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# Improvements of depression, anxiety, stress, and social support through a telerehabilitation system in discharged COVID-19 patients: a randomized controlled pilot study.



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Table 2. Post-intervention assessment. ATG vs. BRG. Total Score MSPSS and DASS-21

| | | ATG n=17 | BRG n=18 | Difference | p value | Cohen's d |
|---|---|---|---|---|---|---|
| *Social support (MSPSS)* | *m (SD)* | 77.20 (11.24) | 73.72 (16.98) | | 0.880 | 0.23 |
| Family | | 25.00 (5.44) | 25.11 (5.96) | | 0.916 | 0.02 |
| Friends | | 25.8 (3.26) | 23.66 (6.25) | | 0.602 | 0.41 |
| Other/general | | 26.33 (4.09) | 24.94 (5.82) | | 0.630 | 0.27 |
| *DASS-21 general* | *m (SD)* | 13.18 (9.06) | 15.72 (11.23) | | 0.729 | 0.24 |
| Depression | | 2.43 (2.99) | 4.39 (5.46) | | 0.458 | 0.43 |
| Anxiety | | 4.47 (3.97) | 4.67 (4.48) | | 0.987 | 0.05 |
| Stress | | 6.06 (3.80) | 6.11 (3.69) | 0.05 (-2.53-2.63) | 0.967 [T] | 0.14 |

MSPSS=Multidimensional Sacale of Perceived Social Support. DASS=depression, anxiety, stress scale. (T)=T-Student test was used in this analysis. U-Mann Whitney test was used in the rest of the analysis.

Table 1. Baseline characteristics

| | | Total n= 35 | ATG n=17 | BRG n=18 | p value |
|---|---|---|---|---|---|
| ***Sociodemographic*** | | | | | |
| *Sex* | *n (%)* | | | | 0.380 P |
| Men | | 15 (42.90) | 6 (40.00) | 9 (60.00) | |
| Women | | 20 (57.10) | 11 (55.00) | 9 (45.00) | |
| *Years* | *m (SD)* | 58.00 (8.00) | 58.00 (2.00) | 59.00 (9.00) | 0.543 T |
| *BMI (kg/m2)* | *m (SD)* | 28.89 (4.90) | 28.75 (5.01) | 29.03 (4.86) | 0.869 T |
| *Physical Activity (yes)* | *n (%)* | 21 (60.00) | 10 (47.60) | 11 (52.40) | 0.890 P |
| *Activity Level (h/w)* | *m (SD)* | 5.00 (3.30) | 4.40 (3.00) | 5.50 (3.50) | 0.455 T |
| *Smoker (Yes)* | *n%* | 2 (5.70) | 0 (0.00) | 2 (100) | 0.486 F |
| ***Dates of admission*** | | | | | |
| *Days of admission* | *m (SD)* | 25.00 (20.00) | 24 (20.00) | 25 (21.00) | 0.812 T |
| *Tipe of hospital stay* | *n (%)* | | | | 0.632 P |
| Ward | | 24 (68.60) | 11 (45.80) | 13 (54.20) | |
| Ward and ICU | | 11 (31.40) | 6 (54.50) | 5 (45.50) | |
| *Oxigenotherapy* | *n (%)* | | | | 0.752 F |
| None | | 15 (42.90) | 6 (40.00) | 9 (60.00) | |
| Nasal mask | | 9 (25.70) | 5 (55.60) | 4 (44.40) | |
| Intubation | | 11 (31.40) | 6 (54.50) | 5 (45.50) | |
| *Hospital rehabilitation (yes)* | *n (%)* | 18 (51.40) | 10 (55.60) | 8 (58.80) | 0.395 P |
| ***Post-discharge Fatigue*** | | | | | |
| *PCFS* | *n (%)* | | | | 0.118 F |
| Some symptoms | | 10 (28.60) | 2 (20.00) | 8 (80.00) | |
| Some limitation | | 16 (45.70) | 9 (56.30) | 7 (38.90) | |
| Limitations for IADL | | 8 (22.90) | 5 (62.50) | 3 (37.50) | |
| Limitations for BADL | | 1 (2.90) | 1 (100.00) | 0 (0.00) | |
| *Fatigue (FSS)* | *m (SD)* | 5.98 (0.89) | 6.26 (0.68) | 5.71 (1.01) | 0.102 U |
| *Fatigue level* | *n (%)* | | | | 0,118 F |
| Low severity | | 6 (17.10) | 1 (16.70) | 5 (83.30) | |
| Moderated severity | | 8 (22.90) | 3 (37.50) | 5 (62.50) | |
| High severity | | 21 (60.00) | 13 (61.90) | 8 (38.10) | |
| ***Psychological Scales*** | m (SD) | | | | |
| *DASS-21* | | 19.88 (12.37) | 21.23 (10.79) | 18.61 (13.89) | 0.372 U |
| Depression | | 4.97 (4.57) | 4.47 (4.14) | 5.44 (5.00) | 0.458 U |
| Anxiety | | 7.34 (5.01) | 8.47 (4.35) | 6.28 (5.48) | 0.116 U |
| Stress | | 7.51 (4.12) | 8,29 (3.37) | 6.77 (4.71) | 0.284 T |
| *Social support (MSPSS)* | *m (SD)* | 76.17 (11.85) | 76.23 (11.04) | 76.11 (12.89) | 0.836 U |
| Family | | 24.55 (4.59) | 24.71 (5.11) | 24.4 (4.18) | 0.734 U |
| Friends | | 25.72 (3.33) | 26.00 (2.37) | 25.47 (4.08) | 0.668 U |
| Other/general | | 25.17 (4.83) | 25.71 (4.30) | 24.65 (5.35) | 0.886 U |

BMI (kg/m2)=body mass index. ICU= intensive care unit. PCFS=post-covid functional scale. FSS= Fatigue severity scale. (T)=T-Student. U= U-Mann Whitney. (P)=Pearson's Chi square. (F)= Fisher test.

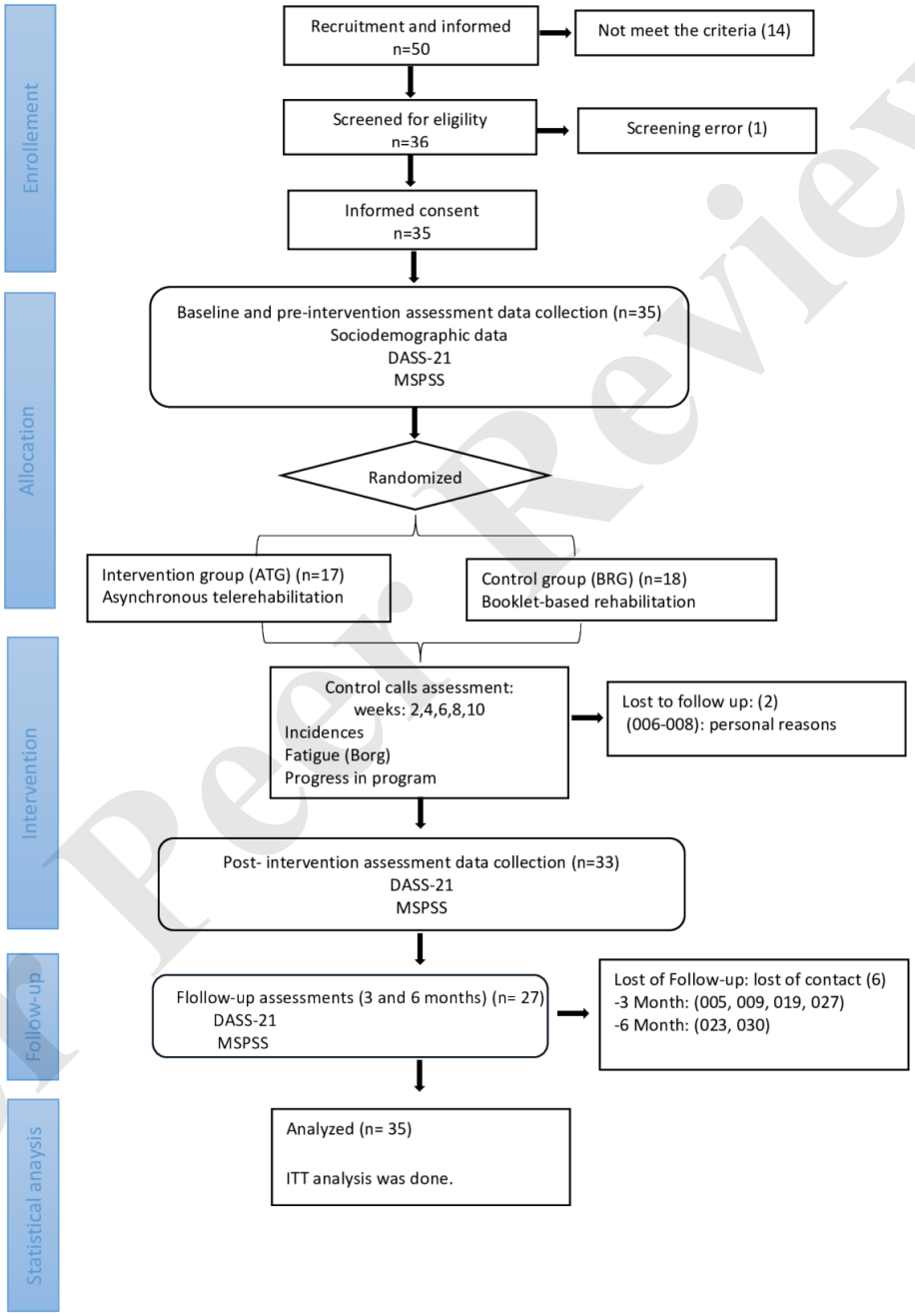
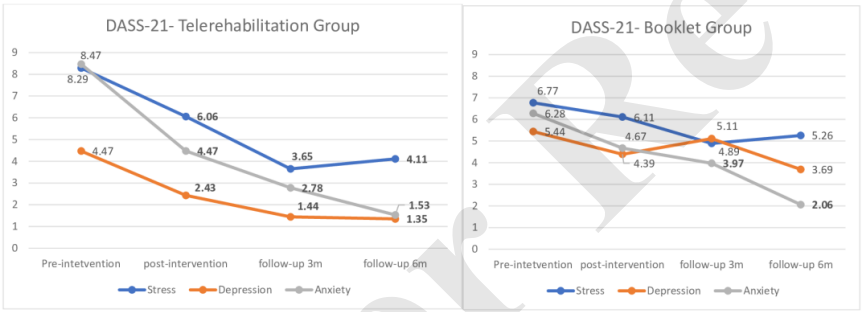


**Figure 2. DASS-21 within groups ATG-BRG.**



# Improvements of depression, anxiety, stress, and social support through a telerehabilitation system in discharged COVID-19 patients: a randomized controlled pilot study.

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# Improvements of depression, anxiety, stress, and social support through a telerehabilitation system in discharged COVID-19 patients: a randomized controlled pilot study.


## Abstract

**Introduction:** Post-acute COVID-19 patients who were discharged from hospitals during the epidemic faced significant challenges, not only physical sequelae, but also psychological distress, anxiety, and depression. It is already known that continued exercise improves psychosocial components, but few studies have explored the impact of multimodal rehabilitation programs, including therapeutic education, in this type of patient. There are no studies that explore the application of these programs through asynchronous telerehabilitation, which would open up new therapeutic windows.

**Methods:** This pilot single-blinded randomized controlled trial included 35 post-discharge COVID-19 patients allocated to two intervention arms: an asynchronous telerehabilitation group (ATG) and a booklet-based rehabilitation group (BRG). The aim was to analyze the preliminary changes in depression, anxiety, stress, and social support comparing both groups.

**Results:** The ATG exhibited statistically significant reductions in depression (p=0.048) and stress (p=0.033) compared to the BRG after ~~post-~~intervention. While both groups showed improvements in psychosocial variables, the ATG demonstrated consistent lower depression levels at 3- and 6-month follow-ups (p=0.010, p=0.036 respectively) and notably higher social support at 3- and 6-month follow-ups (p=0.038, p=0.028 respectively).

**Discussion:** This pilot study suggests that a multimodal rehabilitation program using asynchronous telerehabilitation provides substantial benefits in terms of alleviating psychological distress and improving social support in discharged COVID-19 patients. These data will enable for larger studies to confirm these results.

**Clinical Trial registration:** Clinialtrials.gov #NCT04794036.



Keywords: COVID-19; Physical therapy; Telerehabilitation; Depression; Anxiety; Stress; Social Support; Psychological well-being.

## Introduction

In 2021, patients in the post-acute phase of COVID-19 after hospitalization were in a situation of vulnerability in which anxiety, stress, and social support could be determining factors. More than 30% of patients hospitalized with COVID-19 showed cognitive impairment, depression and anxiety that persisted for months after discharge, symptoms that were even more common in patients who required intensive care (Nakamura et al., 2021; Rogers et al., 2020). A multicenter study of 1142 hospitalized COVID-19 survivors revealed that 16.2% and 19.7% of them experienced symptoms of anxiety and depression, respectively, seven months after hospital discharge (Fernández-de-Las-Peñas et al., 2021).

In addition to the disease itself, experiencing the pandemic firsthand increase the prevalence of post-traumatic stress disorder among COVID-19 patients which appears to range from 10.5% to 37.2% (Kubota et al., 2023) and increased the risk of developing high levels of feelings of social isolation after hospitalization (Gershfeld-Litvin & Ressler, 2023).

Currently, it is still necessary for health professionals and families to closely monitor and support the depressive and anxious feelings of this type of patients (Kubota et al., 2023), as adequate and positive psychosocial support helps alleviate the level of stress, anxiety, and depressive symptoms (Yang et al., 2020). Furthermore, a supervised and personalized therapeutic exercise may be an effective multisystemic therapy for multiple disorders, including post-acute COVID-19 sequelae, modulating the clinical manifestations and prognosis of the disease (Jimeno-Almazán et al., 2021). Exercise intervention exhibits comparable efficacy to traditional therapies in treating depression and anxiety (Herring et al., 2010).

Due to the situation caused by the pandemic, telerehabilitation has also emerged which ~~are~~ is considered a viable and effective option for implementation in clinical practice as an approach to post COVID-19 physical sequelae. Most telerehabilitation programs are primarily based on physical therapy (PT), and in some cases are accompanied by health education turning them into multimodal programs (Bernal-Utrera et al., 2022), whose benefits have also been shown from a psychosocial point of view (Jimeno-Almazán et al., 2021). A multidisciplinary approach that includes exercise is essential, but must also include psychological aspects, as well as the social impact that this pathology entails (Jimeno-Almazán et al., 2021). Therapeutic education (TE)

programs have significant potential to mitigate psychological distress. They are designed to improve self-management, adaptation to treatment and encompass preventive measures, social coping strategies, and psychological symptoms management (Whitehead, 2016). They contribute substantially to reducing anxiety and depressive symptoms (Trivedi et al., 2013). Several studies have implemented these multimodal therapeutic exercise programs with programs with TE and have proven their efficacy (Calvo-Paniagua et al., 2022; Pehlivan et al., 2022; Wang et al., 2020). In addition, they play a key role in fostering resilience and facilitating recovery from mental health problems (Schwarz et al., 2003).

However, despite the numerous publications on the psychosocial sequelae of COVID-19, there are few studies that analyze the effects of these multimodal programs on these variables and less through asynchronous telerehabilitation. Therefore, the aim of this pilot study was to analyze in a preliminary way the changes that a multimodal telerehabilitation program compared to a home booklet-based rehabilitation generates on psychological variables, such as depression, anxiety, stress, and social support, on discharged COVID-19 patients.

## Materials and Methods

### *Study Design*

This is a pilot single-blinded randomized controlled trial with two parallel intervention arms: the asynchronous telerehabilitation group (ATG) and the booklet-based rehabilitation group (BRG). This study lasted 20 months with 12 weeks of intervention plus two follow-ups at 3- and 6 months post-intervention. The protocol was published (Carpallo-Porcar et al., 2022) and registered on clinicaltrials.gov (NCT04794036) and followed the CONSORT (Consolidated Standards of Reporting Trials) extension for randomized pilot studies. It was approved by the Ethics Committee (reference number: PI21/019, current protocol version dated April 04, 2021).

### *Participants*

Patients who were admitted and discharged after COVID-19 from two hospitals in Spain and required rehabilitation were sent to the Rehabilitation Unit. ~~.were invited to~~

~~participate~~. The recruitment was carried out in the two weeks after discharge in this ~~by the post-COVID-19~~ Rehabilitation Unit by a physician from the research team ~~belonged to two hospitals in Spain~~.

The potential participants were informed and those who wanted to participate and met the following criteria were enrolled.

Inclusion criteria: (1) patients in the post-acute phase of COVID-19; (2) patients hospitalized for at least 5 days for COVID-19; (3) aged 18 to 75 years; (4) independent standing with or without technical aids; and (5) present a degree of fatigue ≥4 points in the Fatigue Severity Scale. The exclusion criteria were: (1) having any other central and/or peripheral neurological disorders; (2) a previous history of rheumatic pathology or acute musculoskeletal injury; (3) patients with severe hypoxemia, defined as having an oxygen saturation less than 90% or a respiratory rate ≥30; (4) having any cardiac comorbidities or signs of cardiovascular instability as uncontrolled arrythmia, blood pressure and/or effort angina; (5) having any other contraindicated pathology for moderate-intensity aerobic or strength exercise; (6) no daily access to internet; and 7) to be unable to follow oral and written instructions in the Spanish language.

~~They were assigned to the ATG o BRG~~ . The list of randomization in a 1:1 ratio was performed by an independent researcher via the software www.randomizer.org. The random assignment with an identification code for each group (ATG or BRG) was placed in numbered, sealed and opaque envelopes.

***Procedure***

The assessments were carried out at the hospital by a ~~an allocation-blinded~~ physical therapist who was blinded to group allocation after the informed consent was signed. All participants were assessed by the same physical therapist at four points during the study: at baseline and at the end of the intervention in a face-to face way, and at 3- and 6-month follow-up by telephone. After the assessment the researcher in charge of the intervention opened the envelope in consecutive order and installed the telerehabilitation platform on the mobile (via an app) of the ATG participants and explained the home booklet-based rehabilitation to BRG participants according to their assignment. During the 3 months of duration, bi-weekly control phone calls were performed to each participant to personalize the progression of the rehabilitation program, ensure the absence of adverse effects and support adherence to the treatment in both groups.

***Intervention***

The intervention was the same in both groups. It consisted of a home-based 12-week multimodal programme. It was composed of physical therapy (PT) and TE. The PT program was designed following the main recommendations for these patients in 2020, including the Spanish Physical Therapy Associations, the Spanish Society of Pneumology and Thoracic Surgery (SEPAR) and the American Thoracic Society (ATS) (SEPAR, 2020; Spruit et al., 2013). The PT program included aerobic, strength-resistance and lung capacity exercises. It was carried out for 3 days a week. The program was divided into three progressive levels of intensity. The TE programme (Ojeda et al., 2021) was created by the team of researchers following the objectives of TE according to the scientific recommendations, to help patients in self-management, adaptation to treatment and to their own disease. The TE program consisted of 3 blocks of content. The first one contained recommendations for the prevention of new infections following the WHO recommendation (World Health Organization (WHO), 2020a). The second focused on reducing the effects of isolation and social distancing at that time since it could increase the psychological symptoms of these patients (Sepúlveda-Loyola et al., 2020; World Health Organization (WHO), 2020b). The third block was composed of advice for the self-management of psychological symptoms (Barker-Davies et al., 2020). The TE program was always available to participants during the 12-week intervention.

*Asynchronous telerehabilitation group: ATG*

The ATG performed the multimodal program via a telerehabilitation app (HEFORA). The PT program was presented in the form of explanatory videos with a specific description. The platform allowed the physical therapist to adjust the number of sets, repetitions, speed, and observations for each patient. The TE program was presented in the form of animated educational videos (*Powtoon videos*) in which health and emotional tips to improve their quality of life according to COVID-19 were explained to the patients. (Appendix 1)

[Appendix 1 near here]

*Booklet-based rehabilitation group: BRG*

The participants in the BRG received the same multimodal program through a home booklet-based rehabilitation which contained the main pictures and descriptions for each exercise in each level. The exercise series, repetitions, and recommended rest were individualized in the bi-weekly control phone calls. In addition, patients in the BRG received the same TE program but in text form. (Appendix 2)

[Appendix 2 near here]

***Outcome measures***

Demographic data, including age, sex, height, weight, body mass index (BMI), days and type of hospital stay, and type of rehabilitation received were recorded at baseline.

*Primary outcome: depression, anxiety, and stress*

The level of depression, anxiety and stress were measured using the Depression, Anxiety, and Stress Scale (DASS-21), which is a set of 3 self-reported questionnaires designed to measure the negative emotional states. This third factor summarizes symptoms related to difficulty in relaxing, nervous tension, irritability, and agitation (Lovibond & Lovibond, 1995). Each of these DASS questionnaires contains 7 Likert-type items with a score ranging from 0=did not apply to me, to 3=applied to me very much or most of the time. The overall score for each factor ranges from 0 to 21 points. The higher scores imply greater ~~of~~ stress, depression, and anxiety (Antony et al., 1998; Daza et al., 2002; Lovibond & Lovibond, 1995; Van der Maas et al., 2015). In addition to the total value, each factor is divided into 4 levels of symptoms, from 0=standard, 1=mild; 2=moderate; 3=severe, to 4=extremely severe. This allows the clinical situation of the patients to be analyzed in more detail than the mean value. DASS-21 has been shown to be reliable (Daza et al., 2002; Zanon et al., 2021). It has been validated in the Spanish population (Daza et al., 2002) and has demonstrated its discriminant validity when comparing clinical and non-clinical Spanish population (Daza et al., 2002).

*Secondary outcome: social support*

The perceived social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS) (Moreno-Murcia et al., 2012). It is considered a priority scale to apply in people who are in the process of recovery. It has been translated and validated in several languages (Viladrich et al., 2011) and in Spanish (Calderón et al., 2021; Ortiz & Baeza Rivera, 2010). It measures social support in 3 domains: family, friends, and significant others, and each domain consists of four factors relating to practical help, emotional support, availability to discuss problems and help in decision making. MSPSS consisted of 12 items which are answered using a Likert scale that ranges from 1= totally disagree, to 7= totally agree. A total score from 12 to14 indicates low social support, a score of 49 to 68 indicates moderate social support, and a score from 69 to 84 indicates high social support (da Cruz et al., 2021; Zimet et al., 1990). Each domain is scored from 4 to 28 points, from the lowest to the highest perceived support.

***Statistical analysis***

Data were analyzed using SPSS 28.0 (SPSS Inc, Chicago, IL). Descriptive statistics, including frequency counts for categorical outcomes and measurements of central tendency and dispersion for continuous outcomes (standard deviation, 95% confidence interval) was calculated. The Shapiro-Wilk test was used to determine the normality of the data. Intention-to-treat analysis were performed. For the comparison of means between groups at each time point [2 Groups x (pre, post, 3 and 6 months)], t-tests for independent samples and Levene tests for parametric data and Mann-Whitney U-tests for non-parametric data were used. Friedman and Willcoxon test were performed to compare the intervention effects [Group x time (pre-intervention vs post-intervention vs follow-up 1 and 2)] on the outcomes due to the non-parametric distribution of the data. In the Wilcoxon test, type I error will be divided by the number of tests done. The significance level was 0.05 for all statistical analyses. Chi-Square, Fisher, and Fisher-Freeman-Halton tests of independence were used for categorical data. Effect size and clinical significance were calculated with Cohen's d and standardized difference of means: insignificant, small, medium, and large differences will be reflected in effect sizes of <0.2, 0.2-0.5, 0.5-0.8, and >0.8, respectively. A sample size of 50 participants, 20 participants per arm, was determined according to the recommendations for RCT pilot studies (Kieser & Wassmer, 1996; Whitehead et al., 2016), plus 30% for possible dropouts.

## Results

Of 50 screened participants, 36 post-discharge COVID-19 patients met eligibility criteria and were recruited, between February 2021 and March 2022. During the pre-intervention assessment, one participant was excluded due to a screening failure, bringing the total number of participants to 35. Figure 1 shows the study flow chart. 57.1% of participants were women with a mean age of 58 years, overweight, and predominantly sedentary. The average length of stay in hospital was 25 days. 31.4% were admitted to the intensive care unit. The fatigue severity level at baseline was high (6 out of 7 points), and 45.7% had some functional limitations according to PCFS. The sample presented high levels of anxiety (7.34 points) and stress (7.51 points) at the beginning of the study. Both, ATG and BRG had similar characteristics (p≥0,05) at baseline. All data are shown in Table 1.

[Figure 1. Flow Chart. Near here]
[Table 1. Baseline characteristics. Near here]

### *Comparation between groups post-intervention*

Regarding the levels of depression, anxiety, and stress, the ATG did not differ from the BRG in the total score of each questionnaire after intervention (Table 2). A small effect size was only found in depression in favor of ATG (d=.43). In the analysis by levels there were statistically significant differences in favor of ATG in depression (p=0.048) and stress (p=0.033) (Table 3), but both groups were similar in the level of anxiety. Regarding social support, it was high in both groups. It was slightly higher in the ATG with a moderate effect size (d=0.41) in the "friends" domain (Table 2).

[Table 2. Post-intervention assessment. ATG vs. BRG. Total score. Near here]
[Table 3. Post-intervention assessment. ATG vs BRG. DASS-21-Levels. Near here]

### *Comparation between groups at the 3–6-month follow-up*

In the DASS-21 scale analyzed by levels, at the two follow-ups (at -3 and -6 month), lower levels of depression with significant differences were found in the ATG (-3 month; p=0.010), (-6 month; p=0.036) (Table 4). In total score of each questionnaire, the ATG showed less depression at both follow-ups (-3 month; p=0.031, d=.90) (-6 month;

p=0.040, d=.72) too (Table 5). The data for the other questionnaires were slightly better in the ATG but without significant differences with small effect sizes (Table 5).

In social support, both groups showed similar overall data at -3 month, but at -6-month follow-up, the ATG showed significant changes with respect to the BRG (p=0.028, d=.50). In the analysis by domains at 3 months, ATG only showed more social support in the domain of other support (p=0.038), but at -6 month showed significant improvements in family and other support compared to BRG (p=0.30, d=.45; p=0.015, d=.56) (Table 5).

[Table 4. Follow-up 3-6 month. ATG vs. BRG. DASS-21-Levels. Near here]

[Table 5. Follow-up 3-6 month. ATG vs. BRG. Total score. Near here]

***Within-groups changes at the end of the intervention and at the 3–6-month follow-up***

As for the ATG, large improvements were found with statistically significant differences in the three questionnaires of the DASS-21 at the end of the intervention (anxiety; stress p<0.001; depression p=0.018) and a moderate to large effect size after the intervention, notably the improvement in anxiety (d=.94). These improvements lasted from the end of the intervention until the -6-month follow-up with very large effect sizes in all subscales (d>1). (Table 6).

Regarding social support, an improvement in family support (p=0.044) and ~~general~~ other support (p<0.001) was observed at the end of the intervention with small effect sizes. This improvement in general support was still significant at the -6-month follow-up (Table 6).

[Table 6. Changes in DASS-21 and MSPSS within the ATG. Near here]

The BRG had significant improvements in the values of the global DASS-21 scale at 6-month follow-up (p=.007, d=.76) ~~(p=0.019)~~ which were reflected in a decrease in anxiety both at 3 and at -6-month follow-up (p<0.001) with a large effect size at 6-month (d=.93) (Table 7). No differences in social support were found at any of the three measurement points.

[Table 7. Changes in DASS_21 and MSPSS within the BRG. Near here]

[Figure 2. DASS-21-Levels within groups. Near here]

## Discussion

This is the first study to show that asynchronous telerehabilitation achieves better results than a home booklet-based rehabilitation in post-acute COVID-19 patients in terms of ~~on different psychosocial variables such as~~ depression, stress, and social support, measured ~~after the~~ at completion, 3 and 6 months after a multimodal PT and TE program. ~~Three months after completion of the program, a level-by-level analysis of the subscales also showed statistically significant differences in favor of the ATG in reducing depression and stress levels compared to the home booklet-based rehabilitation.~~

In DASS scale, significant improvements between groups after intervention were found in favor of the ATG group in depression and stress scores in a level-by-level analysis. Statistically significant differences in the ATG were also identified in depression and other support dimension of the MSPSS sustained at both -3 and -6 months. In the within-group analysis, large improvements were found in the ATG across all three DASS-21 questionnaires and the improvements lasted from the end of the intervention to the -6-month follow-up with notably large effect sizes. Furthermore, the ATG showed significant improvements in family and other support at the end of the intervention, which remained still significant at the -6-month follow-up. Regarding the BRG only changes in the total score of the DASS-21 after intervention were found. These changes were also significant at -3 months for anxiety dimension and at -6 months for total score and anxiety dimension.

~~Due to the pandemic situation~~ Several telerehabilitation studies in patients with COVID-19 sequelae have been published and the benefits of telerehabilitation for depression have already been recognized (Huang et al., 2022). However, ~~they~~ few have hardly considered psychosocial aspects (Calvo-Paniagua et al., 2022; Calvo-Paniagua et al., 2024; Colas et al., 2022; Dalbosco-Salas et al., 2021). In line with our findings, Harenwall et al. (Harenwall et al., 2021) offered a 7-week virtual rehabilitation course for social, health, and care staff who had experienced long-term symptoms of COVID-19 using a biopsychosocial approach. They found that 37% of participants had improved levels of anxiety and depression. In addition, De la Plaza et al. (Plaza et al., 2022), added

mindfulness to respiratory rehabilitation and found significant improvements in anxiety ~~and quality of life~~, as did Calvo-Paniagua et al. (Calvo-Paniagua et al., 2022), Dalbosco-Salas et al. (Dalbosco-Salas et al., 2021), ~~and Li et al., who also found some improvements in mental health after measuring quality of life in their different telerehabilitation programs.~~ These studies show the benefits of the psychosocial factor approach, however, none of the above-mentioned articles included a control group. ~~Therefore, it is important to note that no evidence has yet been found that would allow a direct comparison of our results with previous studies.~~

Studies as Günebakan et al. and Espinoza-Bravo et al. (Espinoza-Bravo et al., 2023; Günebakan & Acar, 2023), with a control group, have also shown how exercise interventions (including aerobic and strengthening exercises) can reduce depression levels in populations affected by COVID-19. These effects would be attributed to exercise regimens involving alternating days of aerobic and strength resistance training, similar to our program. Such training may alleviate depressive symptoms through modulation of neurotransmitter levels -especially the increase of endorphins released by the hypothalamus- alongside adjustments in neuromodulators and improvements in hypothalamic–pituitary function (Barclay et al., 2014; Lopresti et al., 2013).

On the other hand, Pehlivan et al. (Pehlivan et al., 2022) compared the effectiveness of a similar TE program in patients discharged after COVID-19 by synchronous telerehabilitation (live video conversation), versus booklet group, and found no significant differences in depression. These differences may be ~~since~~ due to the fact that our intervention was multimodal and included education and mental health promotion, which could explain the positive changes in depression and anxiety, especially in the telerehabilitation group. ~~Pehlivan et al. did not consider. In addition, it is possible that 6-week of duration is not sufficient to detect a significant change in variables compared with our 12-week program.~~

Another fact is that Pehlivan et al. (Pehlivan et al., 2022) did not perform post-intervention follow-ups, but in our study the real differences become clear when comparing the groups after 3-6 months. It suggests that follow-ups and tracking patient progress is important in helping to guide conceptualization and treatment planning as well as for short- and long-term monitoring of the effects of the intervention (Moring et al., 2020). More personalized therapies or a more holistic approach could have a greater impact and help us to argue the efficacy of the intervention and its long-term impact on mental health.

~~On one hand, significant improvements in depression scores were observed in the ATG, and in absolute terms, ATG showed less depression at both -3 and -6 months.~~

~~ATG also showed better results in the other subscales, although these were not significant. There are no studies of this type with such long follow-up periods, so it is difficult to compare the results~~.

Regarding social support, it is not mentioned in any of the previously mentioned articles, but in our study, it was high in both groups, as the use of telephone interventions (control and follow-up calls) by healthcare professionals has proven its value as a strategy for providing social support (Hernandez Bustos et al., 2019), but it was slightly higher in the ATG for the friend's support. ~~This is likely to be~~ This leads us to think that the underlying mechanism of action is what is known as parasocial interaction (Eyal & Rubin, 2003; Korres & Elexpuru Albizuri, 2016; Livingstone S, 2013), which refers to the process by which viewers maintain a pseudo-relationship with the character they regularly see on television, social media, or, as in this case, in explainer videos, or who perform the calls and develop feelings of friendship (Moyer-Guse, 2008; Tolbert & Drogos, 2019).

The findings of this study align with the systematic mixed studies review of Steindal et al. (Steindal et al., 2023), who demonstrated that telehealth provides patients with a structured, remotely managed support framework. The inclusion of visual communication features within telehealth platforms has been shown to enhance the efficacy of remote interactions, facilitating the gradual establishment of interpersonal rapport and trust between patients and healthcare professionals being the social support that these patients demand.

In addition, the results of this study at ~~the end of rehabilitation and at the~~ 6-month follow-up, the ATG was significantly better on the global MSPSS, showing~~ed~~ greater ~~social~~ support ~~on a global scale, and greater support~~ from their family and other support. Considering that in addition to follow-up calls, the ATG had the opportunity to exchange text messages with the physical therapists. This allowed them to easily seek and communicate support and reduced the anxiety of face-to-face conversation (Eastin & Larose, 2005). Furthermore, our findings could be due to the platform messaging could have had a dual influence, as there are studies that also consider it a behavior change tool for disease prevention and management, so it could influence the other variables (Cole-Lewis & Kershaw, 2010).

This suggests that the changes in social support are medium-term and may be facilitated by this type of telematic multimodal intervention. Samper-Pardo et al. (Samper-Pardo et al., 2023), analyzed the efficacy of telerehabilitation in long COVID patients using an APP based on health recommendations and exercises. Although they found no differences between the groups, they did reveal a correlation between the time of use of the APP and improvements in community social support. Furthermore, qualitative studies such as that by Killingback et al. (Killingback et al., 2024) assume that telerehabilitation and the aforementioned communication channels provide additional social support for this group that motivates them to continue rehabilitation.

Social support ~~could also have a direct impact on depression and stress measurement outcomes, as it is hypothesized that social support~~ could improve patient adherence to clinical recommendations as stated by some authors (Cialdini & Goldstein, 2004; Halpern et al., 2007). Moreover, perceived social support is very important for psychological well-being and coping with stressful situations (Azpiazu et al., 2002; Vivaldi & Barra, 2012). It is widely known that the buffering effect cushions the impact of stressful life events such as a serious illness or hospitalization on health (Cohen & Wills, 1985; Fernández Larrea et al., 2000; Sarabia Cobo, 2009; Vivaldi & Barra, 2012).

~~As noted above~~ The main difference between the two treatments was the format. It is already known from psychology that active learning strategies such as modeling, feedback, and hands-on practice are more effective than passive strategies such as reading manuals or handouts (Becker, 1997; Beidas & Kendall, 2010). In our program, the ATG included videos that explained the material, which, if we relate it to the concept of modeling or social learning (Bandura, 1977; Beidas & Kendall, 2010), suggests that individuals pay attention to role models because they believe they can learn skills and accepted behaviors (Gibson, 2004),which promotes a more positive attitude toward learning and, consequently, a greater motivation towards the material to be learned (Smith, 2000), which could explain the improvement in the ATG compared to the BRG. However, the BRG received the information in a more passive way, which in itself brings short-term benefits (Becker, 1997; Beidas & Kendall, 2010), but the more active learning of the ATG with explanatory and practical videos, leads to a better and deeper understanding of the concepts learned (Bandura, 1977; Salemi, 2002), which could justify the better long-term results for the ATG.

Therefore, according to this pilot study physical therapy telerehabilitation in conjunction with therapeutic education may be more effective in relation to at home

booklet-based rehabilitation. This finding could open up new research to confirm the effectiveness of this method on emotional variables in post-COVID syndrome and other pathologies. Therefore, further and more robust studies are suggested to examine whether multimodal physical therapy interventions contribute to the improvement of stress through increased social support.

**Strengths and limitations**

The present study is a randomized pilot study design and therefore shows preliminary data that seem to indicate good results of this multimodal program with PT and TE, especially in the reduction of depression and stress applied through telerehabilitation. It is one of the few studies that have measured psychosocial variables and has combined not only new emerging technologies, but also a program that includes several modalities of personalized PT with health education. We also provided a tiered analysis of the DASS scale, which is necessary to understand the clinic, something that has not been found in other studies.

However, there is a risk of low power inherent to a pilot study and the initially proposed sample size ~~initially proposed~~ was not reached. Thus, this design does not allow us to extrapolate the results to other contexts or interventions through telerehabilitation. Replication and larger studies should be carried out to confirm the findings. On the other hand, this study employs a single-blind design, which may introduce potential biases, including experimenter and expectation bias, as investigators aware of group assignment could inadvertently influence the results. However, since the evaluator remains blinded, the impact of these biases is mitigated. The use of a double-blind design would further minimize these biases, thus increasing the objectivity and reliability of the results.

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**Declaration of interest**

SCC participated as researchers in the European project where HEFORA platform was developed. The rest of the authors declare no conflict of interest.

## Author Contributions

BCP: conception and design; analysis and interpretation of the data and drafting of the article. SCC: conception and design; review of the intellectual content of the article and approval of the final version. ILV: drafting of the article. LBF: drafting of the article. NBD: drafting of the article. MGB: interpretation of the data and approval of the final version. CGS: conception and design; review of the intellectual content of the article and approval of the final version

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**Improvements of depression, anxiety, stress, and social support through a telerehabilitation system in discharged COVID-19 patients: a randomized controlled pilot study.**

We would like to thank the reviewers for reviewing our manuscript. We also appreciate the reviewers for their constructive comments to improve the manuscript´s quality. We have carried out the changes that the reviewers requested and revised the manuscript accordingly.

Please find attached a point-by-point response to the reviewer's concerns. We hope that you find our responses satisfactory, and that the manuscript is now acceptable for publication.

Referee(s)' Comments to Author:

**REVIEWER 1:**

Comments to the Author

- The authors do not discuss how patients' self-selection into the research affects the result. It would be useful to have information on how participants were randomized, was there a random number generation?

Response: We are explaining it with more detail in the manuscript. The list of randomization in a 1:1 ratio was performed by an independent researcher via the software www.randomizer.org. Envelopes were created for each new participant with an identification code to pseudonymize the participants, in which the assigned group appeared inside. After the initial assessment, the researcher in charge of the intervention opened the envelope and assigned the patient to the telerehabilitation group or to the booklet-based rehabilitation group to assign them to one or the other intervention.

The sample of this study was not by convenience, but rather the post-COVID-19 Rehabilitation unit informed all potential candidates, who volunteered to participate or not, following the procedures of all RCTs. So, the authors consider that this has no influence on the results.

- The authors refer inconsistently to the blinding of the study, sometimes referring to the research as 'single-blind', even though the physical therapist was blinded. It's not clear who was blind, and who was not, from the test.

Response: Thank you for your reply. We have proceeded to clarify this in the text. There are two physiotherapists in the team. The physiotherapist who carried out the assessments was blinded to allocation, and the other physiotherapist who carried out the intervention (the researcher responsible for the intervention), was not blinded as knew which group each patient belonged to.

- P-values are reported without a zero before the decimal point.

Response: Thank you very much for your appreciation. We have proceeded to remove all zeros in the p-value of the article.

- The authors do not sufficiently engage with the effect size of their results, but there is an over-emphasis on the relevance of p-values.

Response: Thank you for the comment. We have added the effect sizes both in the tables and in the text of the results.

- The discussion should be re-focussed on the meaning and limitation of the presented results, and the next steps.

Response: We have proceeded to improve the findings in the Discussion section. We have also expanded the limitations to make them clearer for the reader and added the next steps.

- The authors hint that social support could be a mediator but have not undertaken the analyses to test this hypothesis.

Response: Thank you very much for your appreciation. “That social support could be a mediator” could be a new hypothesis in view of the final results, which was not previously addressed as an objective to be analyzed. It is right that this hypothesis needs to be raised

in the Discussion section as a new line of research in future projects with a larger sample size and so we have incorporated it into the Discussion section.

**REVIEWER: 2**

Comments to the Author

This paper presents a randomized controlled pilot study investigating the effectiveness of an asynchronous telerehabilitation program compared to a booklet-based rehabilitation program in improving psychosocial outcomes in discharged COVID-19 patients. The study addresses an important area of research. However, several aspects require improvement before publication can be considered.

The paper has the following strengths:

- Clear Methodology: The study design, including the randomization, intervention details, and outcome measures, is clearly described.
- Positive Results: The asynchronous telerehabilitation group showed statistically significant improvements in depression and stress compared to the control group, particularly at follow-up assessments. This is a key finding with practical implications.
- Multimodal Approach: The inclusion of both physical therapy (PT) and therapeutic education (TE) within a multimodal intervention strengthens the study's design.
- Appropriate Statistical Analysis: The statistical analyses appear to be appropriately chosen and conducted.

The following weaknesses should be noted and addressed where possible:

- Small Sample Size: The sample size of 35 participants is quite small for a randomized controlled trial, limiting the generalizability of the findings and the statistical power of the study. This significantly weakens the conclusions. A power analysis should be included to justify the sample size. The authors need to acknowledge this limitation more strongly.

Response: Thank you for the comments. This study was planned as a pilot study with a final sample size of 40 participants as recommended in the scientific literature for this

type of study. In Whitehead's text, a sample size of 25 patients per arm is assumed to be an effect size of 0.2 and a sample size of 10-75 patients is given for a pilot study according to a fixed effect size. Kieser's text also states a sample size of between 12 and 52 patients, similar to our study. We are aware that our pilot study has low statistical power. However, the finding of statistically significant differences shows that the study has a real potential for impact, which would justify a similar study on a larger scale. We will proceed with limitations to further elaborate on this aspect.

- Recruitment and Retention: The paper should provide more detail on the recruitment process, including response rates and reasons for participant attrition. The reasons for attrition should be explicitly analysed, as this could influence the results.

Response: Thank you for the comment. We have added the information to the flow chart. At the statistical level, we have performed ITT for missing values. Recruitment was carried out by the rehabilitation physician responsible for the Rehabilitation Covid Unit who, aware of the study, offered all potential candidates the opportunity to participate in the study. Once the sample size of 50 potential participants had been reached, according to the sample size recommendations for pilot studies, this phase was completed. Those who agreed to participate contacted the project investigators. Prior to appointment, the criteria were checked by telephone and 14 patients had to be excluded because they did not meet the criteria. A one participant dropped out on the day of the baseline assessment due to anaemia and other pathology that could explain the clinical condition outside of post-Covid. There were no participants who refused to participate because of the nature of the intervention. The drop-outs have been mainly in the follow-ups after the intervention at 3 and 6 months due to loss of contact, as shown in the flow-chart, we do not know the cause, in the medium term losses always exist.

- Blinding: The study describes a single-blinded design. Details on how blinding was achieved and the challenges of blinding in this type of intervention should be elaborated. Were the assessors truly blind to group assignment? The discussion should explicitly address potential bias related to the lack of double-blinding.

Response: Thank you for the comment. As you notice, a single blind study always has some limitations. In this particular study, due to the idiosyncrasies of the intervention,

neither the researcher responsible for the intervention nor the participants who know which intervention they have been assigned to (telerehabilitation or booklet) can be blinded. The assessor was actually blinded because the assessment took place in one part of the hospital and the assignment was done with another person in a different room. Participants were advised at all times not to comment on which intervention they had received to the evaluator, who was instructed not to ask questions about the intervention.

This information is included in the manuscript: *The assessments were carried out at the hospital by a physical therapist who was blinded to group allocation, after the informed consent was signed…. After the assessment the researcher in charge of the intervention opened the envelope in consecutive order and installed the telerehabilitation platform on the mobile (via an app) of the ATG participants and explained the home booklet-based rehabilitation to BRG participants according their assignment…*

With respect the potential bias related to the lack of double-blinding; it has been mentioned in the limitations of the study.

- Generalisability: While the findings are encouraging, the generalisability of the results is limited by the study's specific context (Spanish-speaking population, specific interventions). The authors should discuss the limitations and the need for replication in diverse settings.

Response: Thank you. We have added this suggestion to the Limitations section.

- Mechanism of Action: While the study demonstrates effectiveness, the underlying mechanisms responsible for the observed improvements are not fully explored. The discussion could benefit from a more in-depth exploration of how the different components of the intervention (PT, TE, technology) contribute to the observed outcomes.

Response: Following the reviewer's suggestions, we have proceeded to explore these aspects further in the Discussion Section.

- Discussion of Existing Literature: The literature review is somewhat limited, and the discussion of how these findings relate to previous research could be more comprehensive. A more rigorous comparative analysis of similar studies should be undertaken, paying particular attention to studies that have used telehealth interventions for similar populations.

Response: We have added new references to the Discussion section that refer to similar populations and we have tried to provide a more comprehensive and in-depth analysis of how our results relate to previous research.

It is also worth mentioning that the journal has a limit on references and total word count, so we had to limit the studies to be used and therefore included the most relevant articles in the manuscript.

**OVERALL ASSESSMENT:**

The study presents interesting findings with potential implications for the treatment of psychological distress in post-acute COVID-19 patients. However, the limitations related to sample size and generalisability need to be more explicitly addressed, and a deeper examination of the underlying mechanisms of effect is needed. The study is suitable for publication only after a major revision that addresses the weaknesses outlined above. The current results warrant further investigation in a larger, more robust study.

Response: Thank you very much for your comments. We have extended the limitations of the study, because it is really a pilot study with preliminary results that need to be confirmed in other studies of larger size and in different context. We have further discussed our findings not only statistically but also in terms of clinical implication and expressed what mechanisms might be behind these results. We hope that you are satisfied with our changes and that the manuscript is now suitable for publication.

Table 3. Post-intervention assessment. ATG vs. BRG. DASS-21-Levels.

| | | ATG n=17 | BRG n=18 | p value |
|---|---|---|---|---|
| Depression level | *n (%)* | | | **0.048** FFH |
| | Low | 0 (0.00) | 4 (22.20) | |
| | Moderate | 2 (11.80) | 0 (0.00) | |
| | Severe | 0 (0.00) | 2 (11.10) | |
| | Extremely Severe | 0 (0.00) | 1 (5.60) | |
| | No depression | 15 (88.20) | 11 (61.10) | 0.121 F |
| | Yes depression | 2 (11.80) | 7 (38.90) | |
| Anxiety level | *n (%)* | | | 0.775 FFH |
| | Low | 2 (11.80) | 3 (16.70) | |
| | Moderate | 3 (17.60) | 4 (22.20) | |
| | Severe | 1 (5.90) | 2 (11.10) | |
| | Extremely Severe | 2 (11.80) | 2 (11.10) | |
| | No anxiety | 9 (52.90) | 7 (38.90) | 0.404 P |
| | Yes anxiety | 8 (47.10) | 11 (61.10) | |
| Stress Level | *n (%)* | | | **0.033** FFH |
| | Low | 0 (0.00) | 6 (33.30) | |
| | Moderate | 4 (23.50) | 3 (16.70) | |
| | Severe | 0 (0.00) | 0 (0.00) | |
| | Extremely Severe | 0 (0.00) | 0 (0.00) | |
| | No stress | 13 (76.50) | 9 (50.00) | 0.105 P |
| | Yes stress | 4 (23.50) | 9 (50.00) | |

DASS-21=Depression, Anxiety and Stress Scale. (F) Fisher test was used in the analysis. (No anxiety/stress/depression was considered at level=0). (P)=Pearson's Chi square. (FFH)=Fisher Freeman Halton test.

**Table 4. Follow-up 3-6 month. ATG vs. BRG. DASS-21-Levels.**

| | | ATG Follow-up 3 M. | BRG Follow-up 3 M. | p value | ATG Follow-up 6 Months | BRG Follow-up 6 Months | p value |
|---|---|---|---|---|---|---|---|
| Depression level | *n (%)* | | | **0.010** FFH | | | **0.036** FFH |
| Low | | 0 (0.00) | 2 (11.10) | | 1 (5.90) | 1 (5.60) | |
| Moderate | | 0 (0.00) | 1 (5.60) | | 0 (0.00) | 0 (0.00) | |
| Severe | | 0 (0.00) | 1 (5.60) | | 0 (0.00) | 0 (0.00) | |
| Extremely Severe | | 0 (0.00) | 6 (33.30) | | 0 (0.00) | 2 (11.10) | |
| No depression | | 17 (100.00) | 8 (44.40) | **<0.001** F | 16 (94.10) | 15 (83.30) | 0.603 F |
| Yes depression | | 0 (0.00) | 10 (55.60) | | 1 (5.90) | 3 (16.70) | |
| Anxiety level | *n (%)* | | | 0.136 (FFH) | | | 0.571 FFH |
| Low | | 1 (5.90) | 0 (0.00) | | 1 (5.90) | 1 (5.60) | |
| Moderate | | 5 (29.40) | 1 (5.60) | | 0 (0.00) | 0 (0.00) | |
| Severe | | 0 (0.00) | 1 (5.60) | | 0 (0.00) | 1 (5.60) | |
| Extremely Severe | | 0 (0.00) | 2 (11.10) | | 0 (0.00) | 1 (5.60) | |
| No anxiety | | 11 (64.70) | 14 (77.80) | **0.392** P | 16 (94.10) | 15 (83.30) | 0.603 F |
| Yes anxiety | | 6 (35.30) | 4 (22.20) | | 1 (5.90) | 3 (16.70) | |
| Stress Level | *n (%)* | | | 0.512 FFH | | | 0.571 FFH |
| Low | | 0 (0.00) | 0 (0.00) | | 0 (0.00) | 1 (5.60) | |
| Moderate | | 1 (5.90) | 2 (11.10) | | 1 (5.90) | 1 (5.60) | |
| Severe | | 0 (0.00) | 1 (5.60) | | 0 (0.00) | 0 (0.00) | |
| Extremely Severe | | 0 (0.00) | 0 (0.00) | | 0 (0.00) | 1 (5.60) | |
| No stress | | 16 (94.10) | 15 (83.3) | **0.603** F | 16 (94.10) | 15 (83.30) | 0.603 F |
| Yes stress | | 1 (5.90) | 3 (16.70) | | 1 (5.90) | 3 (16.70) | |

DASS-21=Depression, Anxiety and Stress Scale. (F) Fisher test was used in the análisis. (No anxiety/stress/depression was consierated at level=0). (P)=Pearson's Chi square. (FFH)=Frisher Freeman Halton test.

**Table 5. Follow-up 3-6 month ATG vs. BRG. Total Score MSPSS and DASS-21**

| | | ATG Follow-up 3 M. | BRG Follow-up 3 M. | p value | Efect Size | ATG Follow-up 6 M. | BRG Follow-up 6 M. | p value | Efect Size |
|---|---|---|---|---|---|---|---|---|---|
| *Social support (MSPSS)* | *m (SD)* | 77.19 (11.85) | 74.75 (13.69) | 0.213 | 0.19 | 79.06 (9.39) | 73.44 (12.75) | **0.028** | 0.50 |
| Family | | 24.94 (6.88) | 24.28 (5.58) | 0.088 | 0.11 | 26.00 (4.06) | 23.94 (5.10) | **0.030** | 0.45 |
| Friends | | 25.33 (4.18) | 25.05 (3.84) | 0.504 | 0.07 | 25.86 (4.23) | 24.82 (3.44) | 0.063 | 0.27 |
| Other/general | | 26.94 (3.86) | 25.71 (4.98) | **0.038** | 0.28 | 27.20 (2.90) | 24.82 (5.21) | **0.015** | 0.56 |
| *DASS-21 general* | *m (SD)* | 8.82 (5.33) | 13.55 (14.15) | 0.667 | 0.44 | 8.00 (3.92) | 10.11 (7.47) | 0.376 | 0.35 |
| Depression | | 1.44 (1.36) | 5.11 (5.51) | **0.031** | **0.90** | 1.35 (1.44) | 3.69 (4.28) | **0.040** | **0.72** |
| Anxiety | | 2.78 (2.16) | 3.97 (5.45) | 0.894 | 0.28 | 1.53 (1.22) | 2.06 (3.37) | 0.444 | 0.21 |
| Stress | | 3.65 (2.52) | 4.89 (3.75) | 0.381 | 0.38 | 4.11 (2.71) | 5.26 (3.89) | 0.492 | 0.34 |

MSPSS=Multidimensional Sacale of Perceived Social Support. DASS-21=Depression, Anxiety and Stress Scale. U-Mann Whitney test was used in the analysis.

Table 6. Changes in DASS-21 and MSPSS within the ATG

| | | Baseline | Post-Intervention | Follow-up 3 Months | Follow-up 6 Months | p value | Pre-Post | Efect Size | 3 Months* | Efect Size | 6 Months* | Efect Size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Social support (MSPSS)* | *m (SD)* | 76.23 (11.04) | 77.20 (11.24) | 77.19 (11.85) | 79.06 (9.39) | 0.052 | | 0.09 | | 0.08 | | 0.28 |
| Family | | 24.71 (5.11) | 25.00 (5.44) | 24.94 (6.88) | 26.00 (4.06) | **0.044** | 0.261 | 0.05 | 0.183 | 0.04 | **0.036** | 0.28 |
| Friends | | 26.00 (2.37) | 25.80 (3.26) | 25.33 (4.18) | 25.86 (4.23) | 0.740 | | 0.07 | | 0.2 | | 0.04 |
| Other/general | | 25.71 (4.30) | 26.33 (4.09) | 26.94 (3.86) | 27.20 (2.90) | **<0.001** | 0.212 | 0.15 | 0.102 | 0.3 | **0.011** | 0.41 |
| *DASS-21* | | 21.23 (10.80) | 13.18 (9.06) | 8.82 (5.33) | 8 (3.92) | **<0.001** | **0.013** | 0.81 | **<0.001** | 1.46 | **<0.001** | 1.63 |
| Depression | | 4.47 (4.14) | 2.43 (2.99) | 1.44 (1.36) | 1.35 (1.44) | **0.018** | 0.072 | 0.56 | **0.006** | 0.98 | **0.012** | 1.01 |
| Anxiety | | 8.47 (4.35) | 4.47 (3.97) | 2.78 (2.16) | 1.53 (1.22) | **<0.001** | **0.004** | 0.96 | **<0.001** | 1.66 | **<0.001** | 2.17 |
| Stress | | 8.29 (3.37) | 6.06 (3.80) | 3.65 (2.52) | 4.11 (2.71) | **<0.001** | 0.034 | 0.62 | **<0.001** | 1.56 | **0.001** | 1.4 |

MSPSS=Multidimensional Sacale of Perceived Social Support. DASS=depression, anxiety, stress scale. *=Comparation with baseline data. U Mann-Whitney test was used in the analysis.

Table 7. Changes in DASS-21 and MSPSS within the BRG

| | | Baseline | Post-Intervention | Follow-up 3 Months | Follow-up 6 Months | p value | Pre-Post | Efect Size | 3 Months* | Efect Size | 6 Months* | Efect Size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Social support (MSPSS)* | *m (SD)* | 76.11 (12.89) | 73.72 (16.98) | 74.75 (13.69) | 73.44 (12.75) | 0.051 | | 0.16 | | 0.10 | | 0.21 |
| Family | | 24.40 (4.18) | 25.11 (5.96) | 24.28 (5.58) | 23.94 (5.10) | 0.322 | | 0.14 | | 0.02 | | 0.10 |
| Friends | | 25.47 (4.08) | 23.66 (6.25) | 25.05 (3.84) | 24.82 (3.44) | **0.027** | 0.056 | 0.34 | 0.67 | 0.11 | 0.62 | 0.17 |
| Other/general | | 24.65 (5.35) | 24.94 (5.82) | 25.71 (4.98) | 24.82 (5.21) | 0.392 | | 0.05 | | 0.20 | | 0.03 |
| *DASS-21* | | 18.61 (13.89) | 15.72 (11.23) | 13.55 (14.15) | 10.11 (7.47) | **0.019** | 0.066 | 0.23 | 0.028 | 0.36 | **0.007** | 0.76 |
| Depression | | 5.44 (5.00) | 4.39 (5.46) | 5.11 (5.51) | 3.69 (4.28) | 0.177 | | 0.20 | | 0.06 | | 0.38 |
| Anxiety | | 6.28 (5.48) | 4.67 (4.48) | 3.97 (5.45) | 2.06 (3.37) | **<0.001** | 0.077 | 0.32 | **0.007** | 0.42 | **<0.001** | 0.93 |
| Stress | | 6.77 (4.71) | 6.11 (3.69) | 4.89 (3.75) | 5.26 (3.89) | 0.604 | | 0.16 | | 0.44 | | 0.35 |

MSPSS=Multidimensional Scale of Perceived Social Support. DASS=depression, anxiety, stress scale. *=Comparation with baseline data. U Mann-Whitney test was used in all the analyses.