).¹⁹ We helped participants become aware of the signature strengths and growth strengths they might be blind to, then co-explored these positive capacities through questions, reflections, activities, and then participants apply their signature and growth strengths in a new or different way via assignments.

There were in total 7.5 hours of intervention conducted by a researcher (Y.Y.). The first 6 hours intervention included getting to know each other, boosting motivation, knowledge of character strengths, awareness and co-exploring signature strengths, and awareness and co-exploring growth strengths. All these activities happened on a Saturday in May 2021. The other 1.5 hours intervention included checking the compliance, showing and sharing your new story, encouraging to maintain using signature and growth strengths, and summarizing the workshop and lesson learned. All these activities happened on a following Saturday in May, 2021. During this week intercession period, the participants were asked to apply signature and growth strengths in a new or different way as assignments and were reminded to complete these every night, and watched a video related to post-traumatic growth.

The structure and content of group counseling (GC) was based on an existing guideline for group counseling in university students,⁴⁶ with some modification to suit the COVID-19 situation. The GC included four stages: 1) initiation stage; 2) transitory stage; 3) theme stage; and 4) lock up stage. The same as CSI, there was a total 7.5 hours intervention conducted by a researcher (Y.Y.). The content of GC was included in the first 6 hours of intervention: 1) creating a community atmosphere full of trust by ice breaking; understanding and sincerity by getting to know each other activity; 2) knowledge of GC and boost motivation; 3) knowing oneself further by looking for one’s advantages to build confidence; 4) emotional management; 5) coping with stress and frustration; and 6) contemplating one’s future. All these activities happened on a Sunday in May 2021. Another 1.5 hours intervention happened in a similar way to CSI, that is checking the compliance, showing and sharing stories according to the requirements of the GC group, encouraging them to continue using what they learned in the first 6 hours intervention, and summarizing the workshop and lesson learnt. All these activities happened on a following Sunday in May 2021. During this week intercession period, the participants were asked to contemplate their future and draw a self-portrayal and self-portrait (a new me) and watched a video related to improving mental health; they were also reminded to complete assignments.

Both groups received a total time of 7.5 hours intervention conducted by Y.Y., a researcher. The first 6 hours of intervention happened in a weekend (Saturday for CSI and Sunday for GC), and the other 1.5 hours happened the following weekend (Saturday for CSI and Sunday for GC). Both groups had to finish some assignments during the intercession period. The adherence was defined by completion of more than 80% of the assignments and assessed at the end of intervention. We gave students a small gift after the study’s completion.

Study Instrument

Our study instrument was a self-administered questionnaire that included general characteristics of the study participants (ie, gender, grade, self-reported academic achievement, family income per month, having siblings) as well as questions to measure the three main study outcomes: post-traumatic growth, well-being, and depression.

Measurement of Post-Traumatic Growth

We used the Posttraumatic Growth Inventory (PTGI)³⁹ questions to measure post-traumatic growth. The PTGI consisted of 21 questions that assessed post-traumatic growth with a 6-point Likert scale in five domains: 1) New Possibilities; 2) Relating to Others; 3) Personal Strength; 4) Spiritual Change, and; 5) Appreciation of Life. For this study, we used the Chinese version of the PTGI with Cronbach's α coefficient being 0.83 and the re-test coefficient after 2 weeks was 0.71.⁴⁷

Measurement of Well-Being

We used the China version⁴⁸ of the Well-being Index (WHO-5) instrument (1998 version)⁴³ to measure participants' well-being. The WHO-5 consisted of five self-reported questions with a sensitivity of 0.86 and specificity of 0.81. The raw score ranges from 0 to 25, with 0 representing worst possible and 25 representing best possible quality of life. We multiplied the raw score by 4 to obtain a standardized percentage score ranging from 0 to 100. A 10% change in standardized score between periods indicates a significant change.⁴³

Measurement of Depression

We used the Centre for Epidemiologic Studies Depression Scale-Short Form (CES-D-SF) instrument to screen for depression. The instrument consisted of nine self-reported depression-related questions with 4-point Likert scales.⁴⁹ We used the Chinese version of the CES-D-SF with internal consistency reliability ranging from 0.85 to 0.88.⁵⁰

Study Procedures and Data Collection

After determining eligibility, giving information, and obtaining written informed consent of participants, we randomly allocated eligible students to receive either character strength-based intervention (CSI) or group counseling (GS) using computer generated numbers. The students were not aware of which intervention they were to receive. We then used the study instrument to measure the participants' characteristics and study outcomes before the intervention was given ("Point 1", ie, baseline), after the intervention was completed ("Point 2", ie, post-intervention), and at 1 month follow-up ("Point 3"). We sent reminders to participants to complete their assignment in a timely manner each day during the intercession period and checked for their compliance at post-intervention.

Statistical Analysis

We used percentage to describe the baseline characteristics of participants in two groups. We then used general linear mixed model analyses to compare changes in all three outcomes (post-traumatic growth, well-being, and depression) between groups, with the baseline level of each outcome as a covariate. We described and assessed the significance of changes in the mean scores (95% CI) within each group comparing the baseline and the mean difference in these changes (95% CI) between groups at post-intervention and at 1 month follow-up using a linear mixed-effect model with participants as a random effect to allow for within-subject correlation of repeated measures over time. Fixed effects included the main effects and interactions with time (post-intervention and 1 month follow-up test). All analyses were based on an intention-to-treat (ITT) analysis approach.

Ethical Considerations

Investigators received ethical approval from the Human Research Ethics Committee, Faculty of Medicine, Prince of Songkla University, Hat Yai, Thailand (REC: 63-382-18-1). Investigators also received ethical approval from the Medical Ethics Committee, Affiliated Hospital of Guangdong Medical University (Approval number: PJ2020-097). This trial is registered on the Chinese Clinical Trial Registry (<http://www.chictr.org.cn>), Registration number ChiCTR2100045609. Our study complies with the Declaration of Helsinki.

Results

We recruited 140 students, and excluded 16 students due to a history of psychiatric illness (2 students) and history of psychiatric treatment (14 students), and 124 students remained as study participants ($n=124$ students), and we randomly allocated 62 students to each group. However, three participants left before intervention after allocation because of emergency, and two and three participants became lost to follow-up after 1 month intervention test, respectively. The flow diagram of the study is shown in Figure 1. Due to only 6.5% (8/124) loss of follow-up rate, findings based on the intention-to-treat (ITT) analyses were similar to the per protocol analyses. We present here only the results of ITT analyses. Fifty-one out of 57 students (89.47%) in the CSI group and 52 out of 59 (88.14%) in the GC group completed more than 80% of the assignments. The common reasons for incompleteness were lack of time, being physically unwell, and not knowing how to finish the assignments.

Both CSI and GC groups had similar demographic and socio-demographic characteristics (Table 1). There were almost twice as many females as males, and almost twice as many freshmen as sophomores. Over 70% of participants in both groups had one or more siblings.

Participants had relatively low score of post-traumatic growth (Figure 2) and well-being (Figure 3) at baseline and there was significant increasing after intervention which was maintained after 1 month follow-up. There was a significant difference between the CSI and GC group on post-traumatic growth at the post-intervention point ($p<0.01$), but no significant difference at 1 month follow-up (Figure 2). There were no significant differences between the two groups on well-being at both post-intervention and 1 month follow-up. The mean values depression score in both groups were close to the cut-off for depression (≥ 10 points) (Figure 4). This accounted for a 29.3% depressive tendency and 13.0% of high-risk depression. The average scores of the two groups were similar and did not significantly change over time.

The linear mixed effect model (Table 2) showed significant improvements in post-traumatic growth and well-being over time. However, this effect was not observed for depression. The effect of CSI was not inferior to GC for well-being.

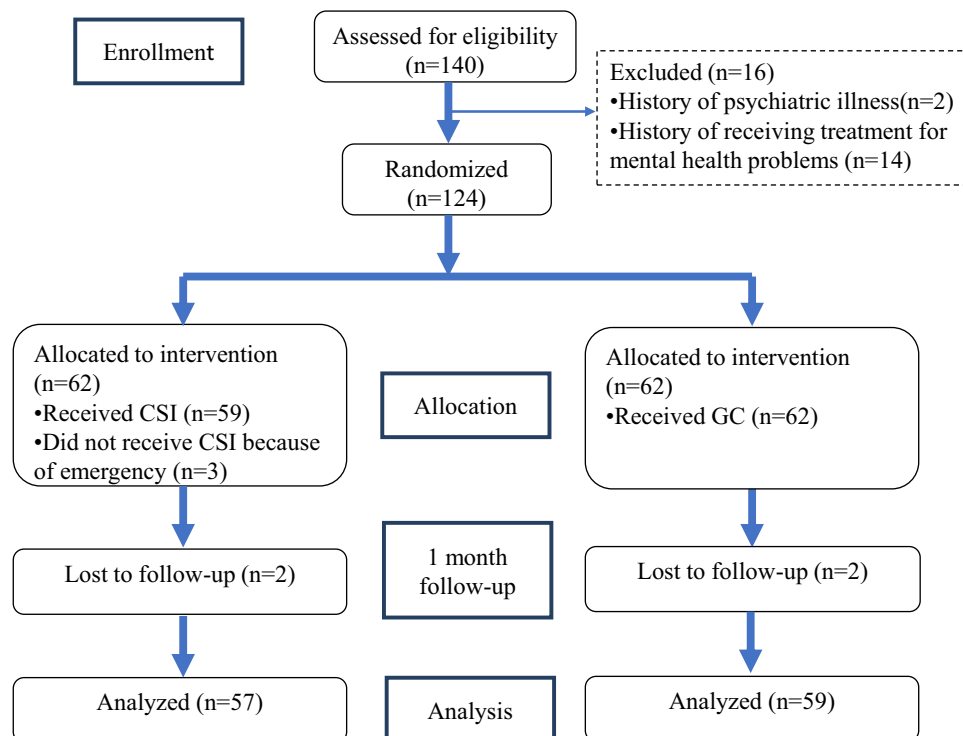


Figure 1 Flow diagram of the study.

Table 1 Baseline Demographic and Socio-Economic Characteristics of the Study Participants Included in the Analysis

	CSI (%) (n=62)	GC (%) (n=62)
Gender		
Male	21 (35.6)	20 (32.8)
Female	38 (64.4)	41 (67.2)
Grade		
First year	42 (68.9)	42 (67.7)
Second year	19 (31.1)	20 (32.3)
Self-reported academic performance		
Good	31 (54.3)	26 (44.1)
Pass	25 (43.9)	32 (54.2)
On probation	1 (1.8)	1 (1.7)
Family monthly income (CNY)		
<5,000	29 (49.2)	25 (41.7)
5,001–10,000	16 (27.1)	20 (33.3)
>20,000	14 (23.7)	15 (25)
Sibling		
No	16 (26.7)	17 (27.9)
Yes	44 (73.3)	44 (72.1)

Notes: Missing data not shown.

Abbreviations: CSI, character strength-based intervention; GC, group counseling.

Students who received CSI had significantly greater change in post-traumatic growth than students who received GC at post-intervention ($p<0.001$) and at 1-month follow-up ($p=0.021$) (Table 2). Neither CSI nor GC had significant effects on depression at post-intervention and at 1 month follow-up.

Discussion

In this non-inferiority trial conducted during the COVID-19 pandemic, participants who received character strength-based intervention (CSI) had the same level of improvement in post-traumatic growth and well-being as participants who received conventional group counseling (GC). However, neither group had any significant reduction in depression scores. Improvement in post-traumatic growth in the CSI group was significantly greater than that in the GC group and remained high at 1 month follow-up. Well-being scores were moderately low at baseline and were significantly improved at post-intervention and at 1-month follow-up.

Post-traumatic growth is one of the important factors for thriving in adversity.⁵¹ A previous longitudinal study during the COVID-19 pandemic showed overall character strengths, especially virtue of humanity, were significantly associated with post-traumatic growth and virtue of transcendence was related to mental health among the adult population.⁵² Moreover, character strengths could help people cope with the threat from COVID-19.⁵³ This RCT showed that character strength-based intervention could timely promote post-traumatic growth among university students. In addition to humanity and transcendence virtues,⁵² our previous study³⁶ showed that wisdom and knowledge virtue (love of learning, perspective), courage (zest), as well as justice virtue (leadership) plays an important role for post-traumatic growth cultivation during the COVID-19 pandemic.

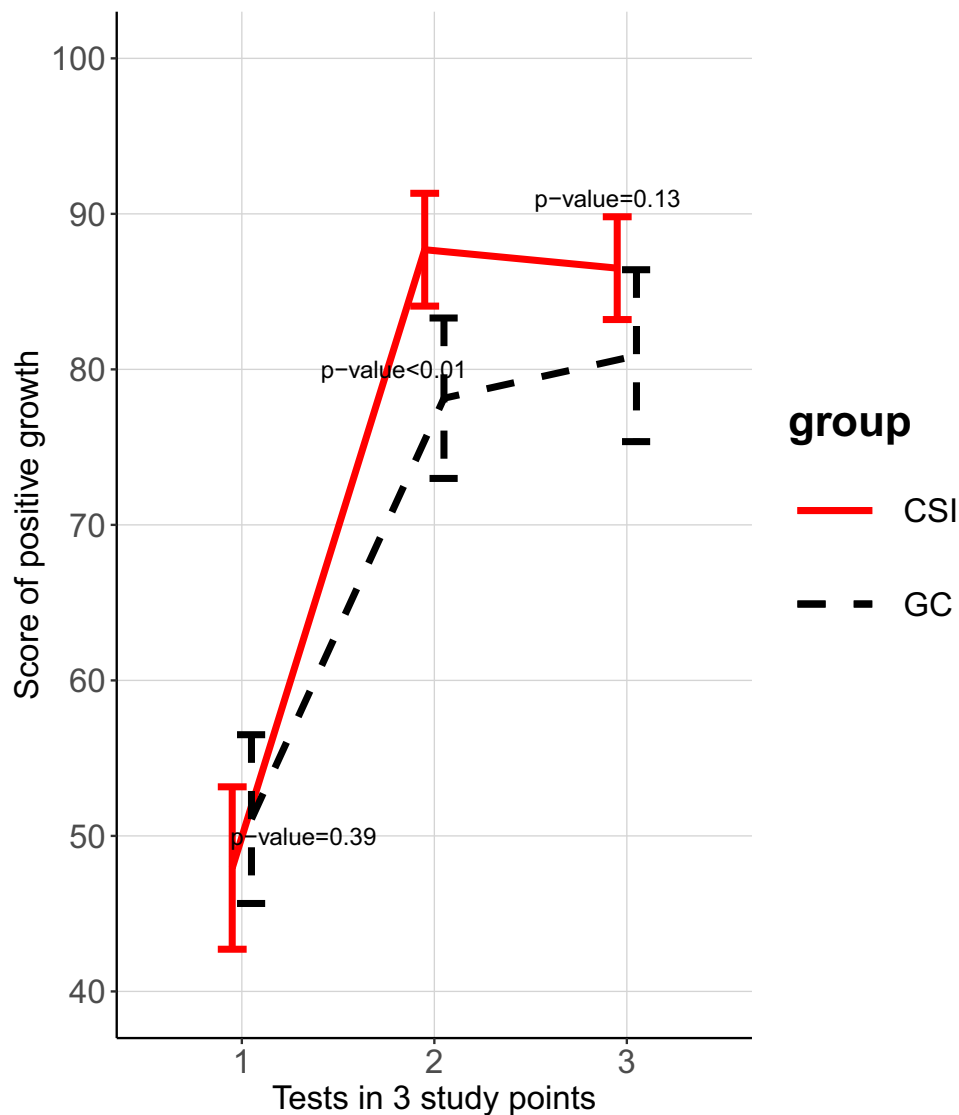


Figure 2 Mean and 95% CI of positive growth score between two groups.

Well-being has been shown to be associated with quality-of-life and longevity.^{54,55} During the early COVID-19 pandemic, however well-being was lower.⁷ A number of studies showed signature strength intervention enhanced well-being among the general population.^{33,45,56} Our study added that CSI was still effective to promote well-being during the pandemic. This positive effect was maintained for at least 1 month. Character strength-based intervention (CSI) habituating and exerting one's character strengths allows individuals to experience a sense of fulfillment or a feeling of self with vigor and authenticity, and results in positive functioning and well-being.⁵⁷

However, our RCT did not show an effect on depression during the COVID-19 pandemic. A meta-analysis showed that signature strengths had a significant decreasing effect on depression with a weighted Hedges' $g=0.21$.²⁰ In most interventions on depression, the participants were asked to use signature strengths in a new or different way each day during 1 week and they had a significant decrease.²⁰ Our CSI asked the participants to use signature strengths and growth strengths in a new or different way each day within a week as assignments. The differentiation is growth strengths added in the present study and then signature strengths may have less chance to be used, or growth strengths are interfering

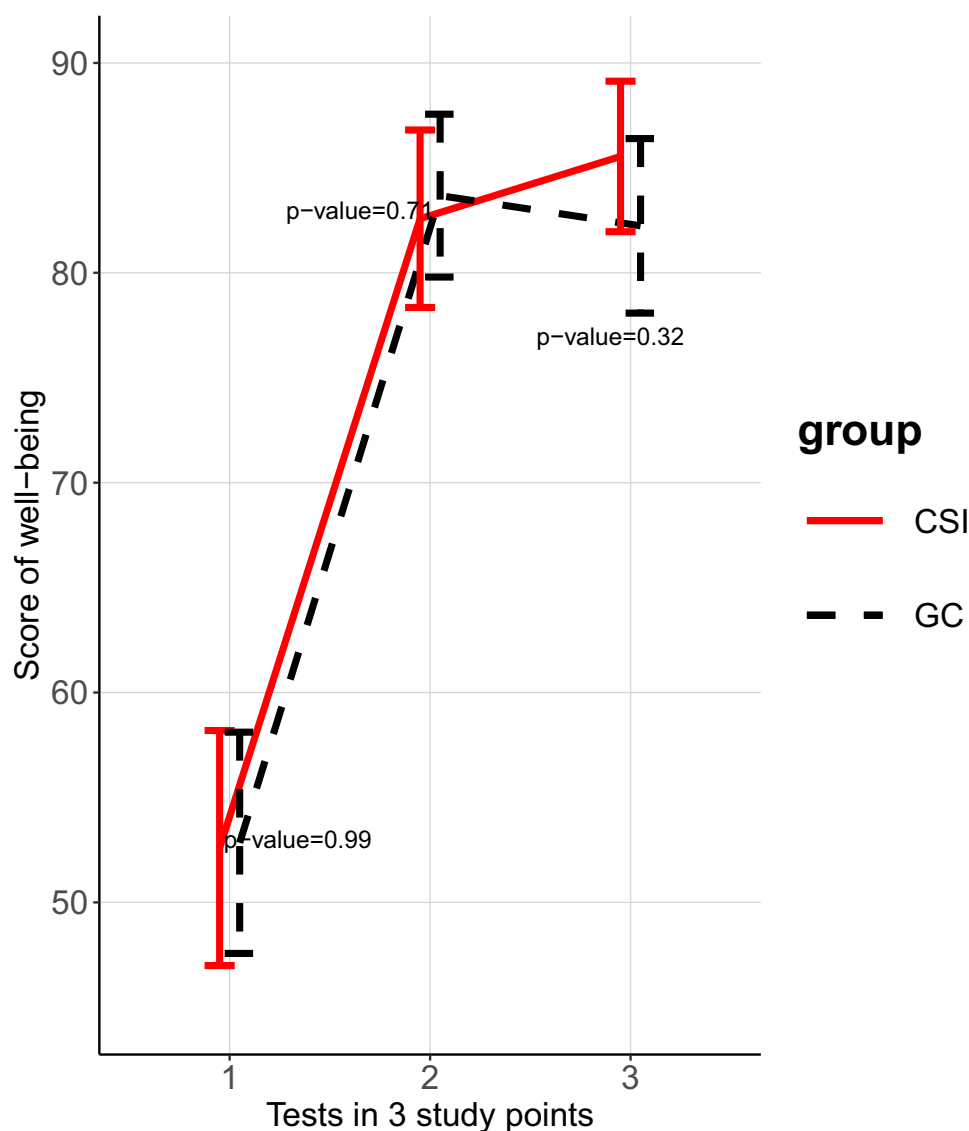


Figure 3 Mean and 95% CI of well-being score between two groups.

factors on decreasing depression. The CSI program may be further developed and tested for depression. We have to be aware that group counseling also had no effect on depression in the present study, although conventionally group counseling is a useful intervention to decrease depression for university students.⁸ Depression among university students in our study (43%) and others (42.3–80.5%)^{58,59} were obviously high during the COVID-19 pandemic compared to the normal situation (21.2%),⁵⁰ which may be one of the possible reasons leading to no decrease in depression in the present study. This suggested a screening and an appropriate intervention for this high-risk group.

Strengths and Limitations

The randomized trial design of our study with complete randomization allowed us to attribute the difference (or lack thereof) to the intervention rather than confounding. The relatively low loss-to-follow-up helped to reduce the presence of selection bias in our study findings. However, a number of limitations should be considered in the interpretation of our study findings. Firstly, there was only one qualified psychologist available during the study period, YY. The psychologist administered both CSI and GC and was not blinded to group allocation. However, the psychologist administered CSI and GC according to guidelines, and measured outcomes using self-reported instruments, which might have helped in

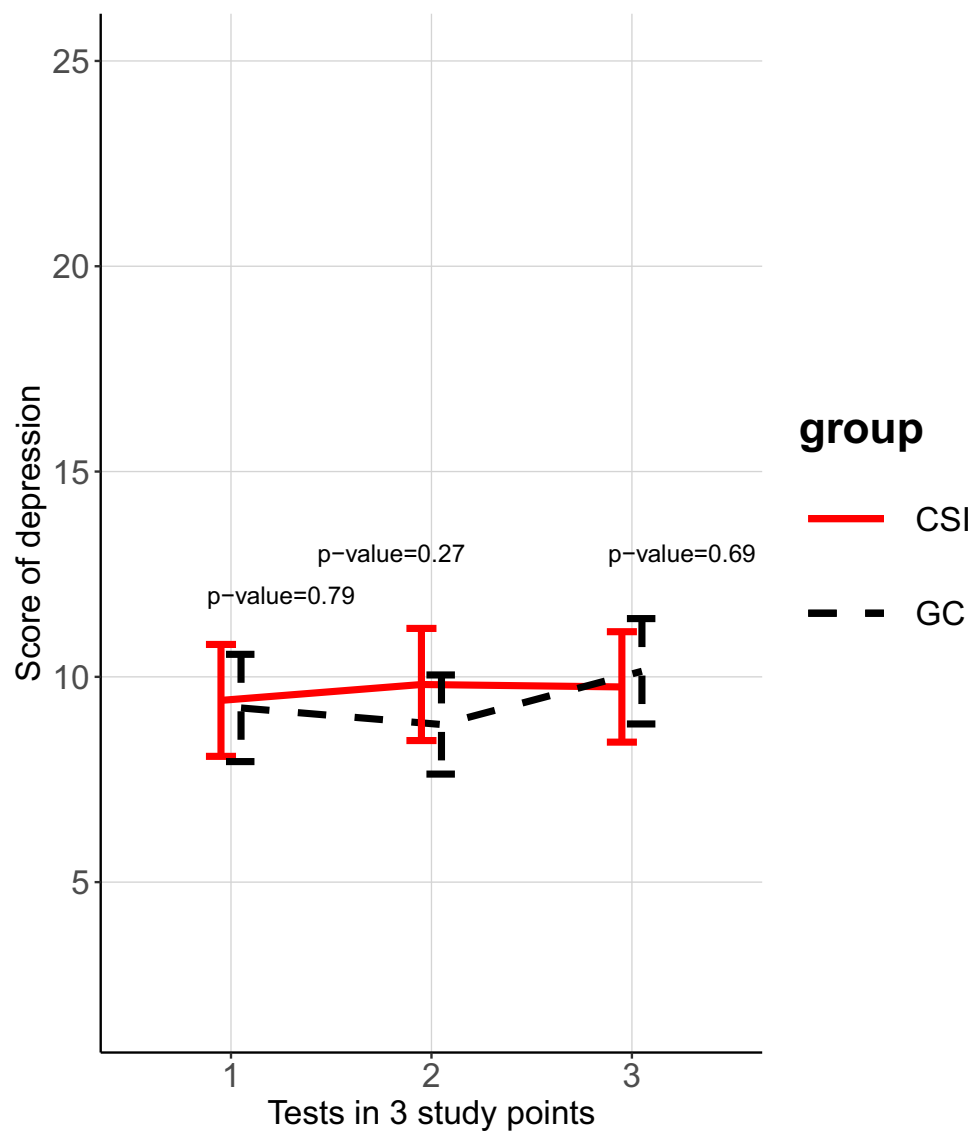


Figure 4 Mean and 95% CI of depression score between two groups.

reducing potential information bias in the study. Secondly, this study was conducted during the COVID-19 pandemic period in a city in southern China where strict, stress-inducing prevention and control measures were being implemented. These unique contexts may have limited the generalizability of the study findings.

Conclusion

A character strengths-based intervention, awareness, explore and apply of signature and growth strengths, showed short-term improvement and maintenance in post-traumatic growth and well-being, but no significant changes in depression among university students during the COVID-19 pandemic. The effects of character strengths-based intervention (CSI) on mental health outcomes among university students were non-inferior to those of group counseling (GC). The findings of this study provided useful information for relevant stakeholders. However, caveats regarding lack of blinding of investigator and limited generalizability should be considered in the interpretation of the study findings.

Table 2 Outcomes Scores at Three Study Points, Mean Changes in Each Group Comparing to Baseline and Adjust Difference in Changes Between Groups

	CSI Group (n=62)	GC Group (n=62)	Change from Baseline Mean (SD)		Difference in Changes Between Groups (95% CI)*	p-value*
			CSI	GC		
Positive growth						
Baseline	47.68 (20.74) ^{a, b}	51.08 (21.80) ^{a, b}	–	–	–	
Post-intervention	87.70 (14.22) ^a	78.15 (20.72) ^a	40.38 (35.25, 45.50)	26.78 (20.99, 32.57)	11.06 (5.42, 16.69)	<0.001
1 month follow-up	86.51 (12.73) ^b	80.88 (21.66) ^b	37.61 (32.79, 42.43)	28.88 (23.01, 34.75)	6.94 (1.12, 12.77)	0.021
Well-being						
Baseline	52.71 (22.15) ^{a, b}	52.84 (21.18) ^{a, b}	–	–	–	
Post-intervention	82.58 (16.57) ^a	83.68 (15.59) ^a	29.57 (24.80, 34.35)	30.92 (25.86, 35.97)	−0.84 (−5.62, 3.93)	0.731
1 month follow-up	85.54 (13.81) ^b	82.24 (16.30) ^b	31.64 (26.33, 36.95)	28.34 (23.45, 33.23)	3.33 (−1.52, 8.19)	0.181
Depression						
Baseline	9.43 (5.43)	9.24 (5.25)	–	–	–	
Post-intervention	9.81 (5.35)	8.84 (4.85)	0.89 (−0.21, 2.00)	−0.39 (−1.72, 0.94)	1.08 (−0.38, 2.55)	0.149
1 month follow-up	9.75 (5.18)	10.14 (5.03)	1.09 (−0.04, 2.22)	1.14 (−0.31, 2.58)	0.16 (−1.75, 1.43)	0.841

Notes: ^ap-value of simple pairwise comparisons of post-hoc tests in MANOVA (pre-int. vs post-int.) <0.05, adjusted using the Bonferroni multiple testing correction method; ^bp-value of simple pairwise comparisons of post-hoc tests in MANOVA (pre-int. vs 1-month follow-up) <0.05, adjusted using the Bonferroni multiple testing correction method; *Difference in changes between groups (95% CI) and p-value calculated with linear mixed effect model with adjustment for baseline score.

Abbreviations: CSI, character strength-based intervention; GC, group counseling.

Data Sharing Statement

The data that support the findings of this study are available from now on in the following link: <https://figshare.com/s/c6a2440c5849ca943aff> as well as the introduction of the data.

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Disclosure

The authors report no conflicts of interest in this work.

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