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Research Article

Digital Support for Wellbeing: Addressing COVID-19 Related Mental Health Challenges in a Developing Country via Web-Based Telehealth

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Abstract

Mental disorders pose a significant global challenge, particularly accentuated by the escalated prevalence during the COVID-19 pandemic outbreak. In addressing this critical issue, the utilization of web-based telehealth systems emerges as a promising solution to provide essential healthcare services to individuals grappling with mental disorders. In light of this, the primary objective of this study is to share the experience of designing and developing a web-based telehealth system tailored for deployment within a developing country. Using a three-phase model, we conducted interviews with 8 clinical psychologists and 8 general psychologists in the Concept Identification phase, extracting content to alleviate COVID-19-related mental health burdens. In the System Design phase, we collaborated with 24 experts recruited from social media to develop a final prototype for a web-based telehealth system's user interface. The third phase, Pre- and Post-Implementation Assessments, engaged 120 participants. Using the COVID-19 Stress Scale (CSS), we measured stress levels before and after participation. Data analysis employed comprehensive statistical tests, calculating Standard Deviation and Mean for an overview, and conducting analytical tests (independent sample t-test, one-way ANOVA, Tukey's post hoc test) for deeper insights. Depression, drug use, stress, anxiety, and sleep problems emerged as shared concerns among all participating psychologists. Data indicated an initial stress score of 128 for participants before engaging with the web-based telehealth. Subsequently, stress scores progressively decreased over quarters: 85 in the first, 44 in the second, and 62 in the third. Significantly, repeated measures analysis of variance highlighted a substantial stress reduction within the COVID-19-affected group. Web-based telehealth presents a solution that overcomes geographical constraints, reduces travel complexities, and eases the financial burden of seeking care. Moreover, it offers increased flexibility in appointment scheduling, enhancing the overall convenience of mental health support. A key advantage of web-based telehealth is its potential to maintain a continuum of care for individuals managing mental health challenges.

Keywords: Telehealth, Mental health, COVID-19 pandemic, Web-based telehealth.

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Introduction

The COVID-19 pandemic spanning from 2019 to 2022 triggered far-reaching disruptions across global economies, societies, and personal lives [1, 2]. Concerns about infection, social isolation and economic instability contributed to a significant upswing in mental health challenges [1, 2]. During this period, studies indicated elevated levels of stress, anxiety, depression, and symptoms characteristic of post-traumatic stress disorder (PTSD) among individuals affected by COVID-19 [3, 4]. Furthermore, existing mental health conditions were exacerbated by this crisis, leading to the aggravation of symptoms and an increased utilization of mental health services [5, 6].

In developing nations, the provision of mental health assistance presents formidable obstacles, amplified by restricted resources and inadequate healthcare systems [7-10]. A substantial impediment has been and continues to be accessibility, given that numerous individuals reside in remote locales with constrained entry to mental health provisions. Furthermore, the expense associated with in-person counseling and medications in these economies is often prohibitive for those already grappling with economic hardships [7, 8].

Telehealth, which involves delivering healthcare services through electronic communication technologies, emerged as a promising remedy for addressing the disparity in mental health service availability [3, 5]. Specifically, web-based telehealth employs the Internet to facilitate virtual consultations, therapy sessions, and various other mental health interventions. This forward-looking approach facilitates remote consultations, eliminating geographical constraints, cutting down expenses, and enhancing the reach of care [7, 8]. Furthermore, numerous studies have underscored the mental health repercussions of COVID-19, expressing apprehensions about the enduring impact of isolation. There are concerns that the collective fear and anxiety within society might potentially inflict more harm than the virus itself [3, 4, 11].

Telehealth involves the provision of medical care services by healthcare professionals, particularly when distance plays a pivotal role, employing information and communication technologies (ICT) to transmit precise and accurate information [1]. Telehealth, specifically in the domain of tele-mental health services, emerges as a practical and apt approach for assisting and caring for individuals with pre-existing medical conditions, family members, healthcare providers, and the entire community throughout this pandemic [5]. Moreover, research reveals that individuals in isolation actively sought online support to meet their mental health needs, underscoring the acceptance and significance of this medium [3, 12]. The adoption of telehealth technology represents a patient-centric 21st-century approach that prioritizes the safety of patients, healthcare professionals, and others involved [7, 8]. Within the context of the COVID-19 era, telemedicine has the potential to enhance epidemiological investigations, manage clinical cases, and exert control over various aspects of the pandemic [3, 13]. Studies emphasize that maintaining mental well-being is paramount for all segments of society affected by COVID-19 [3, 5]. Numerous studies underscore the significance of telehealth services in mitigating the psychological impact of the COVID-19 pandemic [14-16]. Reay et al. (2020) focused on mental health services in Australia during this period, concluded that this approach effectively upholds individuals' mental well-being amidst the challenges of COVID-19 [16]. Monaghesh and Hajizadeh (2020) explored the role of telehealth amid the pandemic, deducing that its utilization enhances the delivery of healthcare services. Consequently, telehealth emerges as a pivotal tool for providing in-service care, safeguarding the well-being of patients and healthcare providers amidst the COVID-19 outbreak [17]. Zhou et al. (2020) delved into the efficacy of telehealth in alleviating the mental burden and promoting mental health during the COVID-19 crisis. Their findings suggested that the creation and development of telehealth solutions similar to those previously

employed for conditions such as Anxiety, Bipolar disorder, Depression, Suicide and Self-harm, Post-traumatic stress disorder, among others, can play a vital role in sustaining mental health and alleviating the mental strain during the pandemic [3].

The utilization and augmentation of online support through telehealth to alleviate the mental health challenges faced by those impacted by COVID-19 emerge as imperative. Consequently, the focus of our study centers on crafting and implementing a web-based telehealth system within a developing country (Iran). In pursuit of this objective, we engaged the expertise of 16 psychologists and 24 specialists to ascertain and amass the requisite data for the web-based telehealth framework. Moreover, a cohort of 120 active participants collaborated with us in the utilization of this system.

Method and Materials

The study was undertaken in 2022 as a methodological investigation. The project pertaining to the web-based telehealth system embraces a user-centered design methodology for its development. This endeavor will unfold through a research model structured around three distinct phases: 1) Concept identification, 2) System design, and 3) Pre- and Post-implementation assessments.

Concepts identification

In the phase of concept identification, our focus was on discerning pertinent content aimed at alleviating the mental health burden experienced by individuals affected by COVID-19. To achieve this objective, we conducted semi-structured interviews with a total of 8 clinical psychologists and 8 general psychologists from Tarbiat Modares University (TMU) and Tehran Medical Sciences (Roozbeh Hospital) in Tehran, Iran. Participants were selected at random and assigned to the study. Given the constraints on sample size, we opted against a formal sampling procedure and instead included all individuals who could participate. The resulting data underwent analysis using a straightforward content analysis approach. The data was first organized into primary codes, which were then further categorized into primary and secondary groups. The interviews were transcribed verbatim and imported into the MAXQDA software [18] in the sequence they were conducted. Subsequent interviews were organized and carried out based on the evolving analysis. Data collection proceeded until no novel primary codes or categories emerged. The final two interviews were conducted to ensure data saturation. The average duration of each interview was approximately 69 minutes, ranging from 65 to 127 minutes.

System design

In the phase of system design, we engaged experts for our study through purposive sampling. Drawing from prior research practices, we sought to involve a cohort of 20 to 30 experts [19, 20]. Interested candidates responded to our recruitment posts on social networks such as Instagram and Facebook and participated in online registration. Ultimately, a total of 24 experts registered, comprising 8 females and 16 males, with an average age of 38. These participants played pivotal roles in two co-creation online workshops held during June and July 2022. Their areas of expertise encompassed human factors in website design, psychology, health science, software development, medical informatics, and development.

In the workshop, we introduced the research team and outlined the project's objectives. We elucidated their roles in the project and familiarized them with the tenets of the user-centered design process. During this phase, we solicited experts to share insights and recommendations in Word format. They were also requested to articulate user requirements and their envisioned

functionalities for the web-based telehealth system. Subsequently, each participant presented their suggestions to the collective group. For the enhancement of user interface design ideas, paper prototypes were fashioned. The Justinmind tool [21] was harnessed for generating a prototype to provide a clearer visualization of the final version. The data gathering process comprised video recordings and commentary stemming from the online workshops, each lasting around 3 hours on average. To dissect and classify the user needs and system requirements for the web-based telehealth system, qualitative methodologies were employed. Ultimately, for integrated development, we adopted Visual Studio Code [22] as our primary tool for programming and webpage development.

Pre and Post implementation

During this stage, our aim was to engage a participant pool of 120 individuals. Over the course of two months, we undertook recruitment efforts through multiple rounds of posts on social networks, including platforms such as Instagram and Facebook.

In the pre-implementation phase, we gauged participants' stress levels using the COVID-19 Stress Scales (CSS) questionnaire [23]. This 36-item assessment tool was employed to discern symptoms of distress associated with the COVID-19 situation. The questionnaire is structured into five segments: 1) Danger and Contamination Fears (DAN), 2) Socioeconomic Consequences Fears (SEC), 3) Xenophobic Fears (XEN), 4) Traumatic Stress Symptoms (TSS), and 5) Compulsive Checking and Reassurance Seeking (CHE). Except for the Danger and Contamination Fears section, which consists of 12 items, the remaining categories comprise 6 items each. Participants provided responses on a scale of 0 to 4, where 0 signifies "Not at all" and 4 represents "Extremely" for each question [23]. The composite score offers an overarching measure of COVID-19-related distress, shedding light on the potential presence of COVID Stress Syndrome. Subsequently, for a span of 9 months (October 2020 – July 2021), the developed telehealth web pages were accessible to individuals for their use. Upon transitioning to the post-implementation phase, we monitored participants' stress levels at three-month intervals using the CSS questionnaire.

Data analysis

In our pursuit of determining an appropriate statistical approach, our initial step revolved around evaluating the normality assumption of the dataset. We employed established techniques such as the Shapiro-Wilk test [24] and conducted a visual examination of histograms and Q-Q plots to comprehensively assess the distribution of stress level data. This meticulous scrutiny was imperative to establish the foundation for subsequent parametric analyses, particularly repeated measures analysis of variance (ANOVA) [25], which hinges on the assumption of normality to yield accurate outcomes.

For instance, we employed parametric repeated measures ANOVA to analyze stress levels across three consecutive three-month intervals subsequent to the implementation of web-based telehealth. This methodology facilitated the ranking of stress levels, enabling a meaningful comparison of mean stress levels across these distinct time frames. Furthermore, our analytical journey encompassed the application of an independent sample t-test, one-way ANOVA [25], and the integration of Tukey's post hoc test [26]. These strategies collectively allowed us to probe variations in mean values among multiple independent groups. By adopting this comprehensive analytical framework, we ensured a meticulous exploration of nuances and variations within our dataset while upholding the integrity of our statistical inferences.

Results

Identifying topics of the web-based telehealth

As a result of the conducted interviews, the psychologists reached a consensus on the critical topics to be incorporated into the development of the proposed web-based telehealth platform. Through collaborative discussions, a comprehensive array of subjects was identified, encompassing but not confined to: depression, recreational drugs and alcohol usage, Substance Use Disorders, Stress and Anxiety, Sleep problems, Positive Motivational factors, Self-care strategies, Self-management techniques, Self-isolation challenges, Financial stressors, Occupational instability, Job Uncertainty, Suicidal feelings, Post-traumatic stress disorder (PTSD), Acute stress disorder (ASD), Daily routines, Social roles, Maltreatment, Bipolar affective disorder, Domestic abuse, Family conflicts, Self-efficacy enhancement, Paranoia management, Postnatal depression and perinatal mental health, Menopause-related concerns, Self-esteem cultivation, Seasonal Affective Disorder (SAD), Schizophrenia, Psychosis, Phobias, Panic attacks, and Eating disorders. It's essential to highlight that these identified topics stand as fundamental textual requisites for the development of the web-based telehealth platform. Synthesizing the core-summary interview with the psychologists, these thematic considerations underscore the platform's ability to comprehensively address a diverse range of mental health needs. See **Supplemental file 1** notes explains core-summary interview with psychologists.

Developing web-based telehealth system

During the second online workshop, participants were invited to articulate their requirements for a web-based telehealth system, followed by collaborative input on refining the user interface design. The consensus among participants led to the identification of the following key insights concerning user needs for such a system: This segment of the workshop highlighted the evolution of telehealth technology, which predates the COVID-19 pandemic. However, the pandemic has underscored the critical significance of telehealth due to the constraints imposed by limited in-person visits, extended quarantines, and the closure of health facilities. Consequently, the role of telehealth has acquired a more pronounced and inclusive dimension within the context of the COVID-19 era. This technology can be harnessed for a diverse array of applications, including facilitating drug, nutritional, and sports-related guidance, offering training in self-care skills, conducting health assessments, providing reports on individuals with specific medical conditions, furnishing mental health services, and extending emotional and psychiatric support. By integrating these insights, the workshop emphasized the expanded and impactful role that telehealth can play during these challenging times, addressing an array of health and well-being needs.

During the second online workshop, participants reached a consensus on the essential elements that should be integrated into the user interface. Key considerations included user-friendliness and the practicality of the system. It was collectively agreed that users should possess individual accounts enabling access to their data, while also having the ability to monitor trends and historical information. The registration process should be both straightforward and swift. Users should be able to track their activity levels, access their search history, and benefit from both a simplified and advanced search feature. Additional features encompassed a dark mode option, a consistently available navigation system, personalized content recommendations, high-quality video and voice call capabilities, a clear and uncomplicated design, stringent privacy safeguards, and a frequently asked questions (FAQ) section.

Moreover, there was a proposal to integrate digital incentives like badges, stars, or scores, to encourage ongoing system use. To illustrate these suggestions, prototypes of the web-based telehealth system were meticulously developed using the Justinmind software. These prototypes featured refined user interface designs and preferred methods of interaction. Finally, the core version of the system was developed employing the Visual Studio Code, as illustrated in Figures 1 and 2.

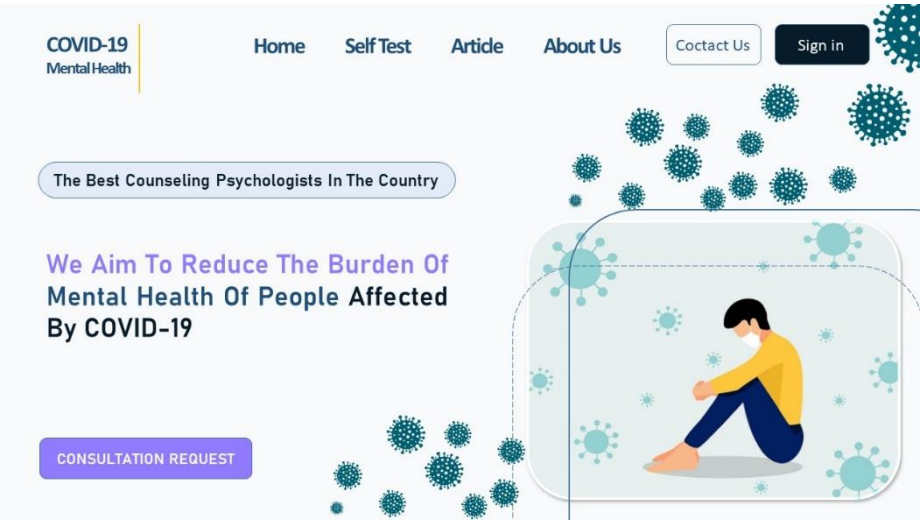

Figure 1. Illustrating prototype home page web-based telehealth.

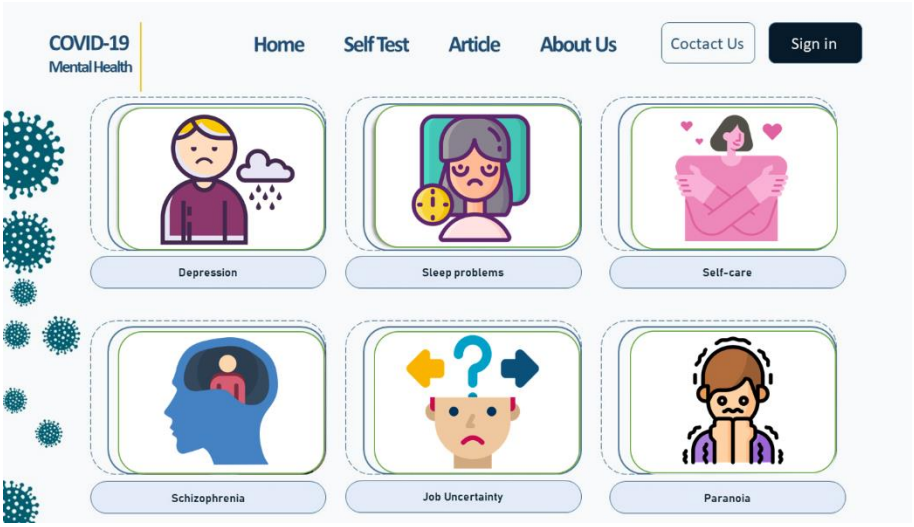

Figure 2. Illustrating prototype article page web-based telehealth.

Assessment of the impact of the web-based telehealth system

The current study consisted of a voluntary participation of 147 individuals who engaged with the web-based telehealth system, retaining the right to withdraw from the study at any point. Over the course of the study, 9 participants were excluded during the first quarter, 7 during the second quarter, and 11 during the third quarter. Following the exclusion of these participants, the data analysis focused on a cohort of 120 individuals, comprising 81 women with an average age of 30.51 ± 8.092, and 39 men with an average age of 28.90 ± 9.324, who continued through the entirety of the course. Across a span of three 3-month intervals, the website was employed for utilization, with the website's implementation spanning from December 10, 2020, to July 12, 2021. Preceding the intervention, participants were administered the CSS questionnaire, evaluating

their stress levels over the preceding seven days, up to October 12, 2020. Subsequent to acquainting participants with the website and its usage, CSS questionnaires were administered at the culmination of each 3-month period. The questionnaire assessed the stress level within the last 7 days, and the calculated scale determined the basis of the evaluation. The analysis of variance with repeated measurements yielded significant findings. The average stress level exhibited notable variations based on factors such as gender, marital status, parenthood of children under 14 years of age, and employment status. Moreover, a decrease in the level of stress among individuals was observed over the 9-month period of website usage (Table 1).

Table 1. People's stress scores based on the CSS questionnaire, separated by demographic information with Repeated Measure test

	valid	**N(%)**	**CSS± SD**			
			Pre	3 month	6 month	9 month
Sex	Female	81(67.5%)	129.65±3.93	86.42±10.69	45.53±5.13	63.85±8.61
	male	39(32.5%)	125.69±4.15	82.21±8.7	41.15±5.17	58.49±5.49
Marital Status	Single	48(40%)	126.12±4.22	83.44±9.91	42.85±5.12	58.10±7.75
	Married	68(56.7%)	130.04±3.75	85.94±10.46	44.75±5.71	64.49±7.37
	Divorced	4(3.3%)	126.75±4.99	89.25±9.74	48.25±3.75	79.75±6.07
Child under 14	Yes	67(55.8%)	129.84±3.92	86.31±10.40	45.10±5.75	64.82±7.61
	No	53(44.2%)	126.51±4.31	83.45±9.90	42.85±4.99	58.68±7.46
Employment Status	No	38(31.67%)	128.08±4.68	81.45±10.15	41.94±3.95	56.16±5.19
	Yes, part time	24(20%)	130.04±4.75	83.13±8.71	43.33±5.91	62.71±8.13
	Yes, full time	15(12.50%)	139.78±4.24	83.20±8.40	44.67±5.43	63.47±7.42
	Yes, remote work	43(35.83%)	127.16±3.64	89.95±10.08	46.23±5.87	66.56±7.43
Total CSS			128.37±4.40	85.05±10.24	44.11±5.52	62.11±8.11

October 12, 2020, to January 12, 2021, which was the beginning of the first quarter of website use by participants, coincided with the start of the third and largest wave of COVID-19 in Iran compared to the previous two waves. So that the number of hospitalized patients and the number of deaths due to covid in hospitals had increased by about 2.5 times. At the end of this course, 21 of the participants were infected with COVID-19. In spite of this critical situation, a significant difference was observed in the level of stress of people before and during this time period by using telehealth on the web, which indicates a decrease in the level of stress of people (pre=128.37±4.40, First=85.05±10.24). The beginning of the second quarter, when the website was on the list of participants, from January 13, 2021, to April 13, 2021, witnessed a large difference in the level of stress of people compared to the previous two periods (pre=128.37±4.40, first=85.05±10.24, second3=44.11±4. 5.52) and the next quarter (third3=62.11±8.11). Because we were in Iran between the third and fourth waves, the critical situation was relatively over. But the conditions were still in place because it was the beginning of the 4th wave of COVID-19 during this period. In the third quarter, when the fourth wave of COVID-19 was going on, however, according to the ranking of the questionnaire scale, this interval was ranked second in reducing

the stress level of people, and the first place in reducing the stress level was related to the second 3 months of using web-based telehealth (Figure 3).

Figure 3. The level of stress of people based on the CSS questionnaire in each pre-period, the first 3 months to the third 3 months, from left to right

Prior to the commencement of participants' utilization of web-based telehealth, an inquiry regarding their COVID-19 status was conducted. This preliminary assessment revealed that 38 individuals had contracted COVID-19. After a 9-month period from the initiation of the intervention, this count increased to 74 individuals. In the context of our study, COVID-19 was treated as a moderator variable due to its potential influence on the causal relationships of other variables.

When evaluating stress levels through the CSS questionnaire, no significant distinction emerged in stress levels between those infected with COVID-19 (129, mean of 38 participants, standard deviation of 29.89) during the pre-intervention phase and those who hadn't contracted the virus (128, mean of 82 participants, standard deviation of 30.10). Notably, both groups exhibited considerably high stress levels. Following the implementation of the website and subsequent evaluation, a significant reduction in participants' stress levels during the course became apparent, as compared to the pre-intervention phase.

It's worth highlighting that after website implementation, stress levels in participants who had contracted COVID-19 (75.72, mean of 37 participants, standard deviation of 29.32) were notably lower than those who hadn't contracted the virus (95, mean of 44 participants, standard deviation of 31.65). After a 6-month span since the introduction of the website, the overall stress level of all participants dropped to 44, an encouraging outcome. Upon closer examination, it's evident that within this timeframe, individuals with a history of COVID-19 displayed lower stress levels than those who hadn't contracted the virus.

Finally, over the 9-month period encompassing measurements conducted in 3-month phases, the collective stress level of participants settled at 62, indicating a notable decrease. Upon comprehensive analysis, it's worth noting that among the eight participants engaged in full-time employment, all of whom had contracted COVID-19, the total stress level was 63 (mean of 15 participants, standard deviation of 37.33). This figure marked a reduction in stress levels compared to their pre-intervention levels (Table 2).

Table 2. Demographic information based on the average score of the CSS questionnaire. (f, age mean)

Affected/ non affected CSS		Pre		Post- 3		Post- 6		Post- 9	
		+	-	+	-	+	-	+	-
Sex	Female	132(22, 29.77)	129(59, 30.89)	75.72(37, 29.32)	95(44,31.65)	42(41, 29.56)	49(40,31.365)	59(49,28.42)	71(32, 33.90)
	Male	126(16, 30.06)	125(23, 28.08)	76(22, 30.90)	91(17, 26.29)	40(22, 30.90)	43(17, 26.29)	57(25, 31.28)	62(14, 24.64)
Marit Status	Single	126(13, 22.46)	126(35, 23.62)	73(20, 23.85)	91(28, 22.92)	41(22,23.90)	44(26, 22.80)	55(31, 23.51)	63(17, 22.94)
	Married	131(24, 33.75)	129(44, 35.31)	77(38, 33)	97(30, 37)	41(40, 33.3)	50(28, 36.85)	60(42, 33.61)	72(26, 36.61)

	Divorced	123(1, 34)	128(3, 29.33)	75(1, 34)	94(3, 29.33)	51(1, 34)	47(3, 29.33)	67(1, 34)	71(3, 29.33)
Child under 15	Yes	131(24, 34.04)	129(43, 35.55)	77(36, 33.58)	97(31, 36.67)	42(38, 33.86)	50(29, 36.51)	60(40, 34.17)	72(27, 35.40)
	No	127(14, 22.75)	126(39, 24.10)	73(23, 24.17)	91(30, 23.43)	41(25, 24.2)	44(28, 23.35)	56(34, 23.76)	63(19, 23.73)
Employment Status	No	129(12, 23.66)	128(26, 22.42)	72(19, 24.94)	91(19, 20.68)	42(21, 25.28)	42(17, 19.76)	54(27, 23.88)	60(11, 20.18)
	Yes, part time	129(13, 27.92)	131(11, 27.36)	77(16, 28.12)	95(8, 26.75)	41(17, 28.11)	49(7, 26.57)	60(19, 28.26)	74(5, 20.8)
	Yes, full time	130(7, 39)	130(8, 35.87)	79(11, 37.09)	94(4, 38)	44(12, 37.5)	49(3, 36.66)	63(15, 37.33)	*
	Yes, remote work	130(6, 36)	127(37, 35.08)	76(13,33.30)	96(30, 36.03)	39(13, 33.30)	49(30, 36.03)	58(13, 33.30)	70(30,36.03)
Total		129(38, 29.89)	128(82, 30.10)	76(59, 29.91)	94(61, 30.16)	41(63, 30.03)	47(57, 30.05)	58(74, 29.39)	68(46, 30.58)

+ = Infected with COVID-19 - = No infection

Based on the outcomes derived from the repeated measures analysis of variance, a notable reduction in stress levels was discerned among the group that had contracted COVID-19. Remarkably, the period of the second trimester, approximately 6 months subsequent to the commencement of telehealth website usage, exhibited the lowest stress levels. The independent paired t-test results, applied to assess the averages of the two groups - individuals infected with COVID-19 and those uninfected - within each period, unveiled insightful patterns. Specifically, in the pre-study period, prior to the study's initiation and when the questionnaire was administered, individuals who had contracted COVID-19 exhibited a significantly higher stress level in the context of the Danger and Contamination Fears (DAN) axis ($P < 0.05$). However, no significant differences emerged in other facets (Table 3).

Table 3. The results of an independent paired t-test on the level of stress of people based on the parts of the CSS questionnaire, according to the status of COVID-19 infection of the participants in different period.

		Pre		**3 month**		**6 month**		**9 month**	
COVID-19	**range**	**+**	**-**	**+**	**-**	**+**	**-**	**+**	**-**
		n=38	**n=82**	**n=59**	**n=61**	**n=63**	**n=57**	**n=74**	**n=46**
Danger and Contamination Fears (DAN)	0-44	44.05± 2.28	43.08 ±2.11	24.45 ±2.98	31.05 ±1.80	10.66 ±3.36	15.73 ±2.11	16.59 ±2.40	23.67 ±2.24
Socioeconomic Consequences Fears (SEC),	0-24	21.34± 1.52	20.81 ±1.81	13.59 ±1.54	15.73 ±1.93	7.49± 1.45	8.31± 1.03	9.14± 1.32	11.80 ±2.13
Xenophobic Fears (XEN),	0-24	21.39± 1.05	21.52 ±1.05	12.44 ±2.08	15.60 ±1.53	6.52± 1.45	58.80 ±1.60	11.85 ±3.46	12.06 ±2.43
Traumatic Stress Symptoms (TSS)	0-24	20.13± 1.98	19.92 ±1.71	12.27 ±2.11 9	15.88 ±1.77	8.92± 2.05	6.65± 1.88	10.47 ±2.05	10.69 ±1.82
Compulsive Checking and Reassurance Seeking (CHE)	0-24	22.50± 1.37	22.52 ±1.14	12.98 ±1.50	15.31 ±1.40	7.77± 2.14	7.70± 1.91	10.10 ±2.11	10.19 ±1.37

Discussion

Main findings

Based on insights derived from semi-structured interviews involving 8 clinical psychologists and 8 general psychologists, certain consistent themes emerged. Specifically, depression, drug use, stress, anxiety, and sleep problems were common concerns shared by all participating psychologists. These findings align with existing literature that highlights the heightened prevalence of depression, stress, and anxiety during the COVID-19 era [14, 27]. A significant study, which delved into the transformative impact of mental health care in the context of the COVID-19 era, brought together a panel of experts and psychologists. Their discussions underscored the vital need for an equitable distribution of mental health care on a global scale. They also emphasized the interconnected nature of psychological issues, where challenges such as financial and employment uncertainties often contribute to the manifestation of depression [14]. Building upon these study findings, the emphasis placed by psychologists on positive motivational factors, self-care, self-management, and self-isolation demonstrates a potentially influential approach.

Numerous studies advocate for the enhancement and promotion of self-care, self-management, and self-isolation strategies as coping mechanisms during the pandemic, addressing both physical and mental well-being [28-30]. Recent research, investigating the initial repercussions of the COVID-19 pandemic on mental health care, pinpointed the adoption of self-management techniques during the COVID-19 era. This included engaging in focused and restorative activities such as cooking or artistic endeavors [30] In the wake of the pandemic, telehealth technology has garnered heightened attention. Zhou et al. (2020) highlighted the effective role of telehealth in mitigating mental burden and preserving mental well-being amidst COVID-19. Their research concluded that the development of online telehealth platforms, akin to those previously employed to address issues such as anxiety, depression, and post-traumatic stress disorder, could contribute to maintaining mental health and alleviating psychological distress during the pandemic [3]. In our study, participants echoed the significance of telehealth technology in the pandemic landscape. They emphasized that individuals could access counseling, receive guidance on nutrition and fitness, and partake in self-care skills training. Moreover, the technology facilitates health monitoring and reporting. Beyond mental health support, participants recognized its potential for extending emotional and psychiatric assistance. Through prototypes encompassing both paper-based and software-based iterations, functionalities and actions were visually depicted, providing a foundation for detailed discussions. This approach aligns with user-centered design processes, where visual representations serve as valuable aids [31, 32].

Comparison with previous studies

Evidential research underscores the efficacy of telehealth, the utilization of digital technologies for remote healthcare delivery, as a pivotal tool in addressing mental health requisites during the COVID-19 pandemic [3, 5]. In a landscape where in-person visits are restricted or impractical due to constraints and social distancing mandates, telehealth bridges the gap, ensuring the uninterrupted provision of care for those grappling with mental health challenges [7, 8]. Notably, the adoption of telehealth for mental health purposes has witnessed a pronounced upswing amid the pandemic [5, 29]. This surge can be attributed to several factors that underscore its viability and significance.

Primarily, telehealth furnishes a secure and easily accessible avenue for seeking assistance without the apprehension of viral exposure [33]. Individuals can engage with mental health experts from the comfort and safety of their homes, mitigating the anxieties associated with in-

person visits during the pandemic [34]. Furthermore, the convenience and adaptability inherent to telehealth have streamlined access to mental health services [35]. Obstacles like transportation issues, protracted wait times, and geographic constraints are circumvented, allowing individuals in remote or underserved locales to access imperative care [36]. This democratization of mental health service accessibility amplifies the reach of professional support, benefiting a broader spectrum of the population [37].

Telehealth has emerged as a potent avenue for treating an array of mental health disorders, encompassing depression, anxiety, insomnia, and stress-related conditions [38]. Empirical investigations underline the affirmative outcomes of telemedicine interventions in mental health, where patients witness symptom alleviation, enhanced functioning, and augmented satisfaction with the care they receive [39]. Beyond individual therapy, the realm of telehealth has catalyzed group interventions and support mechanisms [39,40]. Virtual support groups, counseling sessions, and psychoeducational initiatives have fostered connections among individuals confronting akin challenges, nurturing a sense of community, and alleviating feelings of isolation [41]. Our study delved into the development and application of a telehealth web platform, assessing its effectiveness in alleviating the mental health burden experienced by those affected by COVID-19. The results from the "Impact Evaluation of the System Web-Based Telehealth" section of our article affirm the efficacy of this technology.

It is crucial to grasp that the utility of telehealth in mental health care extends beyond the pandemic era. Even post-COVID-19, telehealth remains a promising avenue for addressing mental health needs. Its convenience, accessibility, and effectiveness position it as a valuable tool for reaching individuals who might otherwise encounter barriers to care. However, it's essential to recognize that telehealth isn't a universally applicable solution. It may not suit everyone, particularly those grappling with severe mental health conditions necessitating intensive or face-to-face interventions. Additionally, technological barriers, such as limited internet access or digital literacy, could impede the widespread adoption of telehealth.

Overall, telehealth has significantly contributed to furnishing mental health support during the COVID-19 pandemic. Its advantages encompass heightened access to care, improved treatment outcomes, and elevated patient contentment.

Limitations

This study has limitations given that it was conducted amid the challenging backdrop of the COVID-19 epidemic in Iran. During this period, the nation grappled with formidable conditions, including prolonged quarantines necessitated by successive waves of infections. Consequently, direct face-to-face communication with participants was infeasible. Compounded by the prevailing limitations in internet speed within Iran, the study encountered hurdles such as delayed and inadequate responses.

Importantly, it is crucial to underscore the significance of maintaining mental well-being amidst the complexities of COVID-19. Recognizing this, both the World Health Organization and the Mental Health Foundation have proffered a multitude of recommendations catering to diverse age groups and circumstances. In light of these considerations, the findings derived from this study hold value as pivotal and essential content within the sphere of mental health, particularly in the context of web-based telehealth. This pertinence extends to both the ongoing pandemic situation and the post-pandemic era.

Conclusion

During social distancing and quarantine protocols, the significance of web-based telehealth becomes even more pronounced as a means to deliver accessible and convenient mental health services. Traditional in-person avenues for mental health care can encounter barriers within these circumstances. In contrast, web-based telehealth offers a solution that transcends geographical constraints, reduces travel-related complexities, and eases the financial burden often associated with seeking care. Moreover, it introduces an elevated level of flexibility in appointment scheduling, enhancing the overall convenience of mental health support. A key advantage of web-based telehealth lies in its potential to uphold the continuum of care for individuals managing mental health challenges. The disruptions experienced due to canceled or postponed appointments during the COVID-19 pandemic can be mitigated through this approach. By fostering regular and ongoing interaction between mental health professionals and their patients, web-based telehealth ensures a consistent source of guidance and support during these demanding times. A transformative aspect of web-based telehealth lies in its capacity to chip away at the stigma attached to seeking mental health assistance. The cloak of anonymity and privacy provided by this platform nurtures a greater sense of ease among individuals. As a result, they feel more inclined to address sensitive concerns and seek help for their mental health needs. This comfort-driven environment fosters early intervention and cultivates improved outcomes for individuals navigating the challenges stemming from COVID-19.

Abbreviations

PTSD: Post-Traumatic Stress Disorder; **ICT**: Information and Communication Technologies; **CSS**: COVID-19 Stress Scales; **ASD**: Acute Stress Disorder; **SAD**: Seasonal Affective Disorder; **FAQ**: Frequently Asked Questions

Availability of data and materials

Please contact the corresponding author if you would like access to the datasets used and/or analyzed during this study.

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Authors' Contribution

Z.M. and M.H. were responsible for the study's conception and design. N.G Conducted interviews with specialists. At the same time, M.H. and N.G. supervised the whole study. A.L., Z.M. and M.K. reevaluated the data, revised the manuscript, and performed the statistical analysis. M.K. and A.L. reanalyzed the statistical data. All authors read and approved the final manuscript.

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Ethics approval and consent to participate

Before the start of the semi-structured interviews, clinical psychologists and general psychologists gave informed consent. Also, for participants in phases pre and post-implementation questionnaires and phase use of the web-based telehealth system informed consent was also obtained. We ensured participants that all their information was kept confidential during the all phase and respected their privacy. The ethics committee approved the study protocol of Tarbiat Modares University (TMU) Tehran, Iran (IR.MODARES.REC.1399.142).

Also, all methods were performed in accordance with the relevant guidelines and regulations by including a Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The author declare no competing interests.

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