The Effectiveness of Digital Cognitive Processing Therapy on Post-Traumatic Stress Disorder (PTSD) in Military Members: A Systematic Review

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ABSTRACT
Post-Traumatic Stress Disorder (PTSD) is a highly prevalent disorder that could devastate patients' daily live s. Military members and veterans are in the particular vulnerability to PTSD. Cognitive processing therapy aims to improve the cognition of PTSD patients. Digitalized cognitive processing therapy contains potentials in the treatment. However, currently, there is no relevant review on this topic. The current review sets out to summarize systematically on the effectiveness of cognitive processing therapy in military members. Databases PubMed, PsycINFO, Midline, and published articles were systematically searched from inception. Randomized controlled trials were included. We finally included seven studies that met the inclusion criteria. Digital CPT mainly adopted video conferencing, facetime, text messages, and an online forum to deliver the therapy. There is evidence that Digital cognitive processing therapy treatment was effective in Military members, especially veterans. Compared with other types of psychological interventions, such as individual psychotherapy, digitalized CPT was found to be not inferior. It was also found that the PTSD patients hold satisfactory attitudes towards the CPT in a digital way which was also reflected by the low dropout rate in the digital CPT group. It is concluded that digitalized CPT is full of potential and more research is needed to consolidate our findings and provide more evidence on the long-term effectiveness.

Keywords: *Post-Traumatic Stress disorder, cognitive therapy, military members, veterans, depressive memories, nightmares*

1. INTRODUCTION

Post-traumatic stress disorder (PTSD) is a highly prevalent condition [1] and a pervasive and persistent mental disease, The main feature of PTSD includes nightmares, personality changes, emotional dissociation, that trigger traumatic memories, irritability, memory loss, being easily frightened and there are some flashlight in their minds. It is because of terrible or impressive experiences or to react to major stress. In DSM-5, PTSD includes four clusters of symptoms [2]:

- ***Re-experiencing the event*** — Recurrent memories of the event, traumatic nightmares, dissociative reactions, prolonged psychological distress
- ***Alterations in arousal*** — Aggressive, reckless or self-destructive behavior, sleep disturbances, hypervigilance
- ***Avoidance*** — Distressing memories, thoughts, or reminders of the event.

Negative alterations in cognition and mood — Persistent negative beliefs, distorted blame, or trauma-related emotions; feelings of alienation and diminished interest in life One population of vulnerability is veterans who experience traumatic periods during the war and these kinds of veterans are more likely to suffer from PTSD. Veterans with PTSD are at increased risk of unemployment and social exclusion and it has been found that PTSD creates higher costs to society than any other mental health issue in veterans [3]. PTSD and veterans now have received more attention from the research field.

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A disproportionate number of veterans have PTSD (vs. the general population). Among veterans, prevalence differs based on era of service (e.g., about 12% of Gulf War veterans have PTSD in any given year, whereas that estimate is up to 20% for Operation Iraqi Freedom/ Operation Enduring Freedom veterans; the lifetime prevalence among Vietnam veterans is an estimated 30%). Moreover, according to Prison data on veterans have estimated a percentage of 35 committing sexual offense and a percentage of 29 committing other violent crimes [1]. Therefore, it is deemed imperative to investigate potential treatment can be implemented among veterans.

There is a great necessity for researchers to pay more attention to all the veterans because among the various types of disorder existing in our society, the general behavior of PTSD has contributed to the influence of public safety. A large number of people are suffering from the pain caused by PTSD and this mental disease always engenders negative impact on their normal life. Thus, the intervention should be concerned and it is worth taking pragmatic and practical measurements and research on the measurement of PTSD. PTSD will also be the main contribution towards aggressive behavior that will in case lead to criminal attempts.

Cognitive Processing Therapy (CPT) is a treatment for PTSD based on the information processing model of PTSD. It contains two components: exposure therapy and cognitive therapy. CPT aims to let the patient fully imagine and recall all events they suffer form, plus their thoughts and feelings about the traumatic event. Previous reviews of PTSD have confirmed the effectiveness of the cognitive processing therapy to be extremely beneficial in reducing the symptoms of PTSD. Digital-based psychological intervention deploys technology in the delivery of psychological intervention such as telephone, website, and smart phone apps. This type of intervention can be delivered remotely, keep patients 'anonymous, and cost-effective. It is regarded as a promising means to integrate with psychological intervention and is beneficial to more people without proper access to the mental health service. However, previous reviews did not specifically assess effectiveness of Cognitive Processing therapy in a digital intervention for military members. Tele-therapy has been trailed in US and Canadian veterans using a variety of treatment methods, such as prolonged exposure, and cognitive processing therapy (CPT) [3]. The continued development of tele-communication technology is likely to result in tele-psychology and becoming a standard service option for PTSD treatment. It currently remains unclear to what extent does digital or online therapy for PTSD minimize the symptoms of PTSD on military members. In the current study, we aim to investigate the effectiveness of cognitive processing therapy delivered by digital technology specifically in the military members employing the method of systematic review. In the current study, we aim to investigate the effectiveness of cognitive processing therapy delivered by digital technology specifically in the military members employing the method of systematic review.

2. METHOD

Database PubMed, PsycINFO, Medline were used to search relevant published articles systematically. Some specific criteria were applied to include the publications: participants are military members with PTSD; PTSD was established by the commonly used diagnostic criteria (DSM, ICD etc.) or well-developed scales. If diagnosis applies, PTSD should be diagnosed by qualified clinicians or well-trained researchers in clinical psychology. Cognitive Processing Therapy (CPT) was the intervention fully or partly used in the study; and all of the study should clearly state the adoption of CPT in one arm of the RCT or other intervention study design (including case study, single group pre-post design). In addition, during the examinations and research, there are no specific requirements of the design of the study. To make sure there are no misunderstanding of the meanings of the research, we only include articles published in English language and in peer-reviewed journals to illustrate these diseases and experiments. If the experiments include data from the same group of veterans, it will give us the longest patients in the research. Otherwise, if the research will last the same periods, people will review the largest sample in the paper. To follow the careful and sophisticated standard established by peer-review process, we excluded unpublished data of any form including dissertations, conference proceedings There are also valuable and practical information sources in the article for people to have a reference. For instance, reference lists of relevant reviews and included articles in the current review were examined. Certainly, these articles citing the included articles were also examined in case of missing studies beyond the period in which the initial search was carried out. In the nutshell, all of the articles are pertinent about the treatment of PTSD. The search terms combined Mesh terms and text words (wildcards were used if necessary) indicative of the post-traumatic stress disorder and digital CPT Then there are severe requirements and selection of military members and even need a long-time observation of these patients. We utilize practical information and case to make the process of the selection process and carefully have a deep analysis of it. First and foremost, we try to select proper data inclusion all kinds of exclusion standards and our group members use Zotero which was used for importing the initially identified records from the databases and for removing duplicates. All of the Title/Abstract screening of each article, full text screening, and data extraction of records was conducted by the three researchers (Jingwen Tang, Jiawei Ni, Shiyu Han) independently. There are definite conflicts with various opinions and thoughts, if we encounter this situation such as disagreements, they were resolved with the help of a senior reviewer.

The next part is to extract the data information, it is important focus to conduct this process because it will clear statistics processed in the table to present the information for the Methodological and Statistical, it will include the measure of post-traumatic stress disorder, effect size definition (including post-test and follow-up data after intervention) and incomplete data handling (per protocol, intent to treat analysis). There are Identification such as the name of first author, publication year. In the study population: sample size, gender distribution, age, geographical. For the example of the Research design: there are types of research design (pair-matched, cluster, individual) random controlled trials), inclusion/exclusion criteria, intervention details (setting, manual/theoretical. Moreover, we will use online platform to the screen studies.

3. RESULTS

3.1 Selection process

Overall, a total of 28 research articles were considered and 2 articles were extracted from outer resources which mainly focuses on PTSD of veterans. Another 4 articles were eliminated which were regarded as having duplicated information. 9 were excluded from the 24 articles and of the remaining only 10 were accessed for eligibility. 9 studies met the inclusion criteria and were included in the systematic review. One case study was excluded since it mainly examines the Cognitive Behavioral Therapy rather than the Cognitive Processing Therapy. Case studies do not provide advantages towards our conclusion since minor trends could be perceived. Sample sizes are low and it is difficult for us to draw conclusion from the results. Two of the studies did not focus on Veterans as their primary population of study. Eight studies were excluded due to the wrong PTSD therapy. Five studies provided irrelevant information that considered findings which are too general for consideration.

3.1.1 Characteristics of the studies

Selected characteristics of the studies were provided in the Table 1. Different control groups were identified including veterans who receive face to face therapy, treatment as usual, and online conference therapy. As for the inclusion criteria, participant's severity of PTSD was established by scales (mainly by PCL-5). Participants will receive both therapies and again examined after a follow up time period of approximately 3 months at least. Age of veterans ranged from 17-70 years old.

3.1.2 Measurement of Outcome

Most participants will go through three sessions of intervention sessions that make a full course therapy (baseline, post-treatment, follow-up session). Each having a follow up analysis by the therapist/psychologist to measure the symptom of PTSD existence in the participant. Studies were conducted from the 2016-2021, and CAPS (Clinician-Administered PTSD Scale) was the most common in use to test for symptoms of PTSD. Results also show an appealing advantage of Cognitive Processing Therapy over other PTSD treatments. Veteran receiving Cognitive Processing Therapy via VTH were more likely to complete treatment than those receiving Prolonged Exposure.

3.1.3 Intervention details

Digital Cognitive Processing Therapy were delivered through several formats, including via video conferencing, facetime, text, audio-devices and shared comments. Majority of these intervention did not much differ from in-person therapy on the completion of the therapy.

3.1.4 Ethnicity

Ethnicity of participants varied among Caucasian (n=209), African American (n=51), Hispanic (n=18), Black (n=30), Native Hawaiian (n=107), Asian (n=14), Other (n=18).

3.1.5 Previous experience of combat/war

Participants joined in various battle fields that interfered their level of PTSD severity according to the severity of the war. Vietnam War (n=127), World War II (n=77), Post Vietnam Wae (n=8), OEF/OIF (Operation enduring freedom/operation Iraq Freedom n=62), Other (n=33)

3.1.6 Effectiveness of digital CPT on PTSD in veteran/military population

A total of four studies showed a positive result that digital CPT were effective towards PTSD patients. According to the study [1], after the baseline, result showed that 25.6% of the participants dropped out at the post-treatment visit compared with the remaining their PTSD severity at baseline (p=0.498). Veterans that participated in the VC group showed similar symptom improvements (p=0.784) compared to the IP group. Bothe groups showed no big difference in the improvement of PCL scores or PHQ-9 scores after the treatment. According to the study [6] on pilots, a total of five veteran in the VC group completed the Telemedicine Satisfaction and Acceptance Scale (developed by Trauma Victims). Majority of the veterans commented that they had high levels of confidence towards the treatment. There were significant differences between CAPS scores at pretreatment compared to the post treatments (p=.004) and the six-month follow-up (p=.005).

Compared to face-to-face therapy, digital CPT could alleviate PTSD symptom significantly or performs not inferior to the face to face therapy. The control group (in-person therapy) works as a reference to test the reliability and effectiveness of the videoconferencing group (experimental group). It is then showed that there was no significant difference on PTSD symptom improvements between video-conferencing and in-person treatment.

3.1.7 Effectiveness of digital CPT in follow up

There were not many studies conducted proper follow up. According to the case study during the time period of COVID-19, the female veteran patients stated that after the two months follow up of her online treatment, she experienced a decrease in nightmares and also an increase in sleep quality. According to the study, during the six-month follow-up there were symptom improvements observed. Another study compared video-conferencing and in person therapy of CPT, and there was no significant difference on PTSD symptoms and depression (measured by PHQ-9 scores) either from the baseline to post-treatment or from baseline to six-month follow-up.

4. DISCUSSION

4.1 Summary of Results

This study summarizes the investigation on the effectiveness of CPT for PTSD via videoconferencing among veterans or military member. CPT has been effective in reducing the symptoms for PTSD. Overall results show that the therapy of CPT provides an observed improvement on symptoms and offer support for the patients. The method of videoconferencing did not decrease veteran's confidence on the treatment, rather, it reduces the dropout rate of patients because it was much easier to attend an online therapy due to its feature of less time consuming.

Our population consisted of people from diverse race and ethnicity, they also participated in various battle fields that showed us different results which could of effected the severity of PTSD for the veterans. This increases the reliability of our results making it more generalized into different cases. Treatment drop-out for videoconferencing (15%) was relatively lower than the dropout rate of in

Table 1. Data extraction of each study

Author, Year	Condition (if RCT)	N(Pre)	N(Post)	Mean Age (SD)	Female (%)	Follow up Length	PTSD Measure	Design
Liu et al.,2020	Video conference (VC) CPT vs. in-person (IP) CPT	207	138	48.4	22.6	6 months	CAPS	RCT
Kathleen M. et al., 2015	initiation of CPT vs engagement in CPT	118	104	51.89	0%	12 months	CAPS	RCT
Murphy, D., & Turgoose, D. (2019)	Not applicable	3	N/A	45.9	11.1%	3 months	PCL-5	Feasibility study
Etingen,B et al., 2020	Not applicable	55,000	N/A	>18	15%	N/A	CAPS	Attitudes study
Joan M. Cook，2015	N/A	241	201	17	0%	N/A	CPT PE	RCT
Leslie A. Morland 2011	video teleconferencing (VT) vs.inperson modality	18	11	48.6	0%	4 years	CAPS	RCT

Hazel R, 2019	CPT versus CPT-C	88	88	N/A	largely females	4 years and expert users for 8 years	CAPS	RCT
Amber L. et al,. 2021	In-person CPT vs. VTC CPT	1	1	70	100%	3 months	DSM-5	RCT
Derrecka M. Boykin et al,. 2019	Fourteen providers delivered EBPs for PTSD	79	39	25-79	33%	N/A	CAPS	Single group Pre-post

Note: PTSD = Post Traumatic Stress Disorders; apply to others,CAPS=Clinician-Administered PTSD Scale, VASDHS=VA San Diego Healthcare System, PHQ=Patient Health Questionnaires e=, GAD-7=Generalized Anxiety Disorder, DAR-5=Dimensions of Anger Reactions) AUDIT =Alcohol Use Disorders Identification Test=, DOD=Department of Defense, VA=Department of Veterans Affairs=, VTC =Video teleconferencing, VHA =The Veterans Health Administration, VTH=Video to home technology, CS=Combat Stress, CBT=cognitive–behavioral treatments, CPT=cognitive processing therapy, KACCS=Knowledge Assessment Of CPT Critical Skills Scale, DSM-5=The Diagnostic and Statistical Manual of Mental Disorders

person (23%). Majority of online sessions did not report the issue of technical difficulties that may have impact the overall treatment quality. Therefore, this concern often held about videoconferencing treatments may not well captured in the current studies. Overall, results collectively showed a valuable usage and delivery of videoconferencing creating an opportunity for participants to access treatment from long distances in advance.

4.1.1 Compare with previous reviews

Comparing with the previous reviews, the present reviews pay more attention to online treatment of PTSD and use questionnaires to figure out which kind of treatment patients like and how to make more improvement during the treatment to satisfy all the people. CPT tends to be an effective measurement and treatment for veteran who suffer from PTSD. Both of the data in the past and at the moment show the same fact that researchers are more likely to use male people as the population in the treatment. This could be attributed to the dominant proportion of male military members in the army. Due to this unbalanced situation, more research is needed to focus on the female members in the future.

4.1.2 Limitation and strengths

There are some limitations in the current review that should be mentioned. The only treatment we studied is CPT and this treatment is not compared with any other treatments for the PTSD. In this case, the superiority of CPT cannot reflect prominently. Moreover, the specific comparison of general population with the veterans have PTSD were not listed and stated, which give an unpopularity and unclear information of PTSD throughout the veterans. Despite this, this review also has some strengths. The article benefits from the method we used which is representative and effective. (eg, the process we use to select the data and search the articles, the research design include random controlled trials.) We show the detailed information of CPT, to be specific, it is through video conferencing, FaceTime, text, audio-devices and shared comments. It’s worth noting that the research only includes the previous English articles to show the veracity of disease experiment some references which are uncorrelated were excluded to make the research more reliable and persuasive.

5. CONCLUSION

It is concluded that CPT based on digital technology can be a promising type of therapy to improve the PTSD symptoms in veteran. However, more research has to be done in the future to consolidate this finding.

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