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Psychosocial Issues Following Natural Disaster in Palu Central Sulawesi: A Case Study on Adolescents

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Abstract

Earthquakes, tsunami, and soil liquefaction struck Palu, Central Sulawesi on September 28th, 2018. The negative impact of the disaster was the crisis experienced by the victims, showed by tension, stress, and frustration. Children and adolescents are a vulnerable group to experience mental health problems after a disaster. This study case aims to identify psychosocial issues among adolescents following the devastating disaster. Qualitative data were collected through in-depth interviews with five survivors aged 16 to 17 years old. Participants reported trauma, anxiety, and grief. Nonetheless, they developed positive coping mechanisms to help them adapt to post-disaster situations. Families contributed by providing a safe and comfortable space, while schools played role in delivering post-disaster education. The findings imply that a psychosocial intervention needs to be developed for adolescents who are to this day still struggling with the psychological consequences of the natural catastrophe.

Keywords: Adolescent, natural disaster, trauma, grief, anxiety, coping behavior

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Introduction

Located in the middle of three main earth plates (i.e., the Eurasian, Indo-Australian, and Pacific plates), Indonesia is very prone to earthquakes. On September 28th, 2018, a city in the Central Sulawesi province, Palu was hit by a high magnitude earthquake (i.e., 7.2 Richter scale) following a wave of lower magnitude foreshocks. In other nearby regions, soil liquefaction was reported. Five minutes after the mainshock, the National Meteorology, Climatology, and Geophysics Agency (BMKG) issued a tsunami warning of a half to three meters height. Unfortunately, a wave as high as six meters hit Palu approximately three to six minutes after the warning. The tsunami drowned the tip of Palu Bay, the most populated area of the



province (Lin & Henschke, 2018). Ministry of Health reported 4,402 dead and missing casualties from four areas, namely Palu, Donggala, Parigi Moutong, and Sigi (Tandigala, 2019).

Natural disasters may cause various physical and psychosocial stress. In general, temporary emotional disturbances, somatic symptoms, perceptual and behavioral problems are common following a catastrophe (Kar, 2006). A more serious consequence is Post-traumatic Stress Disorder (PTSD) (Brown et al., 2017; Midtbust, Dyregrov, & Djup, 2018; Miller et al., 2012; Kousky, 2016; Peek, 2008; Pfefferbaum, Houston, North, & Regens, 2008). The most widely reported manifestations are anxiety, insomnia, and depression. Meanwhile, in Asia, somatization is the most frequent reaction (Kokai et al., 2004). The Palu community is reported to have experienced specific conditions related to the crisis for the individuals and families who were casualties of disaster. The crisis was showed by tensions that related to unstable economic conditions, stress and frustration (Alfarizy, 2020).

The mechanisms behind these reactions to disasters vary. First of all, losing more resources during a disaster has been associated with higher levels of psychological stress (Andrades et al., 2021; Freedy et al., 1994). Problems with adjustment to post-disaster situations may also lead to psychological issues (Andrades et al., 2021; Lai et al., 2013). A positive adjustment pattern is important for self-recovery (Karlin et al., 2012; Masten, 2021). Further, adjustment to a new situation is affected by time. Data on post-disaster adjustment patterns shows that the psychological repercussions of a storm tend to diminish after approximately 16 months (Krause, 1987).

Adolescents and Natural Disasters

The psychological impacts of natural disasters among adolescents are an incredibly interesting research topic. In the 1970s, researchers began to notice a high variability among children exposed to parental psychopathology, poverty, and disasters (Masten, 2011). Since then, the interest in whether or not a child can function well in the face of adversity keeps increasing. Children and adolescents are believed to be particularly vulnerable to the consequences of the catastrophe (Lai et al., 2021; Peek, 2008). As they are more prone to injury and death, children and adolescents are at risk of developing various behavioral

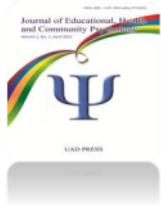


and emotional problems after a disaster (Peek, 2008). Youths experiencing serious mental problems such as posttraumatic stress (Lai et al., 2021).

Natural disasters may affect individuals differently (Lai et al., 2021). Some studies have documented that parents reported psychological repercussions of a tsunami on their adolescents, including trauma and psychological distress (Hafstad et al., 2012; Hardin et al., 1994; Andrades et al., 2021). Another study found that most children and adolescents demonstrated symptoms of PTSD one year after a big cyclone in Orissa (Udomratn, 2008). One-third of them even met the diagnosis criteria for the disorder according to the ICD-10-DCR. Furthermore, another account suggested that children coped with disaster-induced stressors faster than adults could, especially when they received lower exposure to disasters, stress management training or other interventions, and healthy support (Andrades et al., 2021; Hardin et al., 1994; Lai et al., 2013).

McDermott and Palmer (2005) reported that 12% of children and adolescents experienced significant emotional stress even six months after a wildfire. Andrews et al., (1978) showed that children with lower exposure to disasters did not present any serious post-disaster problem until 14 months after the accident. It was also further explained that younger children with a healthy coping mechanism and positive support had a lower risk to develop psychological disorders. Recent study reports that children and adolescents experience the most severe mental trauma in the 12-18 months following an earthquake (Wang & You, 2022). A study by Kar (2006) explained that children and adolescents were the age group most affected by a disaster. He reported that they were likely to lose their parents and appeared silent almost all the time. The study also documented lack of motivation, nightmares, night terrors, and somnambulism among children and adolescents. Depression could also be observed, indicated by the lack of interest in playing, making friends, or doing activities even after the reopening of schools.

Interestingly, although most experts emphasize PTSD as a dire consequence of experiencing a natural disaster, several researchers have documented those adolescent survivors do not always suffer from such repercussions. It is particularly the case when they have a healthy coping strategy and social support



after the accident. Therefore, we are interested to investigate the psychological and social impacts of earthquakes among adolescents in Palu, Central Sulawesi. The contribution of this research is to develop psychological interventions and social environment recovery for adolescents after natural disasters

Method

Study Design

This qualitative study used the case study approach. According to Yin (2003), a case study is an empirical inquiry investigating a phenomenon in a real-life context using various sources of evidence in which the boundaries between the phenomenon and the context are not well-defined. Data were collected through in-depth, semi-structured interviews. In the interviews, the researchers began with the following questions: (a) “Can you tell us about your experience when the disaster happened?”; and (b) “According to your experience, what kind of post-disaster impact affected you the most?”. After these questions, further inquiries were dependent on the responses of each participant.

Setting and Participants

Data were collected 18 months after the 2018 Palu earthquake and tsunami in the affected regions. The rationale behind this 18-month interval is that the survivors would have been in a better and more stable condition after the disaster. Five participants were involved in this study. Their characteristics are summarized in Table I.



Table 1

Characteristics of the Participants

Participant	Gender	Age (years)	Education	Experience of the Disaster
1	Male	16	3 rd grade of Senior High School	Earthquake and liquefaction
2	Female	17	3 rd grade of Senior High School	Earthquake
3	Male	17	3 rd grade of Senior High School	Earthquake and Tsunami
4	Female	17	3 rd grade of Senior High School	Earthquake
5	Male	16	3 rd grade of Senior High School	Earthquake

Data Analysis

Thematic analysis was implemented to analyze the qualitative data through six phases as stated by Braun and Clark (2006). They include: (1) familiarizing with the data; (2) generating initial codes; (3) searching for themes; (4) reviewing the themes; (5) defining and naming the themes; and (6) producing the report. Braun and Clark (2006) also distinguish a top-down or theoretical thematic analysis, which is driven by specific research questions, from a bottom-up or inductive thematic analysis which is more data-driven. With regard to this distinction, this study used a bottom-up thematic analysis driven by the participants' data.

Ethical Considerations

Some ethical steps the researchers had taken include (1) providing the participants information about the benefits and the risks involved in the study; (2) asking for their written consent to participate; (3) adjusting the interview schedules with participants' working hours; (4) ensuring the confidentiality of the data; (5) not pushing participants to explain things they were reluctant to say; and (6) only using a voice recorder or any other recording device when the participant agreed.



Results

Experience of the Natural Disasters among Adolescents

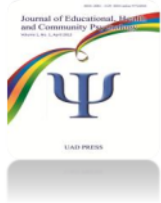
The participants shared their experience when the earthquake, tsunami, and liquefaction happened in Palu, Central Sulawesi in 2018. All participants had direct experience of how the earthquake happened and destroyed buildings they were in and the environment around them. Their first response was to run and find a place to cover.

'That time my house suddenly shook on its own then I ran fast out from the house to save myself.. After I was out, I saw my house was already ruined and damaged... That time, the only one inside was me, after the house was destroyed... I ran to my uncle and aunt... whose house was in front of mine... At that time there were six people gathering... Then we kept running together to a place away from big trees and houses' (Participant 1)

'I was home when the disaster happened. Suddenly, there was a violent shaking. I quickly looked for a door to get out of my house. Everything was falling but I managed to get to the street and I saw a lot of people also getting out. Then, there was a break to get back inside our house, getting some stuff, and then another but smaller earthquake hit. Then someone shouted, "there is a flood coming from the top of the mountain". I was shocked and hastily lifted the cupboard that had fallen on me. I managed to lift that cupboard, then hurried out, and I was about to get on my motorbike when suddenly an earthquake hit again. Then I just left it there while looking behind me. There I realized it wasn't a flash flood but a lot of mud slurry' (Participant 3)

'At that time, the earthquake happened at exactly 18:02. My older sister, my mother, and I were inside our house. My mother and I were in the living room when I was about to read a prayer after the evening prayer call (adhan of Maghrib). Suddenly, immediately after the prayer call ended, we were hit by, Subhanallah, a tremendous earthquake. That time I panicked and because of that I looked for an exit door in the kitchen even though the living room exit in front of my eyes could be accessed.' (Participant 4)

The participants' responses during the violent earthquake were mostly to try to save themselves. They also witnessed how people scattered to save themselves as well.



'I saw my house being devoured by the mud and did not know what to do. The only thing in my mind was to stay alive first. I kept running until I found a wide field and there were already a lot of people running away from their houses'. (Participant 3)

'After that, I tried to run towards the street. I saw all my neighbors and I's motorbikes fell down. Once I got to the street, everyone already gathered out there. Then I immediately remembered where my mother and sister were. It turned out that my mother went inside the house to look for my sister who was taking a bath. Then I shouted from outside, as loud as I could for them to leave the house' (Participant 4)

'That time... I was at school... at my basketball practice... Then.... Before the big earthquake, smaller earthquakes could almost be felt... At that time... I already thought that I would die here... I already thought of all the worst things that time... Anyway, it was complete chaos... Empty... In short, I just wanted to be safe... That's all' (Participant 5)

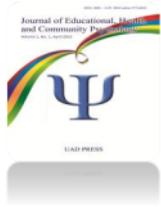
Some participants reported that the natural disaster separated them from their families and made them try to save their own lives.

'Not long after, all of us were dragged away by the mud that who knows where it came from... That time all of us were separated... All of us were trying to save ourselves... I tried to save myself by climbing a fallen tree that was also drifting in the mudflow... We were dragged almost 500 meters away by that mud.' (Participant 1)

Emotional reactions happened during the disaster, such as crying and feeling scared. Confusion and panic were also present in most of the participants.

'And what made the panic ever more was someone saying that the water was already rising. At that time, everyone was confused as to where to go. Because that time we were in a field and behind that field it was the mountain. We had no idea where to go because if we went to the mountain, there was a possibility of landslide, but to stay in the field, we were afraid if the water would reach there.' (Participant 2)

'Because I was panicking, I was going for the kitchen exit, then I fell down. It was so hard to get back up, but I forced myself to stand up. Once I was in the kitchen, the quake stopped only for a few seconds, then it came back with a higher shock. There I was frightened; I had no choice but to hug



a tree. Beside that tree, there was a wall. Fortunately, that wall didn't fall on me that time.'
(Participant 4)

'Sad, messed up, shocked, until it was hard to breathe...' (Participant 5)

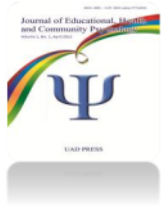
Psychological and Social Issues Following the Disaster

After experiencing a disaster, participants experienced several major psychological and social issues. These Psychological and Social Issues are summarized in table 2.

Table 2.

Psychological and Social Issues Experienced by Adolescents Following the Natural Disaster

Issues	Explanation
Trauma	Trauma was caused by the direct experience of the disaster and its impact. Images of the event stuck on their mind even until the day of the interview. Sometimes, they associated small earthquakes with the earthquake in 2018 which then triggered fear and a sense of insecurity.
Anxiety	Anxiety emerged due to the possibility that an earthquake might happen anytime. It is also manifested in the reluctance to consume seafood as participants witnessed some people got lost in the wave and did not survive.
Grief	The immense feeling of loss and separation from their families still induced sadness until the day of the interview.
Coping Behavior	At the time of the interview, most participants are already back to their regular activities. Family helped them to recover. Information from the schools also helped them better understand what to do if a similar accident was to happen again. Moving to another region was also a way for parents to make sure the psychological well-being of their family.
Disaster Education from Schools	Previously, schools never had provided special education about disasters and mitigation. After the natural disasters in 2018, schools began to provide a lot of such information. This helped students to become calmer as they received new insights that becomes personally significant due to their personal experience with a disaster.



Trauma

Most participants developed a trauma following the disaster. It is associated with the unpleasant experience during the accident. Until the day of the interview, they were easily scared when a small quake happens.

'I was dragged by the current around 500 meters away, around 1 minute... I got near the BTN housing... at that time no one helped me... I remembered that until now... I was very traumatized and phobic... Sometimes when I recall it, I found myself pondering alone...' (Participant 1)

'I'm still traumatized, negative thought popped up in my brain. Perhaps this wall would collapse, this and that. I feel cautious... Still traumatized, still haunted. Is this a dream or a reality? Sometimes I wonder about that...' (Participant 4)

'Even now every time I take a bath, if I hear a rumble, I will turn off the faucet. I would ask, is this an earthquake or not? It turned out that my uncle was heating the machine of the trekking car. Hence the rumbling sound...' (Participant 4)

Anxiety

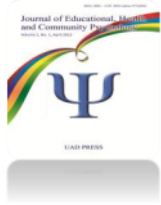
Anxiety was still present in the participants during the day of the interview. It is manifested in fear that a similar accident would happen again.

'I feel afraid of earthquakes, worrying where to run if it ever happens again. If I run towards the street, it might be collapsed. If I run towards the mountain, there might probably be a landslide.' (Participant 2)

'The fear appears suddenly. Usually, it appears when I'm at home alone or being in a crowd like in the mall' (Participant 2)

Additionally, the anxiety was also manifested in a reluctance to consume seafood as the participants witnessed many people being swept away by the tsunami, consumed by the sea, and never coming back.

'Because the tsunami corpses in the sea haven't been evacuated completely, it's horrifying if the fish in Palu region consume human bodies as their food. So, my family only started eating fish again'



around one month after the accident. We are afraid that when we eat fish, there will be a human ring or fingers. So, the trauma emerges. We only eat freshwater fish, like milkfish.' (Participant 4)

Grief

The feeling of loss was the most common expression in adolescents after experiencing the natural disaster. Participants reported how they were separated from their families due to the mishap.

'I still remember it clearly... because at that time... a lot of my family died... I only remember the last time I saw my uncle and aunt... I remember everything. Perhaps I will not be able to forget it until now.' (Participant 1)

'I was shaking and didn't know what to say. I kept thinking about my mother and younger sister at the beach, and my younger brother in the mosque... I still remember my lost younger sister, 5 years old, still missing until now...' (Participant 3)

The feeling of losing friends and teachers to the disaster rendered the survivors still struggling to believe what had happened. However, on the other side, they were grateful that some of them survived the catastrophe.

'There was a time when I could not accept, Ya Allah why? In their teenage age, like, it's too fast for them to leave us. I couldn't believe it. I believed it was a hoax. Turned out it was true, Ya Allah... I also lost my friends and teachers.' (Participant 4)

'Surprised and grateful for my friends who could make it... Worried... Sad and grieving... All mixed in one...' (Participant 5)

'A lot... There was one that almost lost their life and was found full of mud... There were others who lost their family... And there were friends from my own cohort who died. Some of my teachers also died...' (Participant 5).



Coping Behavior

The most common coping strategy used by the participants was to forget the accident. All participants were at the time of the interview in good physical, mental and social condition. They were already back to their daily activities.

'Yes, yes... with family... Slowly I'm forgetting (the accident)...' (Participant 2)

'I just need to hang out with friends... Play some games... I can forget it now' (Participant 1)

'My sleep is sound now... Because this Palu city is very prone to disaster, with the provision of information on natural disasters at schools we know how to save ourselves.' (Participant 4)

'There was no help. We just need to get together with family, it is soothing already...' (Participant 5)

'My mother said that after this, we are moving to Makassar (another region) to feel safe and peaceful...' (Participant 3)

Disaster Education from the Schools

Participants had never received any information or education about disasters from their families, neighborhoods, and schools before. After the 2018 disaster occurred, schools began to provide disaster education. Although it was not specific, the provided information was considered significant by the participants as it helped them to better understand their actions in dealing with disasters.

'Well .. coincidentally, now at school (we are) studying natural disasters. It is in the Sociology lesson about natural disasters... Things that cause natural disasters, how to anticipate natural disasters from happening... Actually, the teacher reviews what happened (in 2018) yesterday...' (Participant 1)

'Yes, disaster education is given in schools. Because the city of Palu is prone to disasters. With information about natural disasters at schools, we can how to save ourselves...' (Participant 4)

'Schools have now provided knowledge about disasters such as earthquakes, tsunamis, and others...and some ways to anticipate them...that's it' (Participant 5)



Discussion

The 2018 earthquakes, tsunami, and soil liquefaction in Palu and other regions in Central Sulawesi are one of the biggest natural disasters to ever hit Indonesia. The casualty rate was extremely high at 4,420 deaths, including missing victims. Around 110 thousand houses were destroyed (Rachmawati, 2020). Although CNN Indonesia (2018) reported that the economy and education in the affected regions were back in business after only 22 days past the unfortunate event, psychological issues remained among children and adolescents until the period of this study.

Natural disasters may cause emotional problems in adolescents. Not only is it frightening, but stress can also result from the destructions that it leaves afterward including house damages, loss of possessions, forced migration, and disruptions to social networks, environments, and local economy. Losing a beloved relative to a disaster can cause an incredibly deep sadness and adolescents might find it more difficult to process such losses (Andrades et al., 2021; Kousky, 2016). Furthermore, children and adolescents are particularly at risk of developing post-traumatic stress symptoms after experiencing a natural disaster (Andrades et al., 2021; Brown et al., 2017; Kousky, 2016; Rezwana et al., 2015). The psychological trauma among participants in this study was related to their firsthand experience of the disaster. They were all doing their activities when the earthquake suddenly hit. In response, they ran aimlessly trying to save themselves. Some of them were swept away by the mud current that appeared out of a sudden from the ground and drowned their houses. The participants were also separated from their families. At that time, they had to deal with overwhelming fear and helplessness while struggling to remain alive. Until the day of the data collection for this study, the memory of that terrifying experience was still vivid in their mind.

After the disaster, the participants developed some kinds of anxiety. They reported concerns that another earthquake of the same magnitude might occur or that another tsunami would hit and rob them of everything they had once more. Kar (2006) explained that panic during rainstorms, helplessness, fear, anxiety, and feeling incompetent are common reactions to natural disasters among adolescents.



A previous report documented a 15% to 20% increase in the number of outpatients with anxiety and depression following the 2004 Aceh tsunami, sparking attention to post-disaster psychological issues (Hidayat & Stokoe, 2005). In this study, adolescent survivors reported anxiety and distress almost 18 months after the catastrophe in 2018 although the symptoms did not meet the criteria for clinical depression. Of note, no symptom of depression was present early after the misfortune. Although adolescents are generally vulnerable to the consequences of natural disasters, the psychological reactions among participants in this study seemed to be influenced by various factors, such as (1) the level of exposure to the disaster, (2) the amount of support during and after the disaster, and (3) the number of personal loss and social disruptions. Furthermore, the response and adaptability of children are also affected by their developmental stage, level of attachment towards adults, unique individual characteristics, and previous experience (Stafford et al., 2020).

As a previous exposure to traumatic events and tsunami should be taken into account in the analysis of any other traumatic experience (Neuner et al., 2006), it is important to note that all survivors in this study reported that it was their first time experiencing a heavily destructive disaster and that they never had any other traumatic event in their life before. Due to this absence of accumulative trauma, they could cope with the disaster relatively well. Additionally, participants in this study also reported grief. Although none of them lost their parents to the disaster, they lost their siblings, schoolmates, and teachers. Extreme sadness might happen to individuals who lose their loved ones in a traumatic event such as a natural disaster and it has been conceptualized as a symptom of a post trauma-related disorder following the death of a loved ones such as family, friends and pets (Adebäck et al., 2022; Andrades et al., 2021; Kanayake et al., 2008).

Indeed, natural disasters may separate children from their family and friends, lead to the death of their loved ones, or relocate them to an unfamiliar and unfriendly environment (Adebäck et al., 2022; Andrades et al., 2021). These repercussions can bear further consequences to the children's physical, emotional, and intellectual well-being both immediately after the accident and in the long run (Peek, 2008). In this study, participants were still dealing with the consequences of the disaster until the day of their interview.



They reported emotional reactions such as feeling sad when reminiscing about all the people in their life who did not survive the catastrophe. Nevertheless, the family had been very supportive and helpful during the post-disaster adjustment period. For example, the parents of one participant decided to move to another city that was geographically safer from the risk of similar disasters. It might explain participants' successful adaptation to the situation. Successful adaptation is of great importance as it protects adolescents from developing a psychological disorder. Adolescents' emotional response to natural disasters should indeed be identified and addressed so that their support system could help attend to their emotional needs (Stafford et al., 2020).

Participants in this study received support from their families after the disaster. Family support is one of the protective factor for adolescents who experience natural disasters (Rachma & Febrianti, 2021). It is important for adults, especially older family members, to acknowledge the emotional risk among children and provide knowledge and practical skills to recover (Rezwana et al., 2015). For instance, in this study, the parents of one participant supported their adolescent's recovery by creating a safe and comfortable environment despite many adversities that follow the disaster. According to Hafstad et al., (2012), parents can initiate a few things after a disaster, including (1) rebuilding a sense of safety and continuing the normal routine; (2) adapting to the situation and preventing the development of psychological symptoms; (3) actively helping the children to cope with psychological symptoms using various methods.

If separated, adolescents should be reunited with their parents, family, or other main caretakers so that they are protected against trauma, abandonment, and harassment (Kousky, 2016). In the context of post-traumatic recovery, parents are one of the protective factors for children who will encourage a resilient state (Masten, 2021). In this study, the participants' risk to develop psychological problems was not very high as they eventually managed to get back to their families. This is in line with a study by Carballo et al., (2005) which suggests that the best post-disaster treatment for children and adolescents is when they feel safe with their parents.



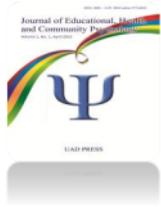
Lastly, participants also mentioned the role of schools in providing knowledge about disasters and their mitigation. Information on this matter helped participants to feel more at ease and understand what to do in case of another disaster. Hence, education had contributed to the post-disaster adjustment of adolescents. According to Brown et al., (2017), school-based psychosocial interventions hold an important role in the post-disaster recovery of adolescents. Schools can help provide positive encouragement towards psychological recovery or other treatments that might bring about positive (Kanayake et al., 2008; Lai et al., 2021). Schools are places of intervention, not only because children and youth are reconnected with their schools, but also programs in schools are considered more normative, not stigmatizing and acceptable to children and parents. (Masten, 2021). Encouragements that come from both informal and formal sources, such as official organization, mental health workers, friends and family, religious leaders, and school teachers can have positive effects on adolescents' mental health (Kanayake et al., 2008).

Limitation of This Study

The limitations of this study are: (1) there is no control over the memory bias of each participant; (2) The researcher did not check data from the significant other because the participants did not agree to participate; (3) the number of participants who are willing to be involved in this study is very limited; (4) participants have not received mental health professional assistance, so data acquisition is not too deep to prevent retraumatization.

Conclusion

In the context of disaster, it is important to understand the heightened vulnerability of adolescents to psychological problems. In this study, three psychological problems were identified among adolescent survivors of the 2018 Palu natural disaster, including trauma, anxiety, and grief. Nevertheless, all participants managed to cope with these problems with the supports from their family and school who helped and encouraged them to adapt to the post-disaster situation. Looking at their experience, we could say that they are a group of strong children. Their strength was rooted in their family resilience



which is post-disaster parenting capable of creating a safe and comfortable environment for the children. Schools also played a big role by providing post-disaster education. For further research, the researcher recommends two themes: (1) the role of strength-based parenting for adolescent recovery after experiencing a disaster; (2) school-based disaster preparedness education to identify the appropriate format for disaster education specifically for youth in Indonesia.

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64

Conflict of Interest

We have no conflicts of interest to disclose.

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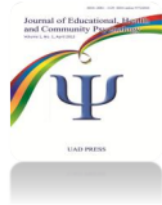
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PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

PAGE 14

PAGE 15

PAGE 16

PAGE 17

PAGE 18

PAGE 19