Health and Social Care During Coronavirus Outbreak: The Exploitation of Long Lasting Memories - LLM Care

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Abstract. The Covid-19 pandemic has globally introduced a new crisis with severe consequences and led to a series of pandemic-related containment measures, including social distancing and self-isolation may cause significant impact on mental health. This study describes a social care initiative that was actualized during the Covid-19 outbreak with regard to the potential benefits in older adults’ quality of life through the use of the Integrated Healthcare System Long Lasting Memories Care (LLM Care), and specifically the web-based cognitive training software. Online questionnaires, assessing various psychosocial and mental health domains, were distributed to 28 older adults before and after the interaction with the software aiming at evaluating the potential positive effect and usability of cognitive training software. Overall, the study demonstrates that the interaction with the web-based cognitive training software during the pandemic plays a significant role in maintaining mental health among older people, through improvements in well-being.

Keywords. Covid-19, cognitive training, health care, social care

1. Introduction

The Covid-19 pandemic has rapidly spread across all the world, posing the need for unprecedented efforts in order to protect public health [1]. Undoubtedly, a global crisis has been noticed in economic and socio-political levels with severe consequences in well-being and mental health of vulnerable groups of people. The pandemic-related containment measures, along with social distancing and self-isolation may have a significant impact on mental health, especially for older adults [2]. Indeed, the disruption of important daily activities can pose a negative impact on older adults’ cognitive condition, impairing to inferior mental health, low quality of life and anxiety [3]. Related studies highlight that 37.1% of older adults had experienced depression and anxiety

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during the pandemic [4], while the emotional response of people aged above 60 years was more apparent as compared to other age groups [5].

To this end, sensitization at all levels and efforts to detect and support the mental health care needs of older adults are stressed out [2]. Information and Communication Technology (ICT) offers in response the utilization of various programs/software and solutions to help people live independently and, thus, overcome problems they face in their daily lives by participating in social networks, accessing services and monitoring their health [6]. Cognitive training is considered to be crucial for the prevention of cognitive deterioration, strengthening the cognitive functions and improving quality of life [7]. This study designates an initiative introduced during the Covid-19 outbreak regarding the potential benefits in older adults’ quality of life through interaction with a web-based cognitive training software.

2. Methods

2.1. Health and Social Care Ecosystem Long Lasting Memories Care-LLM Care

The LLM Care [8] is an ICT platform that combines cognitive training exercises (BrainHQ) with physical activity (wFitForAll) and provides evidence-based interventions for improving cognitive functions as well as the overall physical condition. LLM Care was initially exploited in order to deliver the appropriate training for improving the older adults’ cognitive and physical health and, thus, resulting in the enhancement of their quality of life and autonomy [9].

The cognitive training environment of LLM Care, BrainHQ [10], is a web-based training software developed by Posit Science and incorporates highly empowering cognitive techniques by providing fully personalized and adaptable cognitive training. The physical training, webFitForAll exergaming platform, developed by the research group of the Medical Physics Laboratory of Aristotle University of Thessaloniki, Greece, within the European Project Long Lasting Memories (LLM) [11], provides specialized physical training in order to improve or to maintain individuals’ physical condition.

2.2. Participants

Twenty-eight (28) older adults (mean age 67.14 years) participated in this study. A majority of the participants were female (67.9%) while 32.1% were males. Also, 67.9% were married, 7.1% unmarried and 21.4% widowed. The subject pool was selected under the social care initiative provided through Covid-19 outbreak.

2.3. Intervention

The cognitive training software BrainHQ was used as an interactive and online tool to cognitively train the participants. The intervention was set to 12 weeks from June to August 2020 (32 sessions, 2-4 times/week, min 30’).
2.4. Measures and procedure

Online questionnaires were distributed to participants including the scope, purpose of the study and consent forms, while specific instructions and guidance were also provided in respect to the cognitive training. Psychological assessments included within the online questionnaires were distributed every two weeks in order to assess a variety of psychosocial and mental health domains. Specifically, the assessments comprised of the World Health Organisation-Five Well-Being Index (WHO-5), a short self-reported measure of current mental wellbeing [12], the Short Anxiety Screening Test (SAST) to standardize the detection of anxiety disorder [13], the System Usability Scale (SUS) for measuring the usability [14] and the Impact Factor Event Scale (IES-R) for stress reactions after traumatic events [15].

2.5 Statistical Analysis

Statistical tests were performed using SPSS (IBM SPSS Statistics 25). To assess the reliability of WHO-5 and IES-R questionnaires, Cronbach’s alpha coefficients for internal consistency and Pearson’s rho correlation coefficients were calculated. As normality assumption was met (i.e. Shapiro-Wilk test), paired sample T-test, one-way repeated-measures of ANOVA were utilized to test the statistically significant differences between WHO-5, IERS-R scores and the variables of gender, age, education and marital status.

3. Results

The Cronbach’s alpha was measured to examine the internal consistency of WHO-5 scores (cf. Table 1). These findings indicate that the answer for each question is consistent with the others and they do not overlap.

| WHO-5 Evaluations | Cronbach’s Alpha | Mean ± SD |
|-------------------|------------------|-----------|
| 1st evaluation    | .89              | 56±25.97  |
| 2nd evaluation    | .89              | 63.71 ±24.05 |
| 3rd evaluation    | .85              | 63.43 ±22.14 |
| 4th evaluation    | .89              | 66 ±22.78  |
| 5th evaluation    | .90              | 66.57 ±23.43 |

A repeated measure of ANOVA was conducted with age as the between-subjects factor and WHO-5 scores as the within-subjects factor. There was found a significant main effect of WHO-5 scores (F(4,88)=2.609, p=.041) and a significant increase in the WHO-5 scores for the participants 71+ years old across: a) WHO-5 scores from 1st evaluation (M=52, SD=22.15) compared to WHO-5 scores from 2nd evaluation (M=69.6, SD=24.96), t(9)=2.52, p=.033 and b) WHO-5 scores from 1st evaluation (M=52, SD=22.15) compared to the WHO-5 scores from 5th evaluation (M=74, SD=20.93), t(9)=2.607, p=.028 that means 71+ years old participants had more depression symptoms in the beginning of the study in comparison with 2nd evaluation and the 5th evaluation.

Cronbach’s α of the total scale was 0.82 and for subscales of intrusion, avoidance and hyperarousal was 0.78, 0.76, and 0.68, respectively. The convergent validity was supported by positive correlations between the subscales (intrusion, avoidance,
hyperarousal) and Pearson correlation between IES-R scores from 1st and 5th evaluation showed that all IES-R scores were remarkably consistent across the two occasions and significantly correlated (cf. Table 2).

Table 2. Alpha Coefficients, Subscale Means, and Test-Retest Reliability of IES-R Subscales.

| Subscales    | Cronbach’s Alpha | Mean ± SD   | Pearson’s Correlation Coefficient |
|--------------|------------------|-------------|-----------------------------------|
| Intrusion    | 0.78             | 0.77 ± 0.35 | 0.548⁺                         |
| Avoidance    | 0.76             | 0.90 ± 0.35 | 0.511⁺                         |
| Hyperarousal | 0.68             | 0.94 ± 0.74 | 0.574⁺                         |

SD = standard deviation.

⁺p< .05

There was found that women (M=6.89, SD=5.14) had higher intrusion scores than men (M=3, SD=2.45), t(26)=2.760, p=.042, that means women had more unbidden thoughts and images, troubled dreams, strong pangs or waves of feelings, and repetitive behavior than men during the study. Moreover, there was a statistically significant difference between intrusion scores and marital status as determined by one-way ANOVA (F(2,26)=7.022, p=.004). In particular, post hoc tests revealed that the intrusion scores for married (M=3.79, SD=3.05) were lower compared to the unmarried (M=12.5, SD=10.61), p=.023 and widowed (M=9, SD=4.65), p=.032 respectively, which means that married had less intrusive images, thoughts and feelings during the interventions in comparison with unmarried and widowed participants.

When comparing hyperarousal scores and marital status, significant differences determined by one-way ANOVA (F(2,26)=6.991, p=.004). After Bonferroni post hoc test, there was observed a significantly lower difference between married (M=3.68, SD=2.14) and widowed (M=8.5, SD=5.24), p=.008 that means widowed participants experienced and acted with more anger and irritability than married participants.

4. Discussion

This study aimed to investigate the effect on well-being through personalized cognitive training provided by an interactive online tool. In particular, participants' outcomes indicated an overall improvement in well-being levels from the beginning until the end of the intervention, between the first and fifth evaluation, while an initial improvement was already observed between the first and the second evaluation of older adults ageing 71 and higher [7, 16]. This improvement is possibly related to the exploitation of new technologies and serious games, which contribute to increasing aspects of quality of life, and, in particular, they have a positive effect on participants' proactivity in their daily lives [17]. The results also seem to have a connection between the age of the examined population and the effect of experiencing events, which is associated with intrusive emotions and thoughts. To this end, the engagement with serious games acted as an enhancer for older adults, who had supporting social networks (marital status), mitigating the impact of negative thoughts (intrusion) and emotions (hyperarousal) among this population [15]. In the light of this, proactive engagement with the LLM Care platform provides a significant effect in the experience of stressful situations like Covid-19.

5. Conclusions

The Covid-19 crisis has led day care centers, institutions and basic support services for older adults or vulnerable groups to face significant issues. Mitigation measures globally
affected overall well-being and mental health. The aim of this action was to actively engage older people with cognitive training and improve aspects of their quality of life. To this end, the program successfully achieved the challenge to maintain mental health among older people during Covid-19, through improvements in overall well-being.

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