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## Effectiveness of mindfulness therapy among adolescent with conduct disorder in Jakarta, Indonesia

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### Abstract

Background and objectives: The prevalence of adolescent conduct disorder (CD) among school in Jakarta is 26,1% leading to high incidence of student brawls. Up until now, there is no structured module for CD intervention that can be done by teacher, thus mindfulness therapy is used in school to reduce such incidence. The objective of this study is to assess the effectiveness of learning of self-regulation in mindfulness therapy conducted by school counselor in mitigating their involvement in brawls and other forms of violence. Changes in behaviour and cortisol level are used as indicators of success. Method: subjects were randomly assigned into treatment as usual (with school counselors) and into Mindfulness training by counselors supervised by a psychiatrist. Cortisol level was checked before and after treatment. Behavioral changes were reported through a conduct disorder instrument developed for the study. Outcome data was analyzed using Chi-square, Odds Ratio calculation, and the General Linear Model Repeated Measures. Results and conclusion: 103 students completed the study (intervention n=53 control n=50) after 8 weeks, showing the effectiveness of Mindfulness therapy by NNT=2, RR=3,40 (2,04-5,65). The secondary results showed a decrease of anti-social behaviour measured by TCD-AM and a significant decrease of serum cortisol level (p<0,00) compared to the control group. Mindfulness therapy is recommended to manage anti-social behavior in school. Learning of self-regulation in mindfulness therapy resulted in improvement of emotional and behavioral control among adolescents with conduct disorder. Mindfulness therapy can be conducted by school counselors after appropriate training. This study is limited among male adolescents with mild and moderate history of conduct disorder. Girls and those with experienced severe conduct disorders were not included in the study.

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## 1. Introduction

Conduct disorder (CD) is a maladaptive behaviors with negative impacts to the development of teenagers (Rutter 2006). The disorder is characterized with recurrent behavioral pattern persisting for six months, in the forms of violating the rights of others and social norms prevailing for teenagers at their age (Saddock 2004). The manifestations of the behavior include frequently starting fights, acting aggressively, taunting, stealing, mocking, threatening, alienating friends, manipulating others, skipping classes and lying (Olsson 2009). The incidence of CD in Indonesia has not been reported, but the description of the symptoms is actually quite ubiquitous, including bullying and aggression in schools and student brawls (Amelia 2011). The studies performed by Plan Indonesia in 2011 observed that bullying conducted among junior high school students are in the forms of mocking/verbal (59 %), physical abuse (46 %), psychological pressure/ alienating friends (59 %). In 2010, there were 128 cases of student brawls; while in 2011, there were 330 cases which resulted in 82 student deaths. During the period of January-June 2012, there were 139 student brawls that resulted in 12 student deaths (Sejiwa 2010). The data suggested that violence exists among junior high school students as the manifestation of CD symptoms.

Adolescence with conduct disorder experienced negative effects such as low academic achievement, low self-esteem and poor interpersonal relationships (Searight 2001). Other impacts include more serious disorders such as depression, anxiety, substance abuse and impairment on daily function (Popma 2007). Other serious impact of untreatable CD 40 % developed into antisocial personality disorder as adults (Moffit 2002). The biopsychosocial factor interacts with the neuroendocrine pathway in the forms of HPA axis activated directly by stress in the level hypothalamus or indirectly in the level of amygdala. The behavioral problem of conduct disorder in adolescence development is influenced by the hormones cortisol that associated with the occurrence of social aggression and stimulation of impulsivity (Montoya 2012). The high cortisol level causes the expression of certain genes in the amygdala that facilitate fear, anxiety, and aggressive behavior that means cortisol would impede the activity of the HPA axis in situations of fear (Fairchild 2008). The level of cortisol is associated with low behavioral control and low self-control directing towards the increase of impulsivity and aggression (Popma 2007). Cortisol is the final result of the hypothalamus-pituitary-adrenal (HPA) axis, holds an important role in adaptation to stress, both externally and internally. When responding to anger, anxiety, fear, unpleasant situation, even to the unaccomplished expectation, there could be an increase of HPA axis activity. The elevated cortisol level due to persistent stressor will stimulate the response of HPA axis (Robert 2005). It will cause neurobiological profile, the production of cortisol will continue to rise and may break the neurons in the hypothalamus, thus causing atrophy impacting the hippocampus by the emergence of cognitive problems and will also influence their behavior (Matousek 2009).

Mindfulness therapy is proven to be beneficial to teenagers, based on the self-evaluation reports from teenagers who used the mindfulness, by the decrease of anxiety symptoms, depression, and somatization and increase in self esteem and quality of life. Mindfulness significantly increase the function of life (Brown et al 2003). Mindfulness therapy will increase the attention and cognitive abilities, because when the awareness is increased, the executive function will be improved; thus, causing a more careful motivation and decision making (Flook 2010). The attention and anticipation of emotion and impulsive behavior showed the presence of self control so that the executive function is on order (Beaver 2007). The effects influences the thought process by increasing the awareness and self-acceptance impacting the changes in emotion and behavior. The integrated mindfulness training significantly increase the attention compared to the mindfulness approach which only focus on relaxation (Jain et al 2007).

Learning of self regulation in mindfulness therapy in this study base on mindfulness training and self-acceptance and commitment therapy. The therapy forged metaphor, paradox, and mindfulness with a broader scope guided by the values believed by the person (Hayes 2001). The Self-Acceptance therapy is a process to accept the events experienced by an individual by seeing an event without emotion and making a commitment to change behavior and attitude (Hayes 2004). The individual is taught to recognize the observation of themselves and able to recognize the sensation of body, mind, and emotion (Hayes 2005).

The approach is adapted by the writer as a strategic model modified as learning self regulation in mindfulness therapy. This intervention base on mindfulness and cognitive aimed to create the skill to regulate themselves to be able to control their own emotion and behavior by giving an understanding regarding themselves and changing the negative mindset, so that they were able to control their emotion and behavior to the mindfulness

state. The mindfulness therapy is compiled in a guidance module for students and teachers with a structured way and easy application for teenagers with conduct disorder at school. The intervention model consists of eight modules. Modules one through four discussed four aspects, including recognizing emotions, quality of one's emotions, and the ways to manage the conveyed emotions. The thought process in the brain is received by the central core of emotions in the limbic system. The cognitive process may be described as a sensation originating as external stimulus, which would form the self-knowledge and eventually recorded in the hippocampus (Kandel 2007). The process will be recorded in the hippocampus as long-term memory. Long-term memory serves to mediate circuits in strengthening the learning process. The next four modules emphasized on cognitive learning to improve the cognitive distortion. The process may result in positive behavior, understanding about self-concept, empathy, social norm, and step of problem-solving and future planning which is in accordance to his behavior and his life. Learning skills could create perspective of mindfulness and skills to manage their own emotion and cognitive function to control conduct disorder (Singer 1999). The limbic system serves to manage the control of emotion by the prefrontal cortex. The prefrontal cortex controlled emotion from the limbic system, amygdala, which resulted in the thinking skill as the dynamic coordination between the neural circuits of the prefrontal cortex with the amygdala. The reactions showed in conduct disorder was based on negative emotional stimuli, thus it required the control from cognitive skills. The cognitive learning will result in hormonal equilibrium, which would result in the balance of the body. The prefrontal cortex controls the thinking process, decision making, planning, assessment, and adaptation. The regulation of the process would transform students with conduct disorders by applying their executive functions in their conduct (Faichild 2009). The self-regulation intervention is used as guidance, monitoring, performance drive, and direct interaction of learning to achieve success (Shapiro 2006). The purpose is to manage the expectations and desires. Finally, the learning skills would help students in controlling and improving their self-regulation (Chamber 2009).

The issue of conduct disorder in schools have not been handled effectively by school counselor. Rapid intervention efforts is required to prevent students from developing severe disorders. School counselors should be prepared to have the ability to perform interventions to the students. Before the intervention is performed, the school counselor should be trained to understand and perform mindfulness.

For this study to asses behavioral change used TCD-AM tools, that was developed by Yusnadewi with sensitivity 77.6 % and specificity 99.8 %.

## 2. Research Objective

The aim of this research is to asses the effectiveness of learning of self regulation in mindfulness therapy conducted by school counselor inmitigating their involvement in brawls and other forms of violence and changes in behavior.

## 3. Research Method

The research used a quasi-experimental designs, aiming to find out the effectiveness of "learning of self-regulation in mindfulness therapy in juniors high schools students with conduct disorder. The study was performed in several junior high schools in the DKI-Jakarta region for children aged 13-15 years, studying in grade 7 and 8 who were diagnosed with conduct disorder and met the inclusion and exclusion criteria. Random selection as performed in students who have been diagnosed with conduct disorders according to ICD-X for research. The main result is the success of intervention, which was analyzed using *chi square* test with calculation of Risk Ratio (RR) and Number Needed to Treat (NNT) and 95% confidence interval. General Linear Model Repeated Measure was used to analyze the differences of conduct disorder changes using the TCD-AM score and changes of serum cortisol level. Random sampling was performed using with computer programs. This study was approved by the ethics research committee of Medicine/RSCM Jakarta. Before the intervention, student counselors were trained for three weeks, which was divided in three session. The first session, which was divided into three parts is a training to understand symptom conduct disorder in school, theory and technique intervention, watching a video regarding the whole technique intervention of mindfulness. direct practices in intervention for the participants divided in the groups. After completing the session, the participants were given homework, to practice the technique of intervention and tried to educate one participant. The second session was conducted one week later, which includes follow-up and evaluation of the result from direct practice and sees example of education about the skill to the patient by a trained student

counselor. The final session is a phase of booster or strengthening before conducting the intervention. Assessment to teacher based on pre-post test and key performance is the indicator that their ability works on the simulation, the ability to deal with a patient, responsibility and cooperation, desire to develop themselves, leadership and loyalty.

#### 4. Results

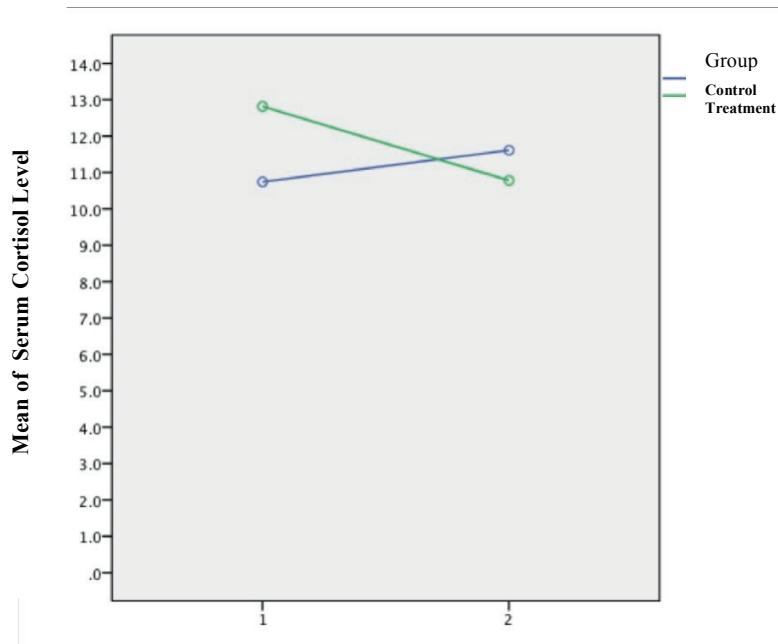
Adolescents with conduct disorder were randomly allocated to the intervention or control group. The recruitment of study participant was performed during the period of June to October. One-hundred and eight subjects from 8 schools were divided as follow: 55 subjects into the treatment group and 53 into the control group. 103 student completed the study (intervention n=53, control n=50). The baseline characteristics of the two groups were shown in table 1. There were no significant differences between clinical characteristics both in the demographic variables. Data are presented as mean  $\pm$  SD

**Table 1.** Demographic Characteristics of Study Subjects

| Characteristics                 | n=103                      |                       |
|---------------------------------|----------------------------|-----------------------|
|                                 | Intervention (%)<br>n = 53 | Control (%)<br>n = 50 |
| <b>Age</b>                      |                            |                       |
| 13 years old                    | 5 (9.4)                    | 5 (10.0)              |
| 14 years old                    | 29 (54.7)                  | 39 (78.0)             |
| 15 years old                    | 19 (35.8)                  | 6 (12.0)              |
| <b>Parental marriage Status</b> |                            |                       |
| Married                         | 46 (86.8)                  | 47 (94.0)             |
| Widowed/Divorced                | 7 (13.2)                   | 3 (6.0)               |
| <b>Parental Education Level</b> |                            |                       |
| University                      | 3 (5.7)                    | 9 (18.0)              |
| High School                     | 27 (50.9)                  | 23 (46.0)             |
| Junior High School              | 19 (35.8)                  | 11 (22.0)             |
| Elementary School               | 4 (7.5)                    | 7 (14.0)              |
| <b>Economic Status</b>          |                            |                       |
| Less                            | 32 (60.4)                  | 26 (52.0)             |
| Adequate                        | 21 (39.6)                  | 24 (48.0)             |

The mean scores of influences in the learning of self regulation in mindfulness therapy group and the control group were analyzed using *General Linier Model (GLM) Repeated Measure* test and yielded a significant decrease of TCD-AM score between the intervention and the control group after eight weeks  $p \leq 0.05$  (0.001). The mean TCD-AM score of the intervention group at baseline was 48.82 ( $\pm$  6.34) and for the control group was 48.7 ( $\pm$  6.03). After eight weeks, the scores were decreased to 33.78 ( $\pm$  7.86) and 46.74 ( $\pm$  10.38) for the intervention and control group, respectively.

The influence of learning of self regulation in mindfulness therapy method to the serum cortisol level was obtained by comparing the cortisol level of the two groups. The mean baseline serum cortisol level of the intervention and control group were 12.82 ( $\pm$  4.94) and 10.74 ( $\pm$  3.97), respectively. After eight weeks, the treatment group showed an decrease to 10,78 (4.29), while the control group showed increase 11.61 ( $\pm$  4.55), ( $\pm$  7.86) and 46.74 ( $\pm$  10.38) for the intervention and control group, respectively. There was a statistically significant difference between the two groups ( $p = 0.003$ ).



**Figure 1.** The influence of “learning of self regulation in mindfulness therapy” to the serum cortisol level

## 5. Discussion

The consideration of TCD-AM instrument development is based on the reality in Indonesia that there has not been any study that could screen CD using non-medical staff and applicable in Indonesia, including teachers, and suitable to the culture and norms in Indonesia (Yusnadewi 2013).

The main outcome of the experimental study was that CD students who were given the intervention in the forms of learning of self regulation in mindfulness therapy showed a higher success rate compared to the control group, which includes the students who were given the usual treatment at school. The results showed that the behavior of teenagers with conduct disorders after the intervention has an NNT value of two, which means that every two intervention will yield success of one subject and prevent the failure of another one subject. The relative risk (RR) of 3.40 (95 % CI 2.04 - 5.65) showed that the intervention group were 3.4 times more likely to show self-regulation to mindfulness than the control group. The “learning self-regulation in mindfulness therapy” was also associated in the changes of serum cortisol and TCD-AM scores. The improvements of behavior in the teenagers with conduct disorder were in accordance with the theory that learning, psychotherapy, education, training and non-biological interventions. These interventions would change the structure of the brain as effectively as biological therapies, such as medicine and intervention of self-regulation( Herdegaen 2004).

The self Regulation have several function explained in the study, such as: 1. It will generate positive emotional response, control their impulses, as well as a aims to behave based on self awareness to manage their emotions. 2. The approach paid attention to situations that contain elements of moral values containing a positive life and emphasis on empathy in others. 3. It will control depression(cortisol) that has a great influence on conduct disorder with reactive aggression, which shows activity along a more active HPA.

The study has several limitations. First, the sampling was not able to be performed to achieve pure experimental study (randomized clinical trial). However, the study was performed using quasi-experimental design. The selection is constituted, the treatment and control group could not undergo the study in one location, because it will elicit measurement and observation. The second, measurement of behavior change is only performed at baseline and at the end of the study, there is no follow-up measurement of brain neuroplasticity but its changes indirect from changing TCD-AM.

## 6. Conclusion

- a. The successful of intervention learning of self-regulation to mindfulness conducted by the teacher showed better outcome than the treatment as usual at school.
- b. Intervention of learning of self regulation to mindfulness by teacher was effective in handling conduct disorder on teenager which being assessed using TCD-AM.
- c. There was significant decrease of cortisol serum level on student before and after the group intervention with learning of self-regulation to mindfulness .

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