Title Page

A study on the effects of art therapy with clay intervention program on emotion regulation strategies, psychological stress and cortisol rhythm of secondary school students: A randomized controlled trial

Authors: Joshua K M Nan[1]*, Rainbow T H Ho[2], Elvis C H Lam[3] & Wendy W T Wong[4]

Institutional addresses:

* [1]Assistant Professor and Principal Investigator, Department of Social Work, Hong Kong Baptist University; corresponding author; [2]Professor, Department of Social Work & Social Administration; Associate Dean, Faculty of Social Sciences, the University of Hong Kong; [3]Independent researcher; Researcher, [4]Department of Social Work, Hong Kong Baptist University.

Corresponding email and address: joshuanan@hkbu.edu.hk; Room 1012A, 10/F., AAB Building, Hong Kong Baptist University Road, Kowloon Tong, Hong Kong.

Effects of art therapy with clay intervention program on emotion regulation strategies, psychological stress and cortisol rhythm of secondary school students: A randomized controlled trial

Abstract

Background: Serious emotional problems of adolescents have become a pressing issue in Hong Kong (HK). While causes of the problems are inconclusive, effective measures to combat stress and control teen suicide carry vital significance at the present. As the literature shows that art therapy has positive impacts on emotional efficacy, this study aims to specifically investigate the efficacy of art therapy with clay (clay art therapy; CAT) by comparing it with a control group, in improving psychophysiological stress responses, which includes changes in various signs of emotion, interaction between cognition and emotion, and physiological stress response by analyzing salivary cortisol.

Methods: 122 local senior secondary school students (S4-S5) were randomized into a CAT group or control group, which the CAT group will attend six 2-hour weekly sessions. Intervention efficacy will be examined by using State Difficulties in Emotion Regulation Scale (S-DERS), Positive and Negative Affect Scale (PANAS), Hospital Anxiety and Depression Scale (HADS), Toronto Alexithymia Scale (TAS-20) and salivary cortisol analysis at baseline (T0), immediately post-intervention (T1), and 2-months post-intervention (T2). Participants will be examined in terms of their psychological health indicators such as depression and anxiety related symptoms, emotional regulatory status and stress level based on physiological marker.

Discussion: Based on prior research studies, CAT has significant and prolonged effects on generating and sustaining positive affect, enhancing resilience and psychological wellbeing which mainstream pharmacological treatment may fall short of. This study fills the research gap by examining the capacity of CAT intervention in fostering effective emotion regulation strategies. Through this study, data about local secondary school students such as their psychological health status and physiological stress level will be collected as normative data. The analyzed quantitative data will show the various effects of CAT, if any and help to build an evidence-based and efficacy-based art therapy protocol for secondary school youth in combating stress. Based on previous research findings, the reviewed protocol will provide further information and help contribute in future knowledge transfer projects in promoting art-based mental health interventions in a community-based setting.

Trial registration: N.A.

Keywords: Art therapy, Adolescents, Emotional regulation, Stress, Depression, Randomized controlled trial (RCT), Salivary cortisol, Hong Kong

Background

A recent HK-wide survey indicated that 50% of adolescents are at risk of developing clinical depression, an increase on the figure from the previous year[1], and startlingly, there was no improvement in the adolescent suicidal rate between 2016 and 2017 [2].

Recent research shows that adolescents in HK may falsely assume a causal relationship of both life satisfaction [3] and future success [4] to academic excellence in the current highly competitive education system. Long-term academic stress [5, 6] can lead to emotion dysregulation that manifests in psychophysiological problems such as depressive or anxious mood, insomnia [7], reduced self-efficacy [8] and self-harming behaviors. Cognitive difficulties such as indecisiveness and impaired memory [9, 10] are prevalent in people with depression, including adolescents. Alexithymia, which involves difficulties in cognitive processing of affect and differentiation of sensations and emotions, also occurs in adolescents suffering from emotional dysregulation, which is usually in line with depressive symptoms [11, 12]. Long-term exposure to psychological stressors can lead to chronic physiological stress at the level of the autonomic nervous system (ANS) and hypothalamic-pituitary-adrenal axis (HPA), which manifests as a reduction in waking cortisol level and blunted cortisol response to acute stress [13].

Most research on stress targets clinical samples rather than vulnerable populations, such as adolescents in the mainstream HK education system. Hence, this study is designed to investigate the effectiveness of art therapy in dealing with emotional problems and improving emotional regulation (ER) strategies in at-risk adolescents studying in HK secondary schools.

Emotional Regulation

The ability to regulate emotion plays a crucial role in pubertal psychological development [13, 21]. There are three components to ER, the first of which relates to positive and negative affective states [5, 22]. Recent research has examined conditions in which individuals' level of positive affect is reduced and the strategies for increasing it [22, 23]. The second component of ER relates to the human brain's physiological arousal systems and the neural mechanisms associated with affective states [24]. Dysregulation of affect can result in hypo-arousal or hyper-arousal and this may occur in people who experience prolonged hopelessness or anxiety [25]. Chronic depressed or anxious mood may also affect the ANS and limbic system, thus catalyzing clinical depression and anxiety disorder [23, 26]. Chronic exposure to stress may manifest in physiological symptoms such as low waking cortisol levels and the blunting of the cortisol response to acute stress [13]. The third component of ER relates to the interplay between cognitive and emotional processes, in other words, the processes by which cognitive deficits (e.g. declination of memory functioning, decision difficulties and loss of cognitive elasticity) influence emotion and vice versa [9, 22]. There is a growing body of research on the relationship between ER and alexithymia, which describes the cognitive-emotion regulation patterns and the cognitive difficulty in processing affect [12].

Stress Response and Diurnal Cortisol Rhythm

Cortisol, a glucocorticoid hormone, is discharged by the adrenal cortex when the HPA axis is stimulated [14]. It regulates different basal processes upon environmental challenges, hence, it is also known as the stress hormone, which it is more prevalent under stressful

conditions [14]. Maladaptive ER strategies have been shown to be related to a reduction in an Area Under the Curve (AUC) measure in cortisol slope among adolescents with high perfectionism [36]. Further research has demonstrated specific associations between ER strategies and diurnal cortisol pattern [37], suggesting cortisol can be used to measure improvement in ER. Chronic physiological stress affecting the activity of the ANS and HPA axis can blunt diurnal changes in cortisol production [38]. This indicates a relationship between an individual's bodily responses and psychological health, feasible interventions that utilize body-mind interactions such as art therapy can both soothes physiological stress symptoms and emotional disturbances [15].

Salivary cortisol can measure the acute status of the HPA axis, which varies diurnally and has daily acute fluctuations [16, 17], without influence of stress, cortisol awakening response declines within 30-45mintues upon collection. With presence of acute stressors, cortisol level does not follow its ordinary declining trend, instead, it remains on a steady output level or even an increasing trend when a negative affective state occurs, whereas a positive affective state has the opposite effect [18]. Hence, signs of emotional disturbance could be indicated if the salivary cortisol's diurnal rhythm is found different from its regular descending trend.

Psychotherapy as an alternative solution to depression other than medication

Low level of adherence and social stigma on medical antidepressant treatments are crucial hindrances in combating depression [19]. Pharmacological depression treatment is also being challenged on its lack of focus on enhancing positive affective states and holistic wellbeing [20], as well as the risks of incomplete treatment and rebound effects [21].

Moreover, medication is usually prescribed to patients with more severe mental health illnesses only, needs of many who are suffering from mild to moderate levels of depression, anxiety and stress disorders could not be satisfied.

As alternatives to medical antidepressants, a considerable amount of past research has indicated the effectiveness of different psychotherapies, including art therapy, in combating depression and other emotional disturbances. Higher adherence rate of adults with depression was reported on joining psychotherapy treatment sessions, they were more self-initiated to share their personal thoughts and experiences to the psychotherapists, rather than performing passively during pharmacological treatments [22]. Research has also shown a more prominent effect on controlling treatment relapse in psychotherapy [23]. Studies of Karlsson [24, 25] showed evidences that psychotherapy can strengthen the synaptic densities of serotonin 5HT-1A receptors, in which serotonin has emotional regulatory effects, and whereas pharmacological treatment with fluoxetine could not.

As a nonverbal form of psychotherapy, literatures have indicated the efficacy of art therapy on alleviating depressive symptoms and negative mood [26, 27], lower stress levels [28], and foster better emotional expression, spirituality and psychological health [29].

Art Therapy with Clay and Emotional Regulation

The art therapy literature shows that various art activities can help to reduce stress, acute anxiety and depressed mood in children and young people with behavioral-emotional problems [27-30]. Group-based art therapy encourages individuals to become aware of their feelings and express them in an unthreatening environment; it also helps the development of self-awareness and self-esteem in children as well as promoting their creativity and sense of

self-efficacy [5, 31].

CAT has been shown to increase resilience in children and young people; has a beneficial effect on psychosocial interactions, and enhance mental and emotional adaptation to adverse environments [14-16, 32]. The distinct features of making three-dimensional clay objects that facilitates expression of inner experiences symbolically are popular among youngsters [15]. A recent study of CAT for adult outpatients with depression by the PI has attracted attention from the fields of psychiatry and clinical neurology [5]. MANCOVA was used to show that CAT promoted a more significant decrease of depressive symptoms than a non-directive visual art (VA) control treatment ($p<.01$, $\eta^2=.051$). In the CAT group there was a reduction in signs of depression immediately after the six-week intervention (T1) ($d=-1.1$, $p<.001$) and three weeks after completion of intervention (T2) ($d=-1.2$, $p<.001$). There were changes in positive/negative affects at T1 ($d=0.7/-0.6$) and T2 ($d=0.6/-0.6$), with both $p<.001$. The CAT group also showed a reduction in alexithymia, a measure of inability to process emotion cognitively, at T2 ($d=-0.4$, $p<.001$). The VA control group failed to show improvements in most outcome variables at both T1 and T2. The various improvements in the CAT group indicate that CAT improved participants' ER [5]. This study confirmed de Morais's [30] finding that in psychiatric patients working with clay helped to alleviate emotional problems, such as signs of depression, anxiety problems and mental pain originating in memories and desires [33].

The various processes involved in making clay promote a range of intense kinesthetic movements (e.g. pounding and rolling clay), haptic sensation (throwing clay balls, squeezing clay and applying clay slips to a clay surface) and sensory-motor functions (kneading clay and pinching) owing to the malleability of clay, which is a property not offered by other art

media. Such integrative utilization of different cognitive functions involves a complex coordination between different cortical regions [31], whereas the activated autonomic nervous circuits can possibly improve cognitive abilities and reshape emotional learning [32, 33]. Furthermore, these processes achieve distinct therapeutic effects: releasing physical tension, connecting mind and body and thus producing psychophysiological attunement and helping to regulate emotion [34, 35]. Although children, young people and clinical populations find working with clay appealing, its efficacy as treatment for adolescents' emotional problems has not been reported in a RCT.

Research Gap

Research has indicated that art therapy in general, and CAT in particular, can directly or indirectly improve various aspects of ER, but there is a dearth of empirical research on the efficacy of art therapy as a treatment for ER problems in HK adolescents. In view of the findings from the PI's earlier study of CAT in outpatients with depression, investigating the effects of CAT in populations at risk of developing depression is an obvious next step. Depressive and anxiety symptoms are prevalent in today's adolescents but limited research has investigated ER in the population of HK adolescents. This study combines research on art therapy training and ER in at-risk adolescents.

Research Objectives

To investigate and compare the effects of clay art therapy program and an active control group on the following aspects:

1. Improvement in emotion regulation strategies;

2. Improvement in positive affective states;
3. Alleviation of negative affective states;
4. Alleviation of defective symptoms in cognitive processing of affect, which symptoms are exhibited in terms of alexithymia; and
5. Reduction in physiological stress level.

Methods/Design

Study design

To investigate the effectiveness of CAT intervention in improving emotional wellbeing of senior secondary students in HK, this study will adopt a scientific two-armed RCT design consisting of an experimental group and a waitlist control group. Senior secondary students who fulfill the pre-defined inclusion criteria would be recruited (S4-5, Cantonese speaking, no major physical and psychological disabilities, meets the screening requirements) from 6 local secondary schools. Ethics approval of the study has been issued from the Hong Kong Baptist University (Ref. code: HASC/17-18/0681) and written consent will be taken from participants and their parents. Recruitment, screening, informed consent, preceding interventions and assessments would be administered at the participants' schools.

Participants will be randomly allocated into two arms (1:1 allocation). During the phase of intervention, the experimental group will receive six 2-hour weekly CAT sessions and the waitlist control group will continue their usual afterschool activities. Quantitative data in the form of questionnaires and salivary cortisol would be collected at three time-points, T0 (baseline), T1 (right after intervention) and T2 (2 months after intervention). Supplementary art therapy sessions would be provided to the waitlist control group as compensation after the

data collection process is fully completed (after T2). (Please refer the participant flow diagram at Figure 1.)

Sample Size

On the basis of previous work by the principal investigator (PI) [5] a small to medium effect size is anticipated. Given an expected moderate effect size of 0.2, statistical power of 0.8 and 0.05 significant level; analysis with Glimmpse, a sample size calculation platform based on guided-study design, suggests that a sample size of at least 94 will be needed. To allow for an attrition rate of 30% (HK students tend to have very busy schedules) a minimum of 122 participants will be recruited. Participants will be recruited from various schools, over a three-year period using convenience sampling. Participants will be recruited on a rolling basis until at least 122 participants is achieved.

Recruitment

As senior form students in bands 1 and 2 schools are exposed to a more competitive academic environment, their stress level is potentially higher than those in others [1] and so the sample will be recruited from this population. 6 local schools are invited through established school networks introduced by *Caritas Family and School Services*, school social workers will promote the research study to the senior form students (S.4-5). Students who are interested in the project will be invited to attend a 20-minute briefing session on the different components and procedures of the project delivered by the PI. Students can ask questions until they are clear about the project. Subsequently, they will be invited to take a screening test. Those who are found eligible and have provided both personal and parents' consents could join the

study, details of screening test and eligibility criteria are as follows:

Screening. Potential participants will complete a screening test, the *Depression, Anxiety and Stress Scale (DASS)* [34]. The recommended clinical thresholds score on the depression, anxiety and stress subscales are 9, 7 and 14 respectively for mild symptoms and 21, 15, and 35 respectively for severe symptoms [34]. The thresholds quoted above are likewise validated in HK. Students who have completed the DASS screening test and have depression subscale scores in between 9 and 21 (mild to moderate depressive symptoms) would be eligible for the study.

Inclusion Criteria. The criteria for recruitment of participants include:

1. S.4-5 students, aged between 15 and 17 (this age range may have included children who are newly emigrated from the mainland);
2. Ability to understand and communicate in Cantonese;
3. Suitable and able to perform activities in groups during the course of the 6-week program; and
4. Students with DASS depressive subscale scores in the 9-21 range will be recruited for the current research and scores on the other two subscales (anxiety and stress) will be used as controlled variables during data analysis.

Exclusion Criteria. Participants will be excluded if:

1. Diagnosed with mood disorder, anxiety disorder, or any other psychiatric disorder that required medical treatment, or professional intervention during the past 12 months; and

2. With other medical conditions that are likely to limit group participation during the course of the 6-week program.

The whole promotion, recruitment and screening process would take approximately one month. To promote participant retention, a certificate of acknowledgement will be given to students who have 80% or above attendance.

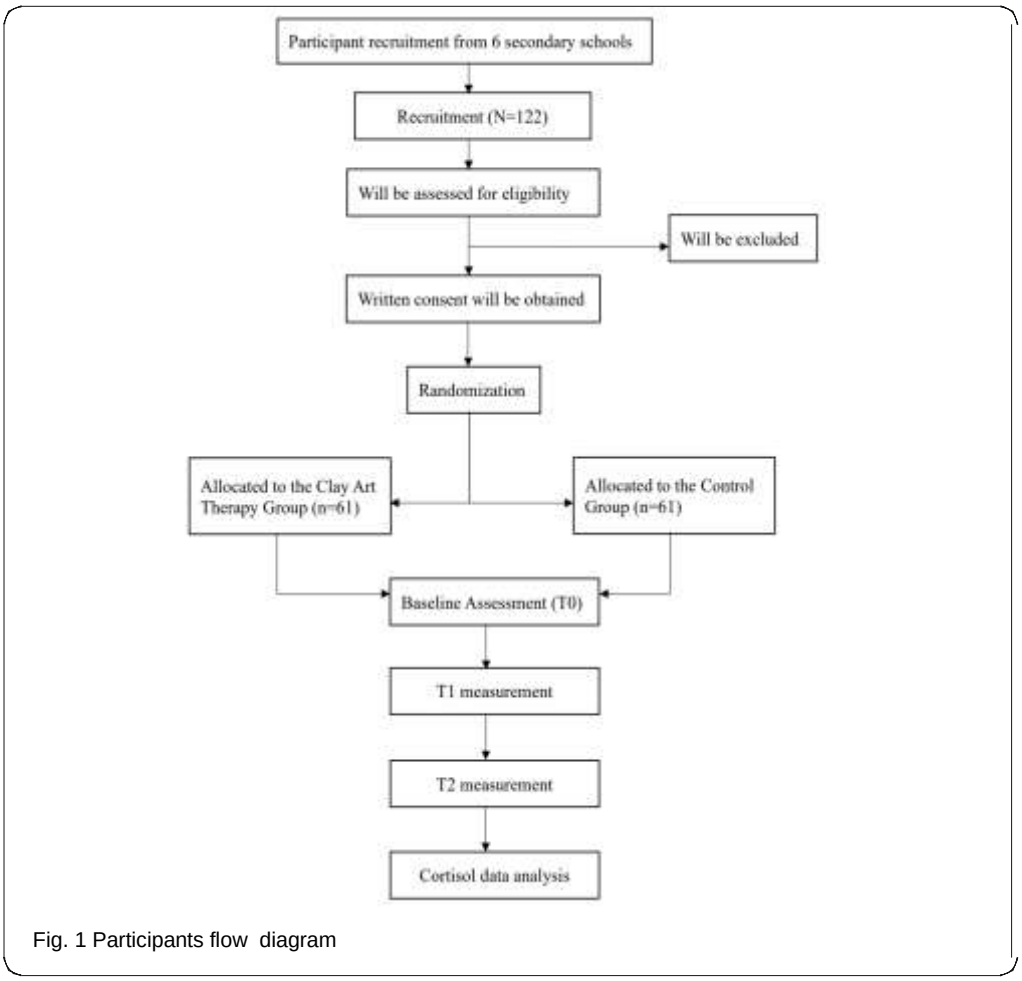

Fig. 1 Participants flow diagram

Group Allocation

Depending on recruitment, 20-24 participants are optimal for each batch and a minimum

number of 12 participants are required for randomized group allocation. A reference number will be assigned to each participant to conceal any possible personal identification. Participants will be randomly assigned to either clay art group or waitlist control group on 1:1 basis. Allocation sequence will be generated by computer randomization program. Both groups should have matched demographics and mean DASS depression subscale scores. If the collected demographics have significant difference, they will be controlled at baseline as covariates. The schools' person-in-charge or social workers will receive the group allocation results before the intervention sessions and will notify the participating students and their parents.

Intervention phase

The CAT treatment for the experimental group comprises 6 two-hour sessions on a weekly-basis. The intervention integrates emotional regulation strategies into the teaching of clay art making knowledge and techniques. The clay art making techniques range from simple clay kneading method, pinching of simple clay works, to a higher level of surface treatment of pinched clay works, and creating self-invented art pieces by integrating several clay works together. Through the process of clay art making, art therapist will guide participants to experience, understand emotions, and freely express personal ideas and feelings in an embodied art form.

The clay art making processes facilitate body (kinesthetic and sensory processes) and mind (perceptual, affective, cognitive) interaction for the participants that aim at achieving various therapeutic effects for effective emotion regulation strategies and alleviation of psychophysiological stress response. Each session will end with a 15-minute group reflective

sharing to consolidate insight, learning, and enhance group support.

The instructor will closely observe and response to participants' different behaviors and reactions in order to assign work with accordance to their working pace and personal needs, aiming to promote the best involvement and learning of every participant.

For the control group, during the intervention phase, participants will continue their daily afterschool tutorial sessions or extra-curricular activities. To prevent any confounding factors that can occur during the course of intervention, participants will be advised not to take part in any other psychotherapeutic sessions that might produce positive or negative effects on their emotional states.

Data collection procedures

Upon obtaining informed consent from the participants and the parents, the participants will be surveyed three times on a valid questionnaire packet composing of questionnaires (in Chinese) on various aspects of mental health status. If the participants do not have the cognitive ability to fully understand the meanings of some of the questions, researchers will verbally explain them. At the same time, saliva samples will be collected for cortisol analysis. Quantitative data collection will be performed once at baseline (T0) (within one-week before the first session commence), and once at immediate post-intervention (T1) (6 weeks after the baseline measure, i.e. immediately after the last session), and one at 2 months after completion of intervention (T2). The participants will complete the study within 4 months.

The participation in this study is voluntary and participants can decline to participate without penalty at any time. If participants withdraw from the study before data collection is

completed, the data will be returned to the participant or destroyed by the researcher.

Data collection, management and analysis

Outcome measures

Outcome measurements will be executed at three time points: The following instruments and physiological indicator will be used to measure changes in various aspect of ER and participants 'psychological and physiological stress levels.

State Difficulties in Emotion Regulation Scale (S-DERS) [35]. This scale measures emotional attributions at the time of completion. The scale measures four factors - non-acceptance of current emotions, capability to adjust present emotional and behavioral reactions, awareness of present emotions and certainty about present emotions. A Chinese translation will be developed and validated specifically for this project.

Positive and Negative Affect Schedule (PANAS) [36]. This 20-item scale assesses affective states, an aspect of ER, at different time points. Responses are given using a five-point Likert scale. The PANAS consists of separate subscales for positive and negative affect. A validated Chinese version will be used [37].

Hospital Anxiety and Depression Scale (HADS) [38]. This 14-item scale assesses levels of depression and anxiety. Responses are given using a four-point Likert scale. Scores will provide necessary information about participants' depression and anxiety symptoms at the various time points. The validated Chinese version of the scale will be administered [39].

Toronto Alexithymia Scale (TAS-20) [40]. This self-report scale measures ability to differentiate personal emotions and communicate own emotions to others. It provides an indication of cognitive ability to regulate emotion. A validated Chinese version of the scale

will be used [41].

Measurement of saliva cortisol. Participants will collect saliva samples using self-administrated "Salivette" kits (Starstedt, Ag & Co., Numbrecht, Germany). The kit consists of a record sheet and a test tube and cotton swab for collecting each sample. Participants will place the cotton swab beneath their tongue and then deposit it in the test tube. They will record health behaviors and activities which might affect their diurnal cortisol rhythm on the day of saliva collection on the record sheet and attach it to the sealed sample package.

Data management

Data collected from questionnaires and cortisol analysis will be all entered to and stored in an onsite server that solely the research team members can access. Participant numbers will be assigned to each participant to anonymously record acquired data. Salivary cortisol samples should be stored at room temperature and can be kept for 4 weeks without any significant changes on cortisol level. All data will only be presented in forms of report writing and conference sharing with no personal identifiable information being shown. Upon three years after the end of the entire study, all data will be destroyed.

Data analysis

Quantitative and demographic data. SPSS will be used to calculate within and between-group effects through pair-wise t-tests and ANOVA. A chi-squared independence test will be executed in SPSS to analyze the demographic profile of the two groups. Outcome measures will be analyzed with pair-wise samples t-tests to examine the intervention effects overtime and will also be processed through repeated-measures ANOVA for comparing

between-group differences. ANCOVA analysis that uses pre-test results as covariates will be adopted when there is a between-groups difference found at baseline (T0). For any missing data, multiple imputation method will be adopted to restore quantitative questionnaire responses

Cortisol. Saliva samples will be centrifuged at 3000 rpm for 15 minutes at room temperature. Cortisol level will be determined using an enzyme-linked immunosorbent assay kit (EIA) (Salimetrics Inc., State College, PA, USA) in the Clinical Oncology Laboratory at the University of HK. The sensitivity of the kit is 0.0007 g/dl (i.e., 0.193 nmol/l) and the intra-assay and inter-assay coefficients of variation are 3% and 10% respectively. As salivary cortisol data have a skewed distribution the raw values will be natural logarithm-transformed to yield an unskewed distribution for all analyses. As well as analyzing the diurnal cortisol slope we will also explore individual temporal changes in cortisol level and the complex relationship between different variables using a two-level individual growth curve model implemented in Mplus software (cortisol level at three daily time points nested within participants). This method is a variant of multiple regression modeling and is appropriate given the nested data structure. Results will indicate whether the experimental group experiences a reduction in physiological stress as indexed by salivary cortisol level.

Discussion

The findings derived from the research analysis can potentially contribute to deeper understanding on HK adolescents' emotion regulation strategies and the challenges. The collected sociodemographic and clinical information will act as valuable statistical basis for future designs of psychological services and education curriculum. The research can also

facilitate multidisciplinary collaboration especially between secondary school educators, social workers and art psychotherapists.

Throughout the process of intervention, the team will progressively evaluate the intervention protocol. It aims at developing an effective, efficacy-based, evidence-based and sustainable art therapy intervention model, in collaboration with the expert team, the participating schools, and community service units, which is rooted in a community setting. The art therapy intervention takes the form of a psychosocial support program that will effectively aid in alleviating the burden on medical treatment and social care provided by frontline social workers. The team will absorb experiences in the process to gradually include transit of the model to future projects, which aim to achieve knowledge transfer to frontline social workers in nongovernmental sector, in using art-based interventions as a common service mode, hopefully to influence the society on a wider scope and a deeper level.

Abbreviations

ANS: Autonomic Nervous System; AUC: Area Under the Curve; CAT: Clay Art Therapy; DASS: Depression, Anxiety and Stress Scale; ER: Emotional Regulation; HADS: Hospital Anxiety and Depression Scale; HK: Hong Kong; HPA: Hypothalamic-Pituitary-Adrenal; PANAS: Positive and Negative Affect Scale; PI: Principal Investigator; RCT: Randomized Controlled Trial; S-DERS: State Difficulties in Emotion Regulation Scale; TAS-20: Toronto Alexithymia Scale; T0: Time-point 0; T1: Time-point 1; T2: Time-point 2; VA: Visual Art

Declarations

Protocol version

Issue Date: 10 January, 2020; Protocol Amendment Number: 01; Author(s): JKMN. Any important modifications to the protocol will be reported to the funding and sponsoring organizations for approval

and updates.

Ethics approval and consent to participate

This ethical approval for the clinical trial has been approval by The Committee on the Use of Human & Animal Subjects in Teaching and Research (HASC) of the HK Baptist University (Ref. code: HASC/17-18/0681). The trial will only commence after obtaining informed consent from the participants. Whenever a participant is unable to continue the study, he/she will be excluded from the study. All data will be stored securely and destroyed three years after completion of the study.

Consent for publication

Not applicable. No details of individuals are reported within the manuscript.

Availability of data and materials

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Trial sponsor

Trial Sponsor: Hong Kong Baptist University; Contact name: Mr. Kenny Mok; Address: AAB 904, Level 9, Academic and Administration Building, Baptist University Road Campus, Hong Kong Baptist University, Kowloon Tong, Hong Kong; Telephone: (+852) 3411-5127; Email: gs@hkbu.edu.hk

Funding

The study is funded by the Early Career Scheme, Research Grants Council, University Grants Committee (ECS/HKBU 22611818). This funding source does not involve in or have the overall authority over any process of the study design, including the data collection, analyses, interpretation, report and the decision to submit results.

Authors' contributions

JKMN is the principal investigator of the study; Conceptualization and design of the study: JKMN; Cortisol

analysis and report: RHTH; Preparation and review of the manuscript: JKMN, ECHL, WWTW. All authors have read and approved the manuscript.

Acknowledgements

The authors would like to acknowledge other collaborating investigators of the study (Rainbow T H Ho, Lisa D Hinz, Cecilia L W Chan, Herman H M Lo, Jerf W K Yeung and Angela F Y Siu) and the collaborating community service unit (Caritas Family and School Services).

References

1. 逾半中學生呈抑鬱 7 成對學業感厭煩 青少年比成年人對前景更沒希望.「中學生抑鬱焦慮狀況調查 2018」Baptist Oi Kwan Social Service: HK, 2018.
2. Abraham, A. It's time to talk openly with Hong Kong's youth about suicide and stress, in South China Morning Post. 2017.
3. Shek, D.T.L. and Li, X. Perceived school performance, life satisfaction, and hopelessness: A 4-year longitudinal study of adolescents in Hong Kong. Social Indicators Research, 2016. **126**(2):921-934.
4. Yu, C.C.W., et al. Are physical activity and academic performance compatible? Academic achievement, conduct, physical activity and self-esteem of Hong Kong Chinese primary school children. Educational Studies, 2006. **32**(4):331-341.
5. Nan, J.K.M., et al. Effect of expressive arts therapy for raising self-efficacy for adolescents with emotional disturbances in secondary school setting. in New Perspectives for Outcome-based Evaluation and Research on Family and Children's Services. 2017. Hong Kong: The Chinese University of Hong Kong.
6. Chan, S.M., C. S.K., and Kwok, W.W. Ruminative and catastrophizing cognitive styles mediate the association between daily hassles and high anxiety in Hong Kong adolescents. Child Psychiatry & Human Development, 2015. **46**(1):57-66.
7. Zhang, J., et al. Emergence of sex differences in insomnia symptoms in adolescents: a large-

scale school-based study. Sleep, 2016. **39**(8):1563-1570.

8. Cheung, T., et al. Depression, anxiety and symptoms of stress among baccalaureate nursing students in Hong Kong: A cross-sectional study. International Journal of Enivromental research and Public health, 2016. **13**(8):779.
9. Trivedi, M.H. and Greer, T.L. Cognitive dysfunction in unipolar depression: implications. Journal of Affective Disorders, 2014. **152-154**:19-27.
10. Joormann, J. and Gotlib, I.H. Emotion regulation in depression: Relation to cognitive inhibition. Cognitive Emotion, 2010. **24**(2):281-298.
11. Thapar, A., et al. Depression in adolescence. The Lancet, 2012. **379:**1056-1067.
12. Karlsson, H., Naatanen, P. and Stenman, H. Cortical activation in alexithymia as a response to emotional stimuli. The British Journal of Psychiatry, 2008. **192**(1):32-38.
13. Kushner, S.C. A review of the direct and interactive effects of life stressors and dispositional traits on youth psychopathology. Child Psychiatry & Human Development, 2015. **46**: 810-819.
14. Marieb, E.N. and Hoehn, K. Human anatomy & physiology. 2007: Pearson Education.
15. Nan, J.K.M., Mind—Body Treatment for Depression: Clay Art Therapy with the Expressive Therapies Continuum in American Art Therapy Association Annual Conference. 2015: Baltimore, Maryland.
16. Clow, A., Hucklebridge, H. and Thorn, L. The cortisol awakening response in context, in International review of neurobiology. 2010, Elsevier:153-175.
17. Hellhammer, J., et al. Several daily measurements are necessary to reliably assess the cortisol rise after awakening: state-and trait components. Psychoneuroendocrinology, 2007. **32**(1): 80-86.
18. Bozovic, D., Racic, M. and Ivkovic, N. Salivary cortisol levels as a biological marker of stress reaction. Med Arch, 2013. **67**(5):374-377.
19. van Geffen, E.C.G., et al. Evaluation of patients' experiences with antidepressants reported by

means of a medicine reporting system. European Journal of Clinical Pharmacotherapy, 2007. **63**:1193-1199.

20. Knekt, P., et al. Randomized trial on the effectiveness of long- and short-term psychotherapy on psychiatric symptoms and working ability during a 5-year follow-up. Nordic Journal Of Psychiatry, 2013. **67**(1):59-68.
21. Sato, S. and Yeh, T.L. Challenges in treating patients with major depressive disorder: The impact of biological and social factors. CNS Drugs, 2013. **27**(1):S5-10.
22. Lee, S., Tsang, A. and Kwok, K. Twelve-month prevalence, correlates, and treatment preference of adults with DSM-IV major depressive episode in Hong Kong. Journal of Affective Disorders, 2007. **98**(1-2):129-136.
23. Thase, M. Antidepressant Combinations: Widely Used, But Far From Empirically Validated. Canadian Journal of Psychiatry, 2011. **56**(6):317-23.
24. Karlsson, H. Psychotherapy increases the amount of serotonin receptors in the brains of patients with major depressive disorder., in Psychodynamic psychotherapy research:Evidence-based practice and practice-based evidence., R. Levy, J. Ablon, and H. Kächele, Editors. 2012: NewYork, NY. 233-238.
25. Karlsson, H., et al. Increased serotonin receptor 1A binding in Major Depressive Disorder after psychotherapy, but not after SSRI pharmacotherapy, is related to improved social functioning capacity. Psychotherapy and Psychosomatics, 2013. **82**(4):260-261.
26. Bar-Sela, G., et al. Art therapy improved depression and influenced fatigue levels in cancer patients on chemotherapy. Psycho-Oncology, 2007. **16**(11):980-984.
27. Gussak, D. Comparing the effectiveness of art therapy on depression and locus of control of male and femaole inmates The Arts in Psychotherapy, 2009. **36**:202-207.
28. Curl, K. Assessing stress reduction as a function of artistic creation and cognitive focus. Art Therapy, 2008. **25**(4):164-169.
29. Puig, A., et al. The efficacy of creative arts therapies to enhance emotional expression,

spirituality, and psychological well-being of newly diagnosed Stage I and Stage II breast cancer patients: A preliminary study. The Arts in Psychotherapy, 2006. **33**(3):218-228.

30. de Morais, A.H., et al. Effect on scores of depression and anxiety in psychiatric patients after clay work in a day hospital. The Arts in Psychotherapy, 2014. **41**(2):205-210.
31. Lusebrink, V.B. Art therapy and the brain: An attempt to understand the underlying processes of art expression in therapy. Art Therapy: Journal of the American Art Therapy Association, 2004. **21**(3):125-135.
32. Bastos, A.G., Guimaraes, L.S.P. and trentini, C.M. Neurocognitive changes in depressed patients in psychodynamic psychotherapy, therapy with fluoxetine and combination therapy. Journal of Affective Disorders., 2013. **151**:1066-1075.
33. Carr, R. Sensory processes and responses, in Art therapy and clinical neuroscience, N. Hass-Cohen and R. Carr, Editors. 2008, Jessica Kingsley Publishers: London & Philadelphia.
34. Mellor, D., et al. Factorial invariance of the DASS-21 among adolescents in four countries. European Journal of Psychological Assessment, 2015.
35. Lavender, J.M., et al. Development and validation of a state-based measure of emotion dysregulation: The state difficulties in emotion regulation scale (S-DERS). Assessment, 2017. **24**(2):197-209.
36. Laurent, J., et al. A measure of positive and negative affect for children: scale development and preliminary validation. Psychological assessment, 1999. **11**(3):326.
37. Weidong, Z., Jing, D. and Schick, C.J. The Cross-cultural Measurement of Positive and Negative Affect Examining the Dimensionality of PANAS. Psychological Science (China), 2004.
38. Zigmond, A.S. and Snaith, R.P. The Hospital anxiety and depression scale. Acta Psychiatrica Scandinavica, 1983. **67**:361-370.
39. Leung, C.M., et al. Evaluation of the Chinese version of the Hospital Anxiety and Depression Scale. A cross-cultural perspective. International Journal of Psychosomatics, 1993. **40**(1-

4):29-34.

40. Ziadni, M.S., et al. Alexithymia, defenses, and ego strength: cross-sectional and longitudinal relationships with psychological well-being and depression. Journal of Happiness Studies, 2016.

41. Zhu, X., et al. Cross-cultural validation of a Chinese translation of the 20-item Toronto Alexithymia Scale. Comprehensive Psychiatry, 2007. **48**(5):489-496.

Figure Legends

Figure 1: Participant flow diagram – the diagram indicates how the participants will be assgined in to different groups and what they will experience throughout the study procedures.

Appendices

Appendix A – Informed Consent Form

Project no.: 22611818

Hong Kong Baptist University
Informed Consent Statement

29 November, 2019

Dear Parents/Guardians,

We would like to invite your child to participate in a research study, namely **"A study on the effects of art development with clay art approach on emotion regulation strategies, psychological stress and cortisol rhythm of secondary school students: A randomized controlled trial",** a research project organized by the Department of Social Work, Hong Kong Baptist University.

Purposes of the art development program:
This study aims to evaluate the effects of an art development program on enhancing emotional competencies and resilience of senior secondary school students; and reducing their psychological and physiological stress level.

Brief arrangements of the study:
S.4-5 students who participate in this research study will be randomly allocated to the clay art development group or the afterschool tutorial group.

Students from the art development group will complete a total of 6 sessions of art development class, which will be held once in each week. Each session lasts for about 2 hours and will be implemented in the group size of 10-12 students. The art development program will be implemented by at least one

registered art therapist, co-facilitated by an experienced social worker, under the supervision of the Principle Investigator. During the early phase of the session, students from the experimental group will be introduced to various kinds of art media and how the art media can facilitate expressions of different facets of themselves. The students will be provided with a safe platform to create thematic artworks in the following sessions with various kinds of art materials and freely express themselves via art.

Students from the afterschool tutorial group will receive supplementary sessions of art group activities after the study has ended.

To ensure the best convenience of participation is granted to each child, all sessions will be hosted in the school.

Participants:
The criteria for recruitment of participants include: 1. S.4-5 students, aged 15-17 (this age range may have included students who are newly emigrated from the mainland); 2. Ability to understand and communicate in Cantonese; 3. Medical conditions that are likely to limit group participation during the course of the 6-week program will be excluded; and 4. Able to take part (or take part with minimal assistance from group facilitator) in simple art making activities in group setting.

All parents and students will be asked to complete a set of measures at three time-points, once before the commencement of the sessions (T0), once at the end of sessions (T1), and once eight weeks after sessions have all ended (T2), it will take approximately 30 minutes to finish the questionnaires each time. Questionnaires are filled out by the students who participated in the study. Salivary samples of students will be collected to assess cortisol level (physiological response to stress). Students will place a cotton swab beneath their tongue and then deposit it into a test tube. Three salivary samples will be collected also at the three-time points (T0, T1, T2).

Risk:
The procedure has no known risk.

Students' and parents' rights in participation:
The participating student has the right to ask any questions during any phase and procedures of the study. If the student feels discomfort during the phase of the study, he/she is encouraged to discuss with the facilitating art therapist or the PI. The participation in the study is voluntary, and therefore, the student can withdraw at any time without penalty. The data collected on behalf of the withdrawn participant will be subsequently withheld from going through further data collection, analysis and research procedures.

Treatment of personal information:
All personal information will only be kept for research purposes and will be strictly confidential. No personal identifiable information will appear in any subsequent reports of the study. All information will be deleted 3 years after publication of the relevant research results.

Please complete the reply slip below to indicate your will in allowing your child to participate in this

research. All information obtained will be used for research purposes only. If you have any questions about the research, please feel free to contact Dr. Joshua Nan from Hong Kong Baptist University (Tel: 3411 2009, Email: joshuanan@hkbu.edu.hk).

Your support is very much appreciated.

Yours sincerely,

Dr. Joshua K.M. Nan, PhD, RSW, ATR
Assistant Professor,
Department of Social Work,
Hong Kong Baptist University

Reply Slip

I have read and understood the consent form, acknowledged receiving a copy of the form, and agree to participate in the study.

Participation dates:

Session	**Date**	**Time**	**Venue**
1			
2			
3			
4			
5			
6			
7			
8			

We strongly recommend your child to attend all sessions.

Name of the Student: _____Class: _____(___)

Signature of the student: _____

Name of the Parent/Guardian: _____

Parent/Guardian's Signature: _____

Date: _____