Since 2002

Online Multicomponent Program for Mental Health Promotion of Medical Students: An Intervention Study

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Abstract

BACKGROUND: Youth mental health is a significant public health concern. Mental health issues are increasing in severity and number in college campuses. Improving adolescent mental well-being remains a challenge for most societies.

AIM: The aim of the study was to promote the well-being and mental health outcomes of Kasr Al-Ainy medical school students.

METHODS: An intervention study conducted at Kasr Al-Ainy Faculty of medicine. The study participants (n = 664) from fourth and fifth graders were assigned to either of two conditions: Fourth graders (n = 325) to intervention (Horizon Egypt) website which provided information across positive psychology domains and fifth graders (n = 312) to control neutral entertainment-based website. Participants were assessed pre- and post-intervention on Depression Anxiety Stress Scale-Short form (DASS-21) and the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS).

RESULTS: There was no pre-intervention statistically significant differences between Horizon Egypt and control group on demographic variables, DASS-21, or WEMWBS scores. Qualitative data indicated that all participants reported that Horizon Egypt website was easy to use, 85% agreed that the program was fun, 91% agreed that the activities were interesting, and 77% agreed that they would continue to use it after study completion. Compared to the control condition, participants in the Horizon Egypt condition with the high levels of adherence reported significant decrease in depression, anxiety, stress, and improvements in well-being score.

CONCLUSION AND RECOMMENDATIONS: Acceptability of Horizon Egypt website was high. The online delivery of positive psychology programs may be an alternative way to address mental health issues and improve youth well-being.

Introduction

Mental health is the "psychological state of someone who is functioning at a satisfactory level of emotional and behavioral adjustment" and his ability to enjoy life, and create a balance between life activities and efforts to achieve psychological resilience [1].

Youth mental health is a serious public health concern, due to the high incidence of mental health disorders in this population and the low proportion of those affected seeking care [2], [3].

Higher optimism was associated with higher well-being, better physical health, better adjustment, less symptoms of depression and stress, stronger social supports, higher academic accomplishment, and lower dropout rates among students facing university problems. Adolescent optimism has also been demonstrated to be the best predictor of adult life satisfaction [2], [4].

Positive psychology is the scientific study of happiness, well-being, and flourishing [4]. In contrast to clinical psychology, it considers mental health to be more than merely the absence of mental illness. It is a set of behavioral, cognitive, and affective dimensions. Gratitude, mindfulness, positive social relationships, meaning, flow, optimism, hope, character qualities, and a healthy lifestyle are among positive psychology domains. While it is becoming more well accepted that prevention is preferable to cure, positive psychology could lead to early intervention programs for "normal" young people and it could be a viable alternative to traditional juvenile prevention initiatives [5], [6].

The World Health Organization defined eHealth by the use of information and communication technology (ICT) for health [7]. Both eHealth and online program offer a distribution method that is both acceptable to youth and financially viable. Employing an online platform for a positive psychology program allows for broader distribution, lowers expenses associated with clinicians,

and improves treatment fidelity [2]. The majority of young people have access to online resources because computers and internet connectivity are available in most schools and libraries, as well as smartphones, tablets, and other forms of information communication technology are getting more inexpensive. Furthermore, users can maintain anonymity and secrecy, employ an appealing and engaging online interactive format, user progress can be easily tracked, and data collecting can be automated [2], [8].

Medical school can be a demanding and stressful experience that takes a significant toll on medical students' mental health. Students enter medical school with superior mental health profiles relative to their age-matched peers, but show elevated rates of depression, anxiety, and burnout by the end of their medical school [9], [10].

Many medical schools have begun to implement a broad range of well-being curricula and activities for preserving medical student well-being (e.g., mindfulness training, pass/fail grading in preclinical courses, learning communities, and social activities). Unfortunately, there has been limited research evaluating the efficacy of these approaches making it difficult for medical schools to identify which interventions are effective for preserving medical student well-being, and what are the optimal methods for delivery and implementation [11].

Thus, the present study aims to profile mental health status of the medical students, develop online program to address positive psychology messages, implement the online program, analyze rates of adherence among participants, evaluate the acceptability of the online program, and assess the effectiveness of the online program.

Methods

Study design and setting

An intervention case–control study conducted at Kasr Al-Ainy Faculty of medicine, Cairo University.

Study participants

All fourth and fifth grade medical students in the academic year 2018–2019 were invited to share in the study. Fourth graders were assigned to intervention group and fifth graders were assigned to the control group.

Eligibility criteria

Any Egyptian fourth or fifth grade medical student who is willing to share in the study was included in the study.

Exclusion criteria

Any student who is suffering from any psychological disease or receiving medical treatment for any psychological disturbance was exluded from the study.

Study phases

Phases of the study were illustrated in Figure 1 and they were as following:

Pre-intervention phase

Before starting implementation of the study, the required permissions and official papers were completed, study tools were prepared and a pilot study was done with a group of sixth grade medical students (21 students) to test the self-administered questionnaire and the study website.

Student enrolment

Participants were recruited through promotional student campaign/program with brochures advertising "How Do You see the World Study": An investigation into how websites impact the way young people think, react, and interact with the world." The advertisement was disseminated through fourth and fifth grade group leaders in fourth and fifth grade Facebook and WhatsApp groups. It was important to conceal the clinical focus of the study to minimize any expectancy effects. Separate WhatsApp groups were created for each grade and interested students were asked to join the groups to facilitate communication. Electronic informed consent was obtained from the students before their enrollment in the study after explaining the purpose and objectives of the study. Researcher had no face-to-face contact with any of the participants in this study and communication was only through E-mails and WhatsApp groups.

Pre-intervention assessment

Pre-intervention assessment was done by Google form which contained pre-intervention self-administered questionnaire and two mental health assessment scales. The form was sent through WhatsApp groups and students were asked to fill in the form. Then, students who meet eligibility criteria were divided into two groups; intervention and control groups.

Intervention phase

An E-mail was sent to all eligible participants including a link to their allocated website and instructions on how to use it, however and whenever, they want over the next 6 weeks, but "for at least an hour a week."
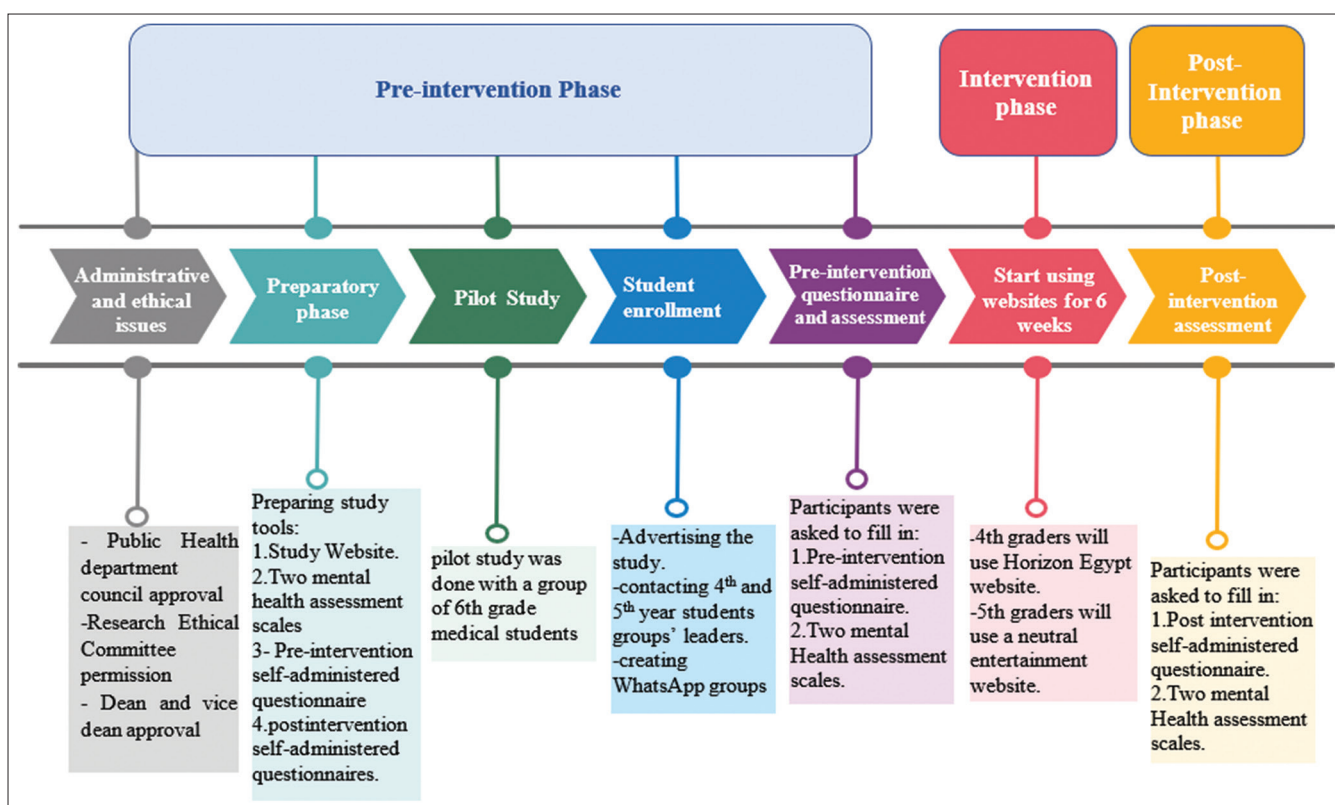
Figure 1: Phases of the study

Participants could access their allocated website from any internet-enabled device and from any location. Both group participants received reminder E-mails and WhatsApp messages once a week to encourage ongoing use and engagement with the websites.

Post-intervention phase

Six weeks from their date of commencement, participants were emailed a link to Google form which contained post-intervention self-administered questionnaires and the two mental health assessment scales. Participants were told that they no longer needed to access the websites each week for the purpose of the study.

Study tools

Participants completed online questionnaires before and after the 6-week intervention period. Demographic information was collected at baseline to assess eligibility and participant characteristics.

Participant intervention adherence was measured by the duration of use of the website and the frequency of website visits per week.

To determine the appeal and usability of the intervention website, the intervention group participants were required to respond to three statements about the website; the website was fun, the activities were interesting, and the website was easy to use. Intention to return to the study website after the completion of the study was also assessed.

Efficacy of the program was assessed in the self-report questionnaires at pre- and post-intervention through:

1. The Depression, Anxiety, and Stress Scale - Short Arabic form (DASS-21) [12]:

It is a self-report instrument consisting of three symptom-based subscales. It is used to assess depression, anxiety, and stress [13]. Each subscale has seven items which participants respond to on a 4-point Likert scale. DASS is not a clinical instrument and cannot diagnose depression, anxiety, or stress. It gives an indication whether any of these issues are having a significant effect on the person's life at present. DASS-21 short version has excellent reliability and good internal consistency. DASS-21 has been used with adolescent samples and is reported to have a Cronbach alpha of 0.87 for depression, 0.79 for anxiety, and 0.83 for the stress subscales. The DASS has also been demonstrated to correlate closely with the Diagnostic and Statistical Manual of Mental Disorders (DSM), diagnoses of panic disorder, generalized anxiety disorder, social phobia, simple phobia, and major depressive disorder [12].

DASS-21 scores were calculated by summing the scores for the relevant items and were multiplied by 2 to calculate the final score to match the DASS-42. Summed scores for each scale range from 0 to 42; more severe symptoms are indicated by higher scores.

2. The Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS) [14]:

WEMWBS was developed by researchers from the universities of Warwick and Edinburgh to enable the measurement of mental well-being in individuals aged 16 and above in the UK. WEMWBS comprised 14 items that related to an individual's state of mental well-being in the previous 2 weeks. Responses are made on a 5-point Likert scale. Each item was worded positively and, together, they cover most, but not all, attributes of mental well-being. Areas not covered included spirituality or purpose in life. These were deemed to extend beyond the general population's current understanding of mental well-being and their inclusion was thought likely to increase non-response. WEMWBS is scored by summing the response to each item. The minimum scale score is 14 and the maximum is 70.

WEMWBS was validated by assessing the correlations between WEMWBS and other scales that measure aspects of mental health, as well as scales that measure general health and emotional intelligence, and also the extent to which it follows anticipated patterns for age and sex (Table 1) [15].

Table 1: Correlation of WEMWBS to other scales

	n	Correlation with WEMWBS α
WHO-five well-being index	79	0.77**
Short depression happiness scale	71	0.76**
Positive and negative affect scale – positive subscale	63	0.73*
Positive and negative affect scale – negative subscale	63	−0.55**
Satisfaction with life scale	79	0.72**
Global life satisfaction scale	77	0.55**
Scale of psychological well-being	63	0.73**
EQ-5D thermometer	72	0.42**
Emotional intelligence scale	67	0.51**

Psychometric data of the measure on the original WEMWBS for adolescents have indicated satisfactory to high internal consistency (r = 0.87) and the short version has acceptable test-retest.

reliability (r = 0.66, 95% CI 0.59–0.72) [16], [17]. In an adolescent population, the SWEMWBS has been demonstrated to be negatively correlated with the Strengths and Difficulties Questionnaire, a measure of adolescent psychopathology (r = –0.44, 95% CI –0.49 to –0.40), negatively correlated with the 12-item General Health Questionnaire (r = –0.45, 95% CI –0.49 to –0.40), and positively correlated with both the WHO-Five Well-being Index (r = 0.57, 95% CI 0.53–0.61) [16].

Online websites

Intervention positive psychology website (Horizon Egypt)

Horizon Egypt is an online interactive positive psychology website used a combination of interactive exercises and information across positive psychology domains: Gratitude, optimism, flow, meaning, hope, mindfulness, character strengths, healthy lifestyle, and positive relationships. Furthermore, the website provided information about the benefits of increasing well-being, methods to develop skills in each of the positive psychology domains, provides links to other relevant resources, and allows for comments and online discussions. Horizon Egypt protected user's confidentiality. Users could use different usernames so they could protect their identity. Not only that, but also every time participants made an entry, they had been given the option to make their post public or anonymous, so no one knows which user posted it. It meant everyone could share their stories and express themselves in their entries with complete honesty.

The control website

The chosen control website was Pinterest. It is an image sharing and social media service website designed to enable saving and discovery of information on the internet using images and, on a smaller scale, animated GIFs and videos. It included features that would engage young people. Similar to Horizon Egypt, the control website is multicomponent, self-guided, youth-oriented, and has the option of contributing personal pieces of work, opinions, and stories to the website. The control website did not deliver positive psychology or information about well-being.

Data management and analysis

All the data were revised for completeness and logical consistency. Pre-coded data were transferred from Google sheets to Microsoft Office Excel software for Windows 2016. Data were then transferred to the Statistical Package of the Social Science software, Version 21 (SPSS) to be statistically analyzed. Descriptive statistics such as frequency, percentages, median, and interquartile ranges were used for data summarization. Graphs were used to illustrate simple information. Mann–Whitney U test is used to compare between the two study groups. Kruskal–Wallis test was used to compare changes in more than two groups. Chi-square test was used to compare two variables in a contingency table. For quantitative variables, the comparison between groups was done using Wilcoxon signed-rank test (for skewed data) to compare changes in variables pre- and post-intervention as appropriate. The least statistical significance level used was at $p \leq 0.05$.

In measuring adherence to websites, participants in the Horizon Egypt website who reported using the website for less than an hour a week were asked to provide a reason for their underusage. Responses were analyzed to extract key themes and coded to capture primary thematic components. Three main themes emerged: Time constraints, internet connection issues, and website content.

Based on the frequency of visits to their allocated website, participants were divided into two groups: Low

frequency (<3 site visits per week) and high frequency (3 or more site visits per week). They were also divided into two groups based on the duration of time they spent on their assigned website: Low duration (30 min or less per week) and high duration (more than 30 min/week).

Ethical consideration

Only those who agreed to take part were included and those who refused were excluded from the study. Electronic consent was obtained from all the participants in the study according to Helsinki Declarations of Biomedical Ethics [18] and after getting approval from the Ethical Committee for Research affiliated to the Public Health Department and Vice Dean for Undergraduate.

Results

Participant characteristics and pre-intervention mental health profile

Of the 712 participants who agreed to participate in the study, 368 students were from fourth grade and 344 students were from fifth grade. Six hundred sixty-four students met the inclusion criteria, 352 were fourth graders and 312 were fifth graders. Forty-eight students were excluded from the study, 17 non-Egyptians and 31 were on antidepressant drugs. After the 6-week intervention period, 506 participants completed the study and completed the post-intervention questionnaires and assessments. They were 291 from fourth grade and 215 from fifth grade (Figure 2).
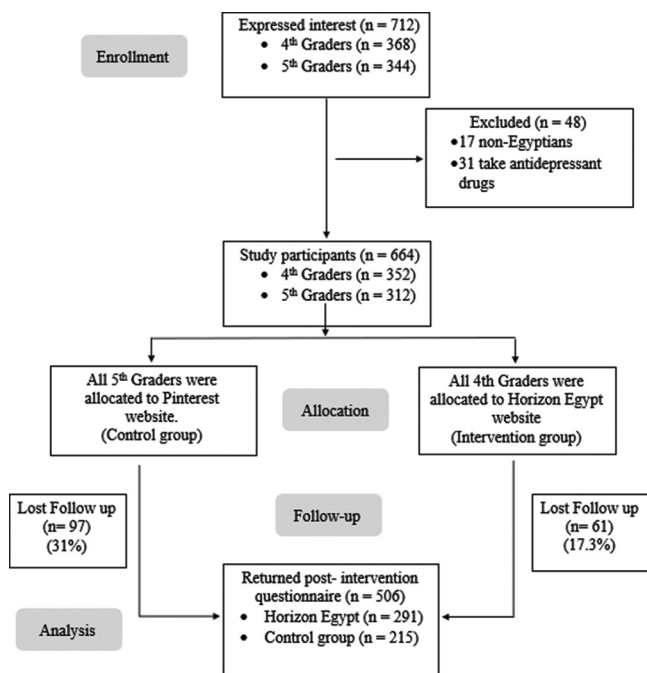

Figure 2: Progression of participants at each stage of the study.

There was no statistically significant difference between Horizon Egypt and control group in gender, residence, or duration of daily internet use. At pre-intervention, both Horizon Egypt and control group participants were similar with no statistically significant deference between median and interquartile range on the DASS-21 depression, anxiety, and stress subscales and on the WEMWBS (Table 2).

Adherence and usability of the websites

There were no significant differences between the reported duration spent using the websites each week between those allocated to Horizon Egypt and control group (p = 0.382). In Horizon Egypt, 21 of the 291 participants (7.2%) reported using the website for more than 1 h/week, 30 (10.3%) participants reported usage of 60 min/week, 60 (20.6%) participants reported usage for 50 min/week, 107 (36.8%) participants reported usage of 40 min/week, and 73 (25.1%) reported usage of 30 min or less per week.

In the control group, 10 of the 215 participants (4.7%) reported using the website for more than 1 h/week, 25 (11.6%) participants reported usage of 60 min/week, 40 (18.6%) participants reported usage for 50 min/week, 69 (32.1%) participants reported usage of 40 min/week, and 71 (33%) reported usage of 30 min or less per week (Figure 3).
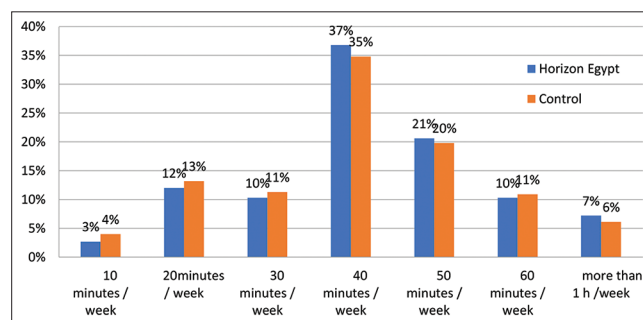

Figure 3: Duration of use of study participants to their assigned website per week (Total 506)
Horizon group n = 291 control group n = 215 Chi-square test

Participants in Horizon Egypt who reported using the website for less than an hour a week were asked to provide a reason for their underusage. In all, 240 participants reported that they used the website for <1 h weekly. When asking them about the reason for website underusage, 82% cited the reason to time constrains (they had heavy faculty curricula and they do not have enough time to visit the website). About 12% of them returned the cause for internet issues (they had limited internet packages on their mobiles). About 6% of them reported the reason for website content, which they wanted to have new activities as they lost their interest after they get around all activities.

Furthermore, there was no statistically significant difference (p = 0.684) between Horizon Egypt and control groups regarding their frequency of

Table 2: Demographic characteristics and mental health profile of the study participants

characteristic	Horizon Egypt group (n = 352) (%)	Control group (n = 312) (%)	Total (n = 664) (%)	p value
Gender				
Male	138 (39.2)	126 (40.4)	264 (39.8)	0.756
Female	214 (60.8)	186 (59.6)	400 (60.2)	
Residence				
Urban	289 (82.1)	266 (85.3)	555 (83.6)	0.273
Rural	63 (17.9)	46 (14.7)	109 (16.4)	
Duration of daily internet use				
About 1 h/day	22 (6.3)	16 (5.1)	38 (5.7)	0.129
2–4 h/day	239 (67.9)	234 (75)	473 (71.2)	
≥5 h/day	91 (25.9)	62 (19.9)	153 (23)	
Pre intervention mental wellbeing score				
Median (IQR)	32 (29–38)	31 (28-38)		0.056
Pre-intervention depression score				
Median (IQR)	14 (10–18)	14 (12–22)		0.367
Pre-intervention anxiety score				
Median (IQR)	14 (8–16)	14 (10–16)		0.101
Pre-intervention stress score				
Median (IQR)	18 (14.5–26)	20 (16–32)		0.0231

visits to their assigned website/week. Majority of the participants visited their website for 3 or 4 times a week. Moreover, less percentage of the participants visited their website twice weekly (Figure 4).
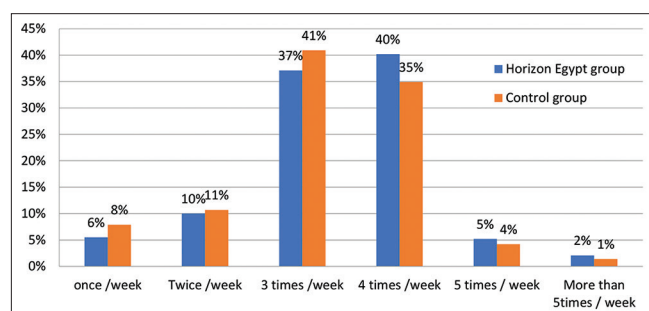

Figure 4: Frequency of visits of study participants to their assigned website per week (Total 506)
Horizon group n = 291 control group n = 215 Chi-square test

Acceptability of the online program

Participants in Horizon Egypt were asked to provide feedback on the appeal and usability of the positive psychology program. Of the 291 participants who used the program for 6 weeks, all participants reported that Horizon Egypt website was easy to use, 85% agreed that the program was fun, 91% agreed that the activities were interesting, and 77% agreed that they would continue to use it after study completion.

Efficacy of the program

To analyze the efficacy of the program, a series of 2-tailed Wilcoxon signed rank tests were conducted to measure differences in DASS-21 and well-being scores

before and after the intervention. Non-parametric tests were employed because of violations of the normality assumption for almost all group cells. All violations were because of skew in the data that would be expected in a non-clinical population. Participants in Horizon Egypt group returned significantly lower DASS-21 depression (p = 0.014), anxiety (p = 0.001), and stress scores (p = 0.016) at 6-week post-intervention. In addition, they returned significantly higher scores on the WEMWBS (p = 0.001). No significant differences in DASS-21 subscales or WEMWBS scores were found in the control group from pre-intervention to post-intervention (Table 3).

Samples for each condition were dichotomized (high and low) based on frequency of site visits and time spent on the site each week. Two further Wilcoxon signed rank tests were conducted to determine if frequency of use or length of time of use affected post-intervention levels of symptoms and well-being. Participants who visited their corresponding site 2 times per week or less were classified as having low frequency of use, whereas those visiting their allocated website 3 or more times/week were classified as high frequency of use. Participants in Horizon Egypt who visited the site with high frequency reported significant reductions in depression (p = 0.011), anxiety (p = 0.001) scores, and stress symptoms that approached significance (p = 0.012), as well as significant increases in well-being scores (P=0.001) from pre-intervention to post-intervention. No such differences were found in the control condition (Table 4).

Participants who visited their allocated website for 30 min or less per week were classified as low duration of use, whereas those who used their website

Table 3: Pre- and post-intervention mental well-being and DASS scores

	Horizon Egypt group (n = 291)		p value	Control group (n = 215)		p value
	Pre intervention	Post intervention		Pre intervention	Post intervention	
Mental well-being score						
Median (IQR)	32 (29–38)	35 (32–39)	0.001*	31 (28–38)	30 (27–38)	0.738
Depression score						
Median (IQR)	14 (10–18)	14 (10–16)	0.014*	14 (12–22)	14 (12–18)	0.640
Anxiety score						
Median (IQR)	14 (8–16)	12 (6–14)	0.001*	14 (10–16)	14 (12–18)	0.481
Stress score						
Median (IQR)	18 (14.5–26)	18 (14–26)	0.016*	20 (16–32)	20 (16–30)	0.490

for 30 min or more per week were classified as high duration of use. Participants in the Horizon Egypt group who visited the site for 30 min or more per week (i.e., in the high duration group) reported significant reductions in depression (p = 0.001), anxiety (p = 0.014) and stress (p = 0.012) scores, and increased well-being scores (p = 0.001) at post-intervention (Table 5).

Efficacy of the program was also apparent in percent change between pre- and post-intervention DASS-21 and WEMWS. There was statistically significant percentage increase in the mental well-being score and percentage decrease in depression, anxiety, and stress scores of Horizon Egypt with little change in scores of the control group (Table 6).

Discussion

The current study was conducted aiming at enhancing the well-being and mental health outcomes of Kasr Al-Ainy medical school graduates through an intervention study, using a web-based multicomponent positive psychology program (Horizon Egypt) among 4th year medical students who are in the middle of medical school academic years.

Despite difficulties maintaining high levels of adherence, positive qualitative feedback from participants indicated that students enjoyed Horizon Egypt and found it interesting and easy to use. Acceptability ratings of Horizon Egypt were favorable: All participants reported that Horizon Egypt website was easy to use. About 85% of the participants agreed that the program was fun. About 91% agreed that the activities were interesting and 77% were willing to continue using website after study ends. These results were quite similar to what was found by Manicavasagar et al., 2014, where 90% agreed that their study online positive psychology website was easy to use, 79% agreed the program was fun, 84% agreed that it was interesting, and 89% agreed that they would continue to use it after study completion [2]. Cheung et al., 2021 also found preliminary evidence for the acceptability of his study program: 76% of participants agreed that the skills were useful and 72% agreed that they would recommend the program to others [9].

Furthermore, in the present study, few percentages of Horizon Egypt participants (6%) reported that they lost interest after they get around all activities. This is quite similar to what Cheung et al., 2021 reported about some negative feedback provided by medical students included comments about how some of their program skills were not particularly novel and some students had learned about these skills in their undergraduate psychology classes or had familiarity with the skills through their own personal practices [9]. Furthermore, Manicavasagar et al., 2014 found that 11% of participants were disappointed of the content relevancy and age appropriateness of their study website [2]. To summarize, although the website and course content had an impact on participant's continued engagement, academic challenges were the primary cause of low adherence rates.

As regard the effectiveness of the program, significant improvement in symptoms of depression, anxiety, stress, and well-being scores were observed for the Horizon Egypt website participants. At present, there is evidence of the effectiveness of these positive psychology technologies in adult populations [19]. Baños et al., 2017 reported positive results of a self-guided internet intervention to induce positive emotions and reinforce psychological resources [19]. Shapira and Mongrain, 2010 also got positive results about the effectiveness of two online exercises to help individuals experience self-compassion and optimism [20]. Gander et al., 2013 reported the positive impact of an internet-based randomized and placebo-controlled study on well-being and depression [21].

In the present study, further analysis also suggested that those who visited Horizon Egypt website more frequently during the intervention period and for longer duration of time each week gained the most benefit. Participants in at least one of these high-adherence groups reported lower depression, anxiety, and stress scores, and higher well-being scores at post-intervention.

However, the most beneficial outcomes were present among participants who visited the website for 30 min or more during each week of the intervention period or 3 or more times during each week of the intervention. No significant changes were found among Horizon Egypt users who did not meet these levels of adherence indicating that the program requires a certain level of usage for a positive effect. These findings are similar to those reported by Manicavasagar et al., 2014

Table 4: Pre- and post-intervention scores of Horizon Egypt participants according to their frequency of website use

	High frequency (n = 246)		p value	Low frequency (n = 45)		p value
	Pre-intervention	Post-intervention		Pre-intervention	Post-intervention	
Mental well-being score						
Median (IQR)	33 (29–37.25)	35 (32–39)	0.001*	32 (29–36)	32 (28.5–35)	0.819
Depression score						
Median (IQR)	14 (10–20)	14 (8–16)	0.011*	16 (14–18)	16 (14–18)	0.206
Anxiety score						
Median (IQR)	14 (8–16)	12 (6–14)	0.001*	14 (12–18)	14 (12–18)	0.317
Stress score						
Median (IQR)	20 (14–28)	18 (12–26)	0.012*	22 (18–26)	22 (18–26)	0.157

Table 5: Pre- and post-intervention scores of Horizon Egypt participants according to their duration of website use

	Long Duration (n = 218)		p value	Short Duration (n = 73)		p value
	Pre-intervention	Post-intervention		Pre-intervention	Post-intervention	
Mental well-being score						
Median (IQR)	32 (29–37)	35 (32–39.25)	0.001*	33 (30–36)	33 (30–37)	0.758
Depression score						
Median (IQR)	14 (10–20)	12 (8–16)	0.001*	16 (14–18)	16 (12–18)	0.061
Anxiety score						
Median (IQR)	12 (8–16.5)	10 (6–14)	0.010*	14 (12–17)	14 (12–17)	0.180
Stress score						
Median (IQR)	20 (13.5–26.5)	18 (12–24)	0.012*	22 (18–28)	22 (18–28)	0.973

where only participants who used his study website for the required period and frequency each week were those who show decline in depression, anxiety, and stress and increase in their mental well-being [2].

Table 6: Percent change of mental well-being and DASS scores

Percent change	Horizon Egypt (n = 291)	Control group (n = 215)	p value
Mental well-being score			
Median (IQR)	5.9 (2.5–10.3)	0 (–2.6–3.4)	0.001*
Depression score			
Median (IQR)	–12.5 (–20–0)	0 (0–7.1)	0.001*
Anxiety score			
Median (IQR)	–11.5 (–19–0)	0 (–10–12.5)	0.001*
Stress score			
Median (IQR)	–10.5 (–15.4–0)	0 (–5.6–0)	0.001*

Overall, these positive findings suggest that further research into online positive psychology programs' effectiveness is warranted, particularly if participant's engagement with the site can be improved. Furthermore, a better follow-up of individual use of the website or self-reported use of the skills is required. To give a more rigorous evaluation of the intervention's efficacy, future research should do a formal pre- and post-evaluation of these measures, with longitudinal identifiers linking participants' survey replies through time and evaluating each skill use.

Finally, while positive psychology programs may help medical students manage more effectively with the stress of medical school, it is not enough for medical schools to focus their efforts solely on individual burnout [9]. Burnout is an indication of a larger problem, rather than a problem caused entirely by a lack of resiliency in the individual [22]. When medical schools focus their efforts on providing individual-level burnout solutions (e.g., mindfulness training and yoga), these solutions can be seen as "band-aid" solutions that place the burden of wellness on medical trainees while ignoring the real issues in the learning environment that contribute to burnout (e.g., mistreatment and lack of faculty engagement). Thus, it is important for medical schools to take a multifaceted approach to combat burnout in medical training and to provide solutions both at the individual and organizational level [9].

Limitations of the study

- Students were very busy with their heavy curricula, so it was very difficult to encourage them engage in the study.
- Data of usage relied on participants' self-report which could have been affected by memory and reporting biases.
- The results of study of student's assessment are descriptive and do not explain the reasons for these findings. Thus, the researchers cautiously interpreted the results of this study.
- Further data were needed to assess which positive psychology domains or site activities were effective at maintaining engagement for students.
- The present study used standardized screening tool (DASS) to determine the presence of anxiety, depression, or stress in medical students. However, a full diagnostic interview by a qualified mental health professional would still be a more accurate way for further assessment.

Conclusion

Medical students are exposed to stressful life, due to the nature of hard academic load and competitive learning environment, this raises the great need for their psychological and mental support. The finding from this study demonstrated that the online positive psychology program (Horizon Egypt) has the potential to reduce symptoms of psychopathology and promote their mental well-being.

Acknowledgment

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