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Proposal to apply a "Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment (PERMA)" based approach to manage the COVID-19-related mental health problems in the era of long COVID

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Abstract: Long COVID (LC)-related health problems are highly concerned. Many patients seem to have "recovered" from an acute SARS-CoV-2 infection, however, they might experience various symptoms, almost involving all organs and systems. Of those, neuropsychiatric symptoms like depression, anxiety, and post-traumatic stress disorder (PTSD) are not rare. These problems significantly impact the quality of life (QOL) of patients, family, and caregivers, even lead a tragic suicide outcome. Other than the conventional psychological and medical approaches, here, we proposal a positive emotion, engagement, relationships, meaning, and accomplishment (PERMA)-based approach to fight against these COVID-19-related mental health problems (CRMHPs). This approach is characterized by positive psychological interventions and self-achievements, which has been proved to be a powerful tool against mood disorders in common people. Nowadays, abolishment of certain prophylactic measures (such as isolation, lockdown, compulsorily wearing a mask and maintaining social distance, measures to avoid crowding) enables us to have more opportunities to contact patients and implement the PERMA-based approach to the patients with CRMHPs. We believe that application of PERMA-based approach is conducive to alleviate the influence of the CRMHPs and improve their QOL.

Keywords: positive psychological intervention, PERMA model, long COVID, COVID-19-related mental health problems

At present, long COVID (LC)-related health problems are highly concerned since it has been a marked clinical problem in the routine clinical practice. Although the definition of LC remains in vague, it is commonly used to include the post-acute COVID-19-related sequelae (*1*). Ballering *et al*. estimated that approximately 65 million people worldwide are suffering from LC (*2*). Many patients seem to have "recovered" from an acute SARS-CoV-2 infection, however, they might experience various symptoms, almost involving all organs and systems of the whole body, certainly the neurological system is involved (*1*), of those, neuropsychiatric symptoms including depression, anxiety, and post-traumatic stress disorder (PTSD) are not rare (*1*). The causes of COVID-19-related mental health problems (CRMHPs) are quite complex. Overall, they can be classified into biological factors (brain injuries due to direct viral infection, related immunological/inflammatory reactions, and the systemic damage of the other organs, *etc*.) and social factors (worries due to illness *per se*, prophylactic measures like isolation or lockdown, unemployment, deterioration of the economic, *etc*.). Although the acute COVID-related respiratory/systemic symptoms were controlled, patents are commonly suffering from long-term mood disorders. Herrman *et al*. reported that patients infected with SARS-CoV-2 have double risk of development of mood disorders (*3*), about 30–40% of patients are estimated to have CRMHPs (*4*), *vs.* only 10–35% of those with non-COVID diseases (*5,6*).

CRMHPs may influence the daily life of patients. Severe depression and/or anxiety state may markedly reduce the quality of life (QOL) of patients *per se*, family members, even the caregivers. If leave CRMHPs untreated, the situation might become worse, even induce the final tragic outcome, namely suicide. A study reported that the suicide rates were increased in 2021, which were

believed to be associated with the COVID-19 pandemic. Accordantly, intervention and control of CRMHPs have been regarded as important tasks, for both the medical and social workers.

There are no specific therapies for treating the mood disorders. Globally, a battery of strategies were proposed for intervention of CRMHOs in the context of LC, for example: health at home campaign recommended by world health organization, computerized cognitive behavioral therapy (*7*) and mindfulness-based online intervention (*8*) in China, online multimedia psychophysiological educational interventions in Iran (*9*), and Bhramari pranayama intervention (*10*) and Yoga (*11*) in India, of those, psychological counseling services play a crucial role. However, such services have limitations. Main limitations lie in most of interventions are focusing on recording and measuring frequency of CRMHPs as well as the changes of scores in the behavioral assessments. Ignorance of the patients' actual psychological condition as well as lack of interaction/communication with the patients might be a stumbling block for such services reaching a satisfactory efficacy.

Based on these contexts, here, we proposal a positive emotion, engagement, relationships, meaning, and accomplishment (PERMA) approach for intervention of CRMHPs, which is implementing in our institutes. As shown as in Figure 1, when a patient potentially having CRMHPs steps into a hospital, a medical staff will evaluate his/her mental state with several mental assessment tools. When the CRMHPs are confirmed, the positive psychological intervention (PPI) will be initiated. The PPI including five domains (please read the following statements), and the medical staff will evaluate the improvement of the mental state termly (Figure 1). Although the appropriate parameters and follow-up timing are still under investigation, in light of the reported ameliorations in other diseases (*12-17*), the efficacy of this PERMA approach on CRMHPs is therefore highly anticipated.

A PERMA model falls into the field of positive psychology (*12*) developed by Martin Seligman (*18*). According to Seligman's theory, flourishes of human well-being should include these five domains, namely positive emotion, better engagement, relationships, meaning, and accomplishment (*19*). This model focuses not only the medical issues, but also the interpersonal relationship, interaction and communications, supports from the surroundings, and personal value and achievement. It is in line with the spirits of bio-psycho-social medical model. As a PPI (*vs*. conventional symptom-based treatments), this PERMA model may continuously and actively "give" good emotion to the patients. It attempts to help the patients to construct a good interpersonal relationship. Moreover, this approach is also good for finding/correcting their negative emotions. Hence, it is not surprising that the PERMA-based PPI has good efficacy in terms of treating the mood disorders. Indeed, numerous previous studies have documented that application of the PERMA approach achieved improvement of the psychological state as well as QOL in patients with various diseases, such as depression (*13*), stroke (*14*), acute liver failure (*12*), lung cancer chemotherapy (*15*), breast cancer (*16*), and in patients undergoing hemodialysis (*17*). In terms of the COVID-19 pandemic, Sánchez-Hernández *et al*. documented the importance of PPI and self-care to maintain good psychological state in the context of COVID-19 pandemic (*20*). Other than the patients, a Korean report confirmed the efficacy of the PERMA-based PPI in improvement of the well-being and sleep quality in the South Korean emergency workers who were struggling with depression and sleep quality

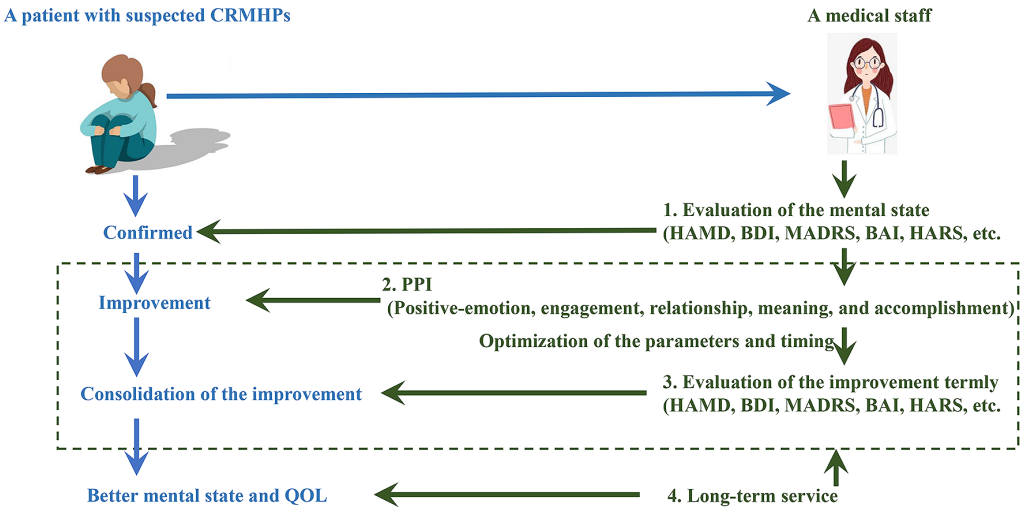

Figure 1. A diagram of the processes of the PERMA-based approach. BAI: Beck anxiety inventory; BDI: Beck depression inventory; CRMHPS: COVID-19-related mental health problems; HARS: Hamilton anxiety rating scale; HAMD: Hamilton depression scale (HAMD); MADRS: Montgomery-Asberg depression rating scale; PPI: positive psychological intervention; QOL: quality of life.

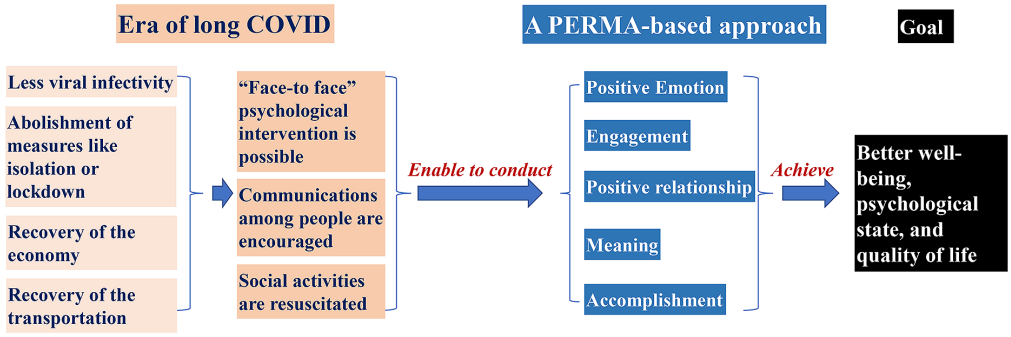

Figure 2. Application of the PERMA-based approach to manage the COVID-19-related mental health problems in the era of long COVID. PERMA: Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment.

during the COVID-19 pandemic (*21*). In addition, the PERMA model was used to evaluate/ intervention the well-being in various populations affected by the COVID-19 pandemic, such as language teachers (*22*), mid-career musicians (*23*), university students (*24*), patients with acquired brain injury (*25*). However, due to the communicable nature of COVID-19, investigations directly involving COVID-19 patients were limited. Alternatively, the uncertain, long-term, less-communicable (might be) natures of LC, enable the clinicians using this PERMA model to conduct investigation/intervention of the psychological state of patients with LC.

In terms of application the PERMA model in LC, these five elements should be seriously implemented: *i*) Positive Emotion: As a fundamental intervention tool in the PERMA model, actively online multimedia psychoeducational interventions had been proved to be useful in relief of the stress of COVID-19 patients (*9*). For LC patients, performing a face-to-face intervention might have a better efficacy. Moreover, observing the psychological state of patients outside of clinic, and performing a timely intervention became possible. *ii*) Engagement: Government should be aroused to emphasize the CRMHPs in the context of LC. More facilities for psychological service should be set up and more public participations should be proposed. Patients with CRMHPs are encouraged to attend more social activities, and set up a certain specific of life goal. *iii*) Positive relationship: Healthy education should be implemented to the public to establishment of the proper knowledge, attitude, and practice (KAP) to LC. Family members and the public should be educated to eliminate discrimination and prejudice to LC patients. Meanwhile, the patients are also encouraged to attempt to make good relationship with all related people. *iv*) Meaning: As per previous studies, the theme of "find meaning" was conducive to the patients to alleviation of stress (*9*) and improvement of psychological state (*26*). Thus, helping the patients to find proper life meaning, and correct the "biased" life meaning should be a fundamental work of the psychological workers. *v*) Accomplishment: Indeed, we should help the patients to setup a serial of "accomplishments" during the daily life. Any tiny progress in terms of fighting against the illness, along with the other achievements should be inspired and praised. Finding their self-value and reconstructing the self-confidence might be the soul of "accomplishment".

Taken together, the CRMHPs remain remarkable complaints in patients with LC. Rather than the situation in COVID-19 pandemic, measures like isolation, lockdown, compulsorily wearing a mask and maintaining social distance, and avoid crowding are abolished, making face-to-face counsel and intervention became available. The medical staffs have more opportunities to directly contact patients. Meanwhile, patients have more chances to communicate with their doctors, caregivers, family members, psychological works, *etc*. This is helpful for the patients suffering from CRMHPs to obtain PPI, such as the PERMA-based approach, to construct better interpersonal relationship, to find his/her life meaning, and to achieve the self-value, and ultimately achieve better well-being, psychological state and QOL. All of these must be helpful to ameliorate the CRMHPs in LC (Figure 2). In this regard, the PERMA-based approach is highly recommended in the era of LC.

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