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Observational Study

Effect of distinct psychological interventions on changes in self-reported distress, depression, and loneliness among older adults during COVID-19

Psychological interventions' effects on mental changes

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Abstract

BACKGROUND

Older adults have been considered a primary at-risk population during the COVID-19 pandemic, and many efforts have been and still are directed toward supporting them and enhancing their capacity to cope with the pandemic. Evidence shows that enhancing proactive coping abilities through psychological interventions, in which cognitive-behavioral and mindfulness techniques are taught and practiced effectively, have supported older adults throughout the pandemic. However, the underlying mechanisms by which specific intervention components affect various mental states such as distress, depression, and loneliness among older adults remain unclear and warrant investigation.

AIM

To determine the effect of an intervention using cognitive-behavioral and mindfulness techniques on changes in distress, depression, and loneliness.

METHODS

We performed a secondary analysis on data from a previous study in which community-dwelling older adults attended a short-term, internet-based intervention during the first COVID-19 wave in Israel. The intervention included seven sessions during which various cognitive-behavioral and mindfulness techniques were learned and practiced. In-session changes in psychological distress were measured using the Subjective Units of Distress Scale (SUDS), which participants rated at the beginning and end of each session. Participants also filled out questionnaires that evaluated levels of depression (Patient Health Questionnaire; PHQ-9) and loneliness (UCLA Loneliness Scale) prior to and after the entire intervention process. The effect of in-session changes in the SUDS on changes in post-intervention depression and loneliness levels were assessed, as a proxy for distinct technique effectiveness.

RESULTS

The findings indicated in-session differences in terms of a decrease in psychological distress (SUDS). Sessions that included relaxation exercises and guided imagery, as well as sessions that included cognitive restructuring and mindfulness meditation, demonstrated the largest decreases in in-session psychological distress (≥ 35%). Two multivariate regression models, one for levels of post-intervention depression (PHQ9 score) and the other for levels of post-intervention loneliness (UCLA Loneliness score), were fitted. The results revealed two statistically significant explanatory variables for depression: the SUDS difference for sessions in which cognitive restructuring and mindfulness meditation were practiced, beta=-0.25, 95%CI: [-1.23, -0.1], and the pre-intervention level of depression, beta=0.62, 95%CI: [0.37, .75]. The second model for loneliness revealed only one significant explanatory variable: the SUDS difference for sessions in which relaxation and guided imagery were practiced, beta=0.41, 95%CI: [0.14, 0.65].

CONCLUSION

Different psychological techniques seem to have different effects on distress, loneliness, and depression. Understanding the pathways by which distinct techniques affect negative mental symptoms has implications for future intervention design.

Key Words: COVID-19; Depression; Loneliness; Aged; Cognitive Behavioral Therapy; SUDS; Intervention studies

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Core Tip: The present study explored how distinct cognitive, behavioral, and mindfulness interventions affect depression and loneliness *via* changes in psychological

distress among older adults. This study is, to the best of our knowledge, the first to explore underlying mechanisms of change in aspects of mental health against the unique backdrop of the COVID-19 pandemic among older adults. The results provide both theoretical and clinical insights into future intervention design and in regard to ways of supporting older adults during times of change and uncertainty.

INTRODUCTION

Ever since the outbreak of the COVID-19 pandemic, a vast number of studies have investigated the effects of protective measures such as social distancing, quarantining, and self-isolating on those individuals defined as comprising the primary at-risk population – older adults. Indeed, much evidence has pointed to elevated levels of psychological distress, depressive symptoms, and loneliness among quarantined older adults, especially during the first six months of the pandemic [1–4]. Conversely, later studies have suggested a much more nuanced picture, with evidence indicating that the mental health of older adults remained roughly stable through the pandemic [5] and that, in fact, older adults have been more resilient to the negative mental health repercussions of the pandemic compared with younger individuals who have suffered greater economic losses [6] and struggled with managing childcare and work commitments [7]. In an effort to trace the protective factors that contributed to older adults' resilience during the pandemic, several studies have pointed to the importance of maintaining close and meaningful social connections [8], of implementing proactive coping [9], and of being able to use technology and function well in digital environments in these regards [10].

Digital environments and tools can be used not only as a means of staying connected with loved ones but also as powerful platforms to deliver designated psychological interventions to support older adults' mental health and well-being throughout the pandemic, and promote proactive coping [11–13]. Indeed, remotely-delivered programs which have been developed during the pandemic have mainly focused on increasing social connectedness and combating the consequences of social isolation, as well as in

augmenting coping skills [14]. One of the widespread and common therapeutic approaches used for adapting and enhancing coping abilities involves cognitive-behavioral tools (which include a wide range of techniques) in combination with other modalities such as mindfulness meditation. Previous evidence found that internet-based cognitive and behavioral interventions combined with peer support, such as interventions conducted in a group format, can effectively reduce depression [15] and loneliness [16].

Cognitive-behavioral interventions, as well as mindfulness interventions, are currently very much in use by therapists to help individuals combat depression [17] and loneliness [18]. Theoretically, these interventions focus on several mental pathways. Examples include 1) targeting the autonomic nervous system and sympathetic-parasympathetic responses [19,20]; by using techniques such as relaxation, breathing exercises, guided imagery, and mindfulness meditation, which share key components of body-based exercises and mind-based practice, therapists aim to retrieve stressful autobiographical memories and alter those memories to be less alarming, and 2) focusing on high-order cognitive processes such as identifying maladaptive thinking patterns, altering them on a moment-to-moment basis, and restructuring self-supportive talk [21]. These "bottom-up" and "top-down" processes, respectively, are of great relevance to different populations with whom therapists work. Although older adults are considered to have better regulatory emotional responses compared to younger people [22], it is important to understand which interventions are most effective in reducing distress, depression, and loneliness among this cohort, as well as in different stressful situations.

We previously reported the results of a short-term, internet-based intervention which was found to alleviate symptoms of loneliness and depression among older adults during the initial COVID-19 outbreak and the first general lockdown in Israel [23–26]. Our intervention protocol aimed to provide participants with the skills to facilitate effective coping with the dire circumstances and uncertainty that typified that period - resulting from high infection and mortality rates, increasing economic pressures, along with reduced social connections and contact. Whereas we focused then on the

effectiveness and acceptability of the intervention as a whole, we did not explore whether the mechanisms of change in psychological distress, loneliness, and depression were related to the use of those specific techniques that constituted the full protocol. The process of developing the intervention protocol had been based on previous evidence that highlighted the importance of addressing older adults' own thoughts and emotions [27], and deficits in social cognition, as primary components of programs aiming to support older adults through times of change and uncertainty [28]. Furthermore, multifaceted interventions that incorporate a collection of therapeutic techniques, such as cognitive, behavioral, and mindfulness techniques, as well as elements of social interaction and peer support through guided group discussions, have been found to be effective in assisting older adults' coping with various health conditions and stressful events [29–31]. The specific techniques that were incorporated into the intervention protocol were chosen on the basis of previous and solid evidence regarding their effectiveness in reducing depression, loneliness, and distress. These included relaxation and guided imagery [32], cognitive restructuring [33,34], and mindfulness meditation [35]. Yet the specific mechanism of change for each of these techniques when delivered and practiced online has not previously been explored among older adults in the context of the pandemic.

We hypothesized that the above-mentioned online intervention would reduce psychological distress, depressive symptoms, and loneliness among older adults during the initial COVID-19 outbreak. Furthermore, we explored the links between the different techniques that were learned in terms of changes in psychological distress during sessions, as well as the effect of these changes (in distress) on post-intervention depressive symptoms and loneliness.

MATERIALS AND METHODS

The analysis described here was performed on data obtained from a randomized controlled trial pilot study. The initial study aimed to evaluate the effectiveness of a short-term, internet-based group intervention to alleviate mental health difficulties

among community-dwelling older adults during the pandemic's first lockdown in Israel. The intervention protocol and findings regarding its effectiveness were previously described elsewhere [24,26]. Briefly, the intervention included seven guided online sessions over 3.5 wk *via* the videoconferencing app Zoom, for small groups of up to seven participants. Each session lasted approximately 60-90 minutes. During the intervention, participants learned and practiced cognitive-behavioral and mindfulness techniques such as the use of repeated self-talk mantras, cognitive restructuring, breathing exercises, guided imagery, and mindfulness meditation (Figure 1). The group moderators were clinical social workers trained to guide the intervention; additionally, they received ongoing supervision by a senior clinical social worker from the research team.

Study participants

Between March and June 2020, following approval by the institutional review board of Ben-Gurion University of the Negev, an online invitation to participate in the study was circulated to prospective participants. The invitation was distributed *via* WhatsApp groups of a local non-governmental organization that focuses on promoting digital literacy among seniors, as well as through welfare departments of several local municipalities in Israel. Eligible participants were community-dwelling older adults (aged 65+) who were: a) proficient in Hebrew, and b) could provide informed consent. Additional inclusion criteria were c) having an active internet connection, d) possessing at least one device that enables online communication (i.e., a computer or smartphone), and e) having a minimal ability to operate this device (i.e., switching it on and off). A total of 124 applicants applied and were screened for eligibility: 37 applicants were excluded due to age (<65) (21) or non-response (16), and one applicant withdrew from the study for personal reasons, leaving 86 eligible participants. The participants were then randomized *via* a 4:1 ratio into either the intervention or the waitlist control group. We used this allocation instead of an even ratio for ethical reasons; we wanted to provide mental support as quickly as possible to the greatest number of people possible who were, at the time (during the initial months of the pandemic), confined to their

homes for an unknown period. The current analysis will focus on data obtained solely from the intervention group ($n = 64$). For detailed information on drop-out reasons and rates see Shapira *et al* (2021) [26].

Procedure

Participants filled out pre- and post-intervention online questionnaires (web-based survey, https://www.qualtrics.com) that had been sent to them by the group moderator *via* email or mobile phone in accordance with their preference. Additionally, at the beginning and immediately at the end of each session, all participants rated their level of subjective mental distress (see in detail in the section below); these data were collected *via* the use of Google Forms. At the end of the study, each participant provided two measurements (pre- and post-intervention) of the study questionnaire, in addition to 14 measurements of subjective distress (two measurements at the beginning and end of each of the seven sessions).

Measurement

Pre- and post-intervention questionnaire

Dependent variables: The dependent variables were depression and loneliness. *Depression* was assessed using a 9-item measure, which is part of the Patient Health Questionnaire (PHQ-9). The PHQ-9 is a commonly used self-administered measure of depression containing nine items that map each of The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) criteria for major depression [36]. The items assess the frequency of depressive symptoms over the past two weeks and are rated on a four-point Likert-type scale: 0 (not at all) to 3 (nearly every day). The responses were summed, with a range of 0–27. The PHQ-9 was previously translated into Hebrew and tested among the Israeli population with good reliability (α ranged between 0.88 to 0.93) [37]. *Loneliness* was assessed using the short 3-item version of the UCLA Loneliness Scale [38]. The items in this scale are related to lack of companionship, social exclusion, and social isolation. Participants rated their feeling of loneliness on a 3-point Likert-type scale: 1 (hardly ever), 2 (some of the time), and 3 (often). Scores for the three items were summed with a possible score of 3 – 9. Higher scores indicated greater

loneliness. This scale was previously translated into Hebrew and used among the Israeli population with good reliability (α=0.87) [39].

Independent variables: The independent variables included sociodemographic data and evaluation of subjective health. *Sociodemographic data* included age, gender, educational level (dichotomized: tertiary education vs. non-tertiary education), and household composition (dichotomized: live alone vs. live with other[s]). *Subjective Health* was assessed *via* one item from Israel's Central Bureau of Statistics (CBS) survey of health indicators [40]. The participants were asked to rate their perception of personal health on a 4-point Likert-type scale: 1 (poor) to 4 (excellent). Higher scores indicated better self-rated health.

In-session evaluation of subjective mental distress

Psychological distress was assessed using The Subjective Units of Distress Scale (SUDS) [41], at the beginning and end of each session. The SUDS provides a quick and simple way to measure distress in a given moment. The respondents were asked to estimate the severity of their emotional distress by providing a numerical value ranging from 0 (no distress) to 10 (highest distress you ever felt). The SUDS is a common tool for measuring the effect of therapeutic interventions [42,43] and has been previously used among older individuals [44,45].

Statistical analysis

Data were analyzed in three steps. First, the differences between the SUDS start score and the SUDS end score for each session were calculated, resulting in seven new variables per participant that represented their changes in mental distress (SUDS) during each session (SUDS1 to SUDS7). Pearson's correlations were used to assess the intercorrelations between the seven SUDS differences. If the correlation coefficient between two values was higher than 0.65, a mean score was calculated for those values to avoid possible multicollinearity and potential bias in the following stages of analysis. The second analysis step included bivariate analyses to evaluate associations between the two dependent variables (post-intervention loneliness and depression levels), SUDS differences, and other study variables using Pearson's correlations and Mann-Whitney

U-test. Finally, two multivariate linear regression models were developed to identify significant associations between the explanatory variables that were found significant in the bivariate analyses and each outcome measure: post-intervention depression and loneliness levels. A P value of ≤ .05 was considered statistically significant. All statistical analyses were conducted using SPSS (version 26, SPSS Inc., Chicago, IL, USA).

RESULTS

Descriptive statistics

Out of the 86 participants who met the inclusion criteria, a total of 64 participants completed the intervention program and provided data for the current analysis. The baseline characteristics of those participants were as follows: gender, 52 female participants (81%) and 12 male participants (19%); age, M=72.1 (SD=5.3) years; household composition, 24 residing alone (37.5%) and 40 residing with other(s) (62.5%); education, 48 had a tertiary education (76%) and 16 had a non-tertiary education (24%). In terms of subjective health, 33% reported their health to be "very good" or "excellent," 44% reported their health to be "fair," and the rest (23%) reported their health as "not so good" or "poor." The PHQ9 score (depression) was 6.6 (SD=5.2) at baseline and decreased to 5.2 (SD=4.7) post-intervention. The score on the UCLA Loneliness Scale was 5.4 (SD=2) at baseline and decreased to 4.7 (SD=1.6) post-intervention. For detailed information on study participants and changes in outcome measures, see previous publications [25,26].

Subjective mental distress

Subjective mental distress was evaluated by measuring the SUDS rating (on a scale from 0-10) at the beginning and end of each session. Figure 2 presents the mean values of the SUDS measure for each of the seven sessions in the program, and the average percentage of change in each session.

The findings indicate that the sessions in which the average decrease in subjective mental distress was highest (≥ 35%) were sessions 2, 3, 6, and 7. Further analysis estimated the intercorrelations between the seven variables representing the delta

differences in SUDS ratings. The results revealed a strong correlation (defined as r>0.6) between the delta values of sessions 2 and 3 (r = 0.65, p<0.001) and between the delta values of sessions 6 and 7 (r = 0.69, p<0.001). Given these results, the variables were merged by calculating a mean value for each of the two pairs.

Bivariate analysis

The associations between levels of post-intervention depression and loneliness, and SUDS difference scores, were assessed. Significant associations were observed between levels of depression and the SUDS difference of sessions 2+3 (r=-0.36, P = 0.003) and of sessions 6+7 (r=-0.4, P = 0.001). Only one significant association was detected between levels of loneliness and the SUDS difference of sessions 2+3 (r=-0.33, P = 0.009). An additional association was found between levels of depression and age (r=-0.3, P = 0.03). Other personal characteristics did not reach statistical significance. Table 1 presents the intercorrelations between study variables.

Multivariate analysis

Two multivariate regression models were fitted to identify statistically significant associations between the study variables and 1) levels of post-intervention depression (PHQ9 score), and 2) levels of post-intervention loneliness (UCLA Loneliness score). The variables entered into each model were selected on the basis of the bivariate analysis results; in addition, we controlled for levels of pre-intervention depression/Loneliness. Both models employed a standard linear regression analysis. The results revealed two statistically significant explanatory variables for depression: the SUDS difference for sessions 6+7, beta=-0.25, 95 % CI: [-1.23,-0.1], and the level of pre-intervention depression, beta=0.62, 95 % CI: [0.37, 0.75]. The second model for loneliness revealed only one significant explanatory variable: the SUDS difference for sessions 2+3, beta=0.41, 95 % CI: [0.14, 0.65] (Tables 2 and 3).

DISCUSSION

This study examined the effectiveness of a short-term group intervention using cognitive-behavioral and mindfulness interventions for alleviating psychological

distress, depression, and loneliness among older adults during the first wave of the COVID-19 pandemic and a national lockdown in Israel. The findings indicated in-session differences in terms of decreases in psychological distress. Sessions during which the techniques of relaxation exercises and guided imagery were learned, and sessions during which cognitive restructuring and mindfulness meditation were learned, led to the highest reduction in distress, and these reductions were related to significant changes in levels of post-intervention loneliness and depression, correspondingly. These results suggest that specific techniques may have different effects on the mental constructs that were examined (i.e., depression and loneliness). Possible explanations for these results are elaborated upon below.

First, the associations between psychological distress, measured by SUDS, and loneliness and depression, have been established previously [46,47]. Changes in SUDS scores have also previously been used to evaluate the effectiveness of psychological interventions and of specific intervention components [48]. The current findings strengthen the notion that changes in SUDS scores can be used as an indicator reflecting adjustments attained by a specific intervention component, and thus make an important methodological contribution to the design and evaluation of psychological interventions.

Furthermore, in relation to the specific effect of distinct cognitive-behavioral and mindfulness intervention components, the different mechanisms underlying the abovementioned therapeutic techniques and their impact on mental health outcomes should be discussed. The need to consider the underlying mechanisms involved in the effects of psychological interventions has been previously identified [28,49]. These mechanisms are not yet well understood, and some evidence suggests that observed positive changes are likely to occur *via* several pathways, such as changing maladaptive cognitive biases [18], improving emotion self-regulation [50], and shifting the sympathetic/parasympathetic balance [51]. The current findings which point to body-oriented, behavioral interventions such as relaxation through breathing and guided imagery as effective in decreasing distress (and consequently loneliness), but not in

decreasing depression, contradict some previous findings but align with others. The same can be said for the finding which indicated that relatively more complex techniques such as cognitive restructuring and mindfulness meditation effectively reduced distress and depression but not loneliness. It should be noted that a meta-analysis study concluded that interventions that address maladaptive social cognitions present the greatest potential for reducing loneliness [28]. This notion was partially supported by the current results, in that the study's entire protocol was indeed found to reduce loneliness [25], although the specific techniques that addressed social cognitions (e.g., cognitive restructuring) were not necessarily found to do so. It is therefore possible to assume that the latter techniques indeed contributed to reducing loneliness in the specific context of the current intervention (the first COVID-19 wave in Israel) and population (older adults isolated in their homes) but that their contribution was smaller compared to that of other techniques identified. Previous evidence has indicated the effectiveness of mindfulness-based [52,53] as well as cognitive restructuring techniques [54,55] in interventions treating depression. The current findings align with this evidence and highlight the importance of combining these two techniques together in programs to treat depression, specifically among older individuals.

Finally, it is also worth mentioning once again the unique setting of the current group intervention – which was internet-based, short-term, and guided – and discussing the abovementioned insights in this context. Indeed, the current program was not designed as a classic therapeutic intervention, but rather as a study program aimed to provide participants with a toolkit that would be available to them, and which would be at their disposal during a period marked by social isolation, lockdowns, and other dire circumstances. As such, the effect of learning and practicing new skills in a digital environment may also have contributed to the beneficial changes observed *via* empowering the participants, perhaps by increasing their self-efficacy [56] and enhancing social inclusion [57]. Future research should explore the effects of online learning as an independent mechanism that enhances older adults' coping capacity during periods of crisis and uncertainty.

The current study had several limitations. First, as the intervention was delivered in a group setting, thus enabling discussion between participants during sessions, we cannot rule out a possible effect of participants' interactions on the outcomes obtained. Second, the effectiveness of the techniques learned was evaluated through a proxy measure: changes in levels of psychological distress. It is possible that this measure does not fully reflect the effect of the intervention on the participants as it was self-reported and subjected to potential bias. Future studies should incorporate objective measures, such as monitoring facial expressions, as part of online interventions [58,59]. Third, the present study examined the group effect of the techniques learned and did not focus on individual-level preferences. Fourth, the small sample size may also compromise the study's conclusions. Larger studies in the future would allow for subgroup analyses and enable the determination of effectiveness for different program elements in a more robust manner.

CONCLUSION

The current study examined in depth the mechanisms underlying the beneficial changes in mental health outcomes among older individuals who participated in an internet-based group intervention during the early part of the COVID-19 pandemic. Findings indicated that different intervention components had different effects on psychological distress, loneliness, and depression, and that each component may enhance the proactive coping abilities of older individuals in different ways. From a theoretical perspective it is important to understand the specific pathways by which distinct techniques affect mental capacities [49]. The frameworks of cognitive-behavioral and mindfulness interventions need to be dissected into segments as a way to better understand the role of each interventional strategy. Doing so would support the design of more concise and efficient interventions tailored to the needs of different populations and mental states. From a clinical perspective, the findings shed light on potential paths by which different therapeutic techniques might affect mental health outcomes among

older adults specifically, and thus have implications for future intervention design. These insights may help in the enhancement of older individuals' resilience during future outbreaks, as well as during other large public health emergencies.

ARTICLE HIGHLIGHTS

Research background

Older adults have been considered a primary at-risk population during the COVID-19 pandemic. Recent evidence have shown that enhancing proactive coping abilities through psychological interventions can support older adults throughout the pandemic. However, the underlying mechanisms by which specific intervention components affect various mental states among older adults remain unclear and warrant investigation.

Research motivation

We previously reported the results of a short-term, internet-based intervention which was found to alleviate symptoms of loneliness and depression among older adults during the initial COVID-19 outbreak and the first general lockdown in Israel. We focused then on the effectiveness and acceptability of the intervention as a whole, but did not explore whether the mechanisms of change in mental states were related to the use of those specific techniques that constituted the full protocol. We believe that a better understanding of the role of each interventional strategy can support the design of more concise and efficient interventions tailored to the needs of different populations and mental states.

Research objectives

To determine the effect of an intervention using cognitive-behavioral and mindfulness techniques on changes in distress, depression, and loneliness. Furthermore, we explored the links between the different techniques that were learned in terms of changes in psychological distress during sessions, as well as the effect of these changes (in distress) on post-intervention depressive symptoms and loneliness.

Research methods

We performed a secondary analysis on data from the original intervention described above. The intervention included seven sessions during which various cognitive-behavioral and mindfulness techniques were learned and practiced. In-session changes in psychological distress were measured using the Subjective Units of Distress Scale (SUDS), which participants rated at the beginning and end of each session. In addition, levels of depression (Patient Health Questionnaire; PHQ-9) and loneliness (UCLA Loneliness Scale) were assessed prior to and after the entire intervention process. The effect of in-session changes in the SUDS on changes in post-intervention depression and loneliness levels were assessed, as a proxy for distinct technique effectiveness.

Research results

The findings indicated in-session differences in terms of decreases in psychological distress. Sessions during which the techniques of relaxation exercises and guided imagery were learned, and sessions during which cognitive restructuring and mindfulness meditation were learned, led to the highest reduction in distress, and these reductions were related to significant changes in levels of post-intervention loneliness and depression, correspondingly.

Research conclusions

Different psychological techniques seem to have different effects on the specific mental states that were assessed in the current study. The findings shed light on potential paths by which different therapeutic interventions might affect mental health outcomes among older adults specifically, and thus have implications for future intervention design. These insights may help in the enhancement of older individuals' resilience during future outbreaks and other emergencies.

Research perspectives

Larger studies are needed to allow for subgroup analyses that would enable the determination of effectiveness for different program elements in a more robust manner.

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