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ORIGINAL ARTICLE

Prediction and Explanation on Adolescent Aggression: A Study Protocol

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ABSTRACT

Introduction: Adolescent aggression is an important public health concern with escalating prevalence of juvenile cases and violence among these age groups including robbery, homicide, and gang fights. The objectives of this study protocol are to determine the biopsychosocial predictors and explore the contextual factors of adolescent aggression among secondary school students in Hulu Langat. **Methods:** Explanatory mixed method study design will be used, consist of quantitative cross-sectional study followed by basic qualitative study. Proportionate population sampling among Form 4 secondary school students from selected public secondary schools in Hulu Langat will be executed. Questionnaires will be distributed to 481 students on aggression as the dependent variable, and several independent variables: demographic (ethnicity, family income), biological (sex, head injury, nutritional deficiency, breakfast skipping), psychological (attitude and normative beliefs, personality trait, emotional intelligence), and social factors (family environment, single parent status, domestic violence, peer deviant affiliation, alcohol, smoking, substance abuse). Subsequently, participants with moderate to high aggression scores will be further explored on the contextual factors of adolescent aggression by in-depth interview. Multiple linear regression will be executed using SPSS to determine significant predictors whereas thematic analysis will be applied for qualitative data analysis on the context of adolescent aggression. Both findings will be further integrated and discussed to give comprehensive description on the phenomena. **Conclusion:** Better knowledge and understanding on adolescent aggression may generate new framework to drive more effective preventive strategies and unravel adolescent aggressive related Public Health problems.

Keywords: Adolescent, Aggression, Mixed methods

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INTRODUCTION

Defining aggression is difficult as it involves the perception of intent (1). It refers to any behaviour or action that is intended to hurt, harm, injure or cause pain towards another person (2) who does not want to be harmed (3). Apart from this, aggression can also be described as an inward aggression against oneself and usually associated with guilt and depression (4). Based on DSM-V criteria, aggression towards people and animals is an indicator of Conduct Disorder, which results in clinically significant impairments in social, academic or occupational functions of a person (5). It is a broad construct that includes violence which is aimed at inflicting extreme physical harm such as injury or death (1). It can be manifested physically through delinquency and homicide or through non-physical actions such as gossiping and spreading rumours.

Overt aggression has been commonly observed among children and adolescents, and it can be manifested physically and verbally through obvious and outward confrontational acts such as kicking and screaming (6). Many studies have investigated on the phenomenon of overt aggression among adolescent secondary school students (8, 9, 10), and they found that overt aggression is a crucial factor in the prevention of school violence (8) as it may indicate low self-control. However, the discreet aspect of covert aggression also needs to be highlighted as it may result in socio-psychological maladjustments such as anxiety and depression, similar to the characteristics found in overt aggression (9).

Increased aggressive and risky behaviours among adolescents are major public health concerns in the world as the negative consequences pose critical consequences not only towards an individual, but also the public (45, 46). They are the main causes of injuries, violence and premature deaths which can lead to health issues in later life that can potentially reduce life expectancy. Unlike younger children, unintentional injuries that can be influenced by adolescent aggression are the leading

cause of death and disability among adolescents (11). This will hinder the ability of adolescents to grow and develop to their optimal potential as their general health is jeopardised.

According to the Global School Health Survey 2012 (11), in Malaysia, the prevalence of physical fight among secondary students was 25.9%, with the highest percentage of those seriously injured were among those aged 16-17 years old (32.6%). The record is higher compared to a similar survey conducted among secondary school students in neighbouring countries such as Indonesia (21.3%; 95%CI: 19.2-23.6) and Brunei Darussalam (24.4%; 95%CI: 21.5-27.5). Though the recent National Health Morbidity Survey (12) in 2017 reported a 2.5% decrement of physical fight cases involving 27,947 school-going students in Malaysia compared to in 2012, the prevalence of non-physical aggression of verbal abuse at home was still high, and the highest record was among Form 4 adolescents (45.1%; 95% CI: 42.84- 47.29).

Each year, the number of adolescents involved in juvenile crime cases in the country continues to escalate, and the state of Selangor has the highest number of social problems such as robbery, truancy, free sex and drug abuse involving youngsters (43). In the Hulu Langat district, many cases have been reported on aggressive-related social problems such as smoking (15) and violent crime (16), and these may have contributed to the high prevalence of depression (68.1%) among secondary school students in the district (17). Many problematic outcomes such as delinquency, criminal offences, risk-taking behaviours and related psychosocial problems are actually the subset of aggressive behaviour (19). Therefore, investigating factors that influence adolescent aggression may reveal the actual causes of associated social problems.

Biological, psychological and social aspects of adolescent aggression such as male (2), aggression-endorsing normative beliefs (7) and domestic violence (46) have been studied by many researchers, particularly in developed countries. Local findings on adolescent aggression, on the other hand, focus on individual and environmental factors such as emotional intelligence (20), family environment (14, 21) and teacher and peer-attachment (22) independently. However, their interrelationship with the biological aspects of adolescent aggression such as nutritional deficiency and hunger (23) has not been investigated. Differences in socio-cultural backgrounds such as ethnicity may also influence manifestation of aggression in various ways (10,48). Hence, factors contributing to adolescence aggressive behaviours in other parts of the world may or may not be the same as in the local context.

Apart from individual and environmental factors, situational and contextual factors such as provocation and specific incentives are also vital for the existence of aggressive behaviour (19). They are modifiable circumstances surrounding aggressive event (47) which encompass situational and unique characteristics that often vary across cultures and ethnicity (48). This requires more in-depth investigations through qualitative studies that would allow the examination of attitudes and behaviours of adolescents and provide important insights in understanding their aggressive behaviour engagement (25).

A theoretical and model-driven study may provide more concrete and meaningful evidence as it can help to predict, explain and provide understanding of health behaviours which are the basis for effective interventions development to improve public health issues (24). Biopsychosocial model has been established to explain and describe the multifactorial causes of aggression, particularly among adolescents (19). It was developed by a physician named George Engel in 1977 in his effort to treat patients in a more holistic manner by considering the interconnections among the biological, psychological and sociocultural aspects (49). Its inclusive and integrative framework, which is based on a general system theory, has allowed for a better understanding of the scientific complex phenomena including human health and development. This set of theories has been incorporated into modern complexity theory approaches nowadays. Therefore, the identification of significant adolescent aggression predictors according to the Biopsychosocial model as shown in the conceptual framework of this study (Figure 1) may help in determining potential qualities or criteria that can be incorporated into the existing prevention policies and practices.

The main implication of various aggressive-related misconducts and crimes to public health is that the cost of handling this issue would be too expensive and

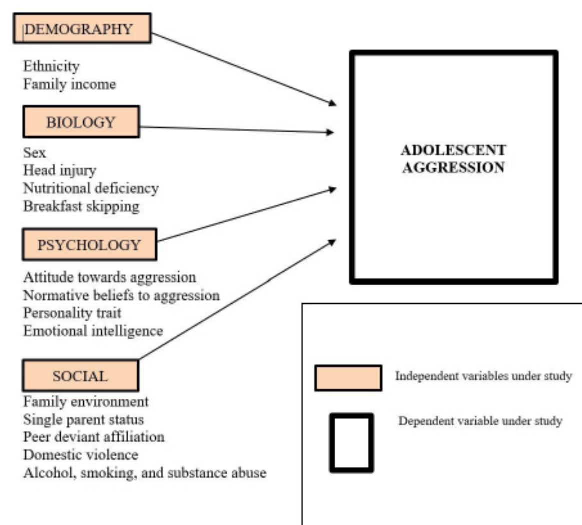

Figure 1: Conceptual Framework on Biopsychosocial Predictors of Adolescent Aggression

could delay the growth of the society and the country as a whole. This warrants for an improved understanding of the existing preventive efforts against adolescent aggression. Therefore, the objectives of this study are to determine the biological (particularly gender, head injury, breakfast skipping and nutritional deficiency), psychological (attitude and normative beliefs to aggression, personality trait and emotional intelligence) and social (family environment, single-parent status, peer deviant affiliation, domestic violence, alcohol, smoking and substance abuse) factors of adolescent aggression. In addition, the study aims to explore the contextual factors of adolescent aggression among Form 4 students in Hulu Langat.

MATERIALS AND METHODS

Study Design

Due to multifactors and complex pathways towards the development of aggression, a pragmatic worldview of research is required to answer the rising questions through the application of multiple data collection methods (26). Therefore, this study employs the mixed-method research methodology with an explanatory study design. This methodology has been incorporated in all research processes as shown by the methodological framework in Figure 2.

In the quantitative part of this study, self-administered questionnaires are used to measure the biopsychosocial predictors of adolescent aggression. Subsequently, participants with moderate to high aggression score of the survey are being interviewed to further explore their contextual aggressive behaviours with the intention to understand their experiences better. Both the quantitative survey and qualitative interviews which produce different types of data have been combined and integrated in the Results and Discussion section to address the research questions. The participant selection model variant of explanatory mixed method design was chosen in the second phase of qualitative study as it is related to the findings of the quantitative study (26).

Setting

The study will be conducted in four of the 36 public secondary schools in Hulu Langat. Public secondary schools have the highest number of available schools provided for Malaysian adolescents as part of the public education system. The students are from multi-ethnicity backgrounds with the Malay language as the principal language. This provides a good source of information for the study since it is the aim of the study to investigate ethnicity differences and adolescent aggression using the questionnaires which are developed in the Malay language.

Sampling Population

The sampling population that will be selected are Form 4 secondary school students attending public secondary schools in Hulu Langat and fulfilling the inclusion and exclusion criteria. This age group of students is selected based on the highest number of crime involvement reported by the Royal Malaysian Police (16), and also because they are more stable and have developed socio-

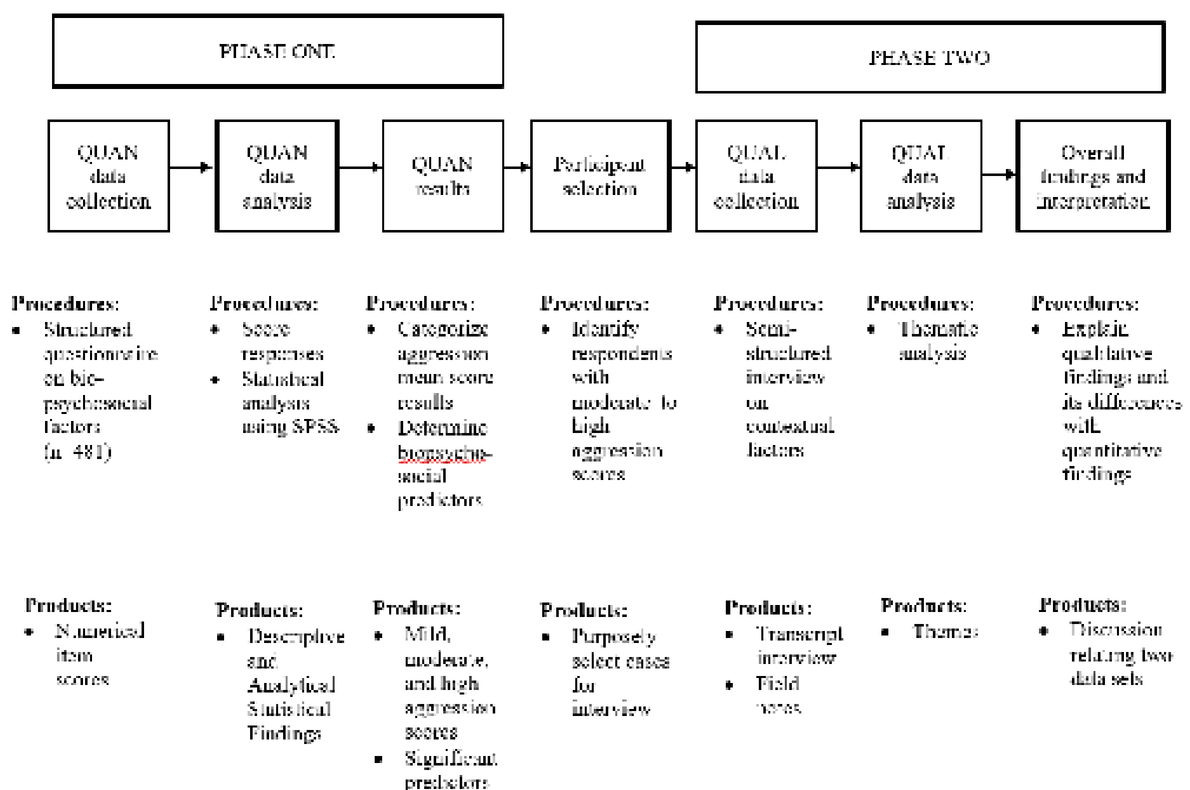

Figure 2: Methodology Framework of Mixed Methods Study on Adolescent Aggression

cognitive processes (27). As they approach adulthood, their troublesome behaviours can also continue into adulthood. They tend to be associated with antisocial behaviour and psychopathic qualities such as uncontrolled behaviour and impulsiveness (36). In the qualitative part of the study, respondents who take part in the quantitative survey and score between moderate and high aggression rating; those who are able to cooperate in the interview sessions; and those who are able to provide required information voluntarily, will be selected. The aggression scores will be categorised statistically using visual binning with cut points created from equal percentiles based on scanned cases. The same individuals will be chosen for both the quantitative and qualitative studies so that the data produced are ready for comparison and also to avoid confusion caused should different individuals are selected (26).

Inclusion and exclusion criteria
Form four students attending public secondary schools will be participants of this study; however, those who are unable to read and/or write, or are in a special education programme due to intellectual impairment or learning disabilities will be excluded. With the exclusion of these groups of students, they will also lose the eligibility to be involved in the interviews. Semi-boarding, full-boarding, vernacular, religious or vocational school students will also be excluded as they follow a different school system compared to the one used in daily public schools.

Sample Size
The sample size calculation uses the formula for multiple linear regression (28). Using 17 independent variables, the highest level of explained variability (adjusted R2) of .33 (20) and an additional 2 percent of explained variance to the model if entered last, the calculated estimated sample size is 152 respondents. After additional adjustments of 30% of non-response rate, 10% of non-eligible rate, 32.8% of attrition rate (29) and 1.5 of design effect (31), the revised number of sample size is 481 respondents. The qualitative data collection process will be continued until it reaches the saturation point, and no new considerable information is acquired (26).

Sampling Method
In the quantitative phase of the study, probability proportional to size (PPS) will be applied in the sampling method for the total of 481 respondents from approximately 12,012 secondary school students in 36 public secondary schools in Hulu Langat. A total of four schools will be sampled based on the sample size divided by the size of the smallest cluster, which is 111. The four schools will be identified from the list of schools based on the sampling interval technique which is calculated by dividing the total number of study population by the number of clusters to be sampled. The starting clustered sample will be determined by a random generator while the subsequent clustered sample will depend on the series of number with an equal number of individuals from each selected school.

As for the qualitative phase of the study, purposive sampling using the unique sampling method will be applied. This will be based on the informants' unique and atypical attributes of aggression (32) using the criterion of inclusion among Form Four students who have scored between moderate and high aggression scores in the quantitative study, and that they are attending the selected public secondary schools in Hulu Langat. In addition, the snowball sampling method will also be conducted to identify aggressive cases by interviewing participants to identify other students with similar characteristics. These purposive sampling strategy methods are chosen as this study emphasises on the depth and similarity of research findings and examination of commonalities or similarities of factors that contribute to adolescent aggression.

Data collection
Data collection process will be conducted in two phases: the quantitative phase and the qualitative phase of the study. Self-administered questionnaires in the quantitative phase of the study will be distributed and collected by the researcher without involving the school teachers or staff. The selected and consented respondents will answer the questionnaires in their respective schools after a written consent is received from their parents.

Subsequently, in-depth interview sessions will be conducted with selected respondents in the qualitative phase of the study. The interview adopts a semi-structured design in which the questions were derived from an interview protocol prepared earlier. A tape recorder will be used to record the interview sessions with the respondents. To ensure privacy and confidentiality of the respondents, the interview sessions will be carried out in a secluded room without the presence of anyone from the school, and the findings gathered from each respondent will not be revealed to the teachers and school administrators. Field notes which include the descriptions or details of the interview sessions will be recorded as part of the information recording process during and/or after the interview sessions. The field notes contain the initial brief notes and the daily and descriptive summaries of the researcher during the data collection process (26). They serve as an important documentation for qualitative data analysis and interpretation as they record the contextual details and non-verbal expressions of both the informants and researcher.

Study instruments
The questionnaire used in this study is developed by adopting the information and the standard questionnaire

designs used by previous studies, with the consent from the original authors. As for quality control, the content and face validity of the questionnaire will be checked prior to the pre-test involving the same population. In order to ensure reliability and internal consistency, the study will try to achieve a Cronbach's alpha value of .7 or more before distributing the questionnaire (38). The test-retest reliability of individual items in the questionnaire will also be assessed using the Cohen's Kappa test. Intraclass Correlation (ICC) test will be performed for ordinal questions two weeks after the pre-test. Instructions on how to complete the questionnaire, which is prepared in the Malay language, will be given orally by the researcher. The sections in the questionnaire are divided according to the different variables measured in the study, namely:

I. Aggression

Self-reported questionnaire on aggression was adapted from the Aggression scale (8), and it consists of 13 items measuring the most common overt aggression behaviours including physical aggression (kicking, hitting, pushing), verbal aggression (encouraging other students to fight, teasing, name-calling, threatening to hit) and anger (being angry most of the day). The initial scale prepared consisted of 11 items before two more items were added after the content validity process was conducted with experts. Two items that address double aggressive actions (e.g.: *I slapped or kicked someone*, and *I threatened to hurt or to hit someone*) were separated to ensure better clarity to the respondents. Respondents will be asked to rate the frequency of their own behaviour using a seven-point scale ranging from 1 (*0 time*) to 7 (*6 or more times*) within the past seven days. This is to minimise recall bias. The final total mean scores will be calculated for each respondent. The aggression mean scores ranging from 13 to 91 scores reflect the degree of aggressive behaviour of the respondents in which a higher score indicates a higher aggression level. The scale is highly reliable as it has been used with middle school students in Texas (8), and showed high internal consistency (Cronbach's alpha: 0.87).

II. Demographic factors

Ethnicity will be divided into four main groups, namely the Malay, Chinese, Indian and others. Family income reflects the estimated household total monthly income.

III. Biological factors

Gender is specified as either 'male' or 'female'. The criterion of head injury will be obtained from a previous or recent serious head injury that has caused unconsciousness or required medical attention (33). Nutritional deficiency will be assessed based on food insufficiency (hunger), junk food intake and low produce intake (23). To gain data on food insufficiency, respondents will be asked on how often they experienced hunger due to inadequate food at home which ranges from never (*0*) to very often (*3*). Junk foods consumption will be assessed by the weekly frequency of soda/sugary drink, fast food and sweets intake. The response ranges from never (*0*) to everyday or more than once per day (*7*). To create a composite measure of low produce consumption, questions on weekly frequency of fruits and vegetables consumption will be asked with similar response options prepared for junk foods i.e. (*0 to 7*). As for the skipping breakfast criterion, respondents will be asked on how often they eat breakfast in the last five school days (34), based on four choices of answers: *none, 1-2 days, 3-4 days* and *all 5 days*. The options were later on dichotomised into regular breakfast consumers (*all 5 days*) and irregular breakfast consumers (*less than 5 days*).

IV. Psychological factors

To assess the attitude towards aggression, questions will be derived from six items of self-report items developed by Bosworth and Espelage in 1995 (35). The instrument measures the acceptability and attitudes towards aggressive behaviours especially in regard to fighting with four choices of responses: *(1) strongly agree, (2) agree, (3) disagree, and (4) strongly disagree*. The higher the total scores (maximum of 20) indicates that the respondents show positive attitude towards aggression which means that they are highly likely to be involved in actual aggressive acts.

Normative beliefs about aggression items in the questionnaire will be based on the 12 possible appropriate reactions toward a situation. The situation depicts a confrontation with a peer who has provoked the opponent (13) using a four-point scale from 0 (*not at all okay*) to 3 (*totally okay*). The total scores range from 12 – 60, with higher scores indicating higher acceptance of physical and related- aggressive responses.

Personality trait items in the questionnaire will be based on the 18 items of the Youth Psychopathic Inventory Short Form (37) which includes the core characteristics of the psychopathic personality i.e. callous-unemotional, grandiose-manipulative and impulsive-irresponsible dimensions. The items are rated using a four-point Likert scale response with 1 indicating (*doesn't apply at all*) and 4 (*applies very well*). The total scores range from 14 – 56, with higher scores indicating higher psychopathic personality traits.

As for the emotional intelligence trait, 29 items of the Schutte Self-Report Emotional Intelligence Test (SSEIT) will be used (18). It supports the four dimensions of emotional intelligence: optimism, social skills, emotional regulation and utilisation of emotions using a five-point Likert-scale ranging from strongly disagree (*1*) to strongly agree (*5*). The total scores range from 28 to 140, with higher scores indicate higher characteristics of emotional intelligence.

All the above-mentioned scales have been tested to

secondary school students in different parts of the world and proven to be a good reliability test (Cronach's alpha value >.7).

V. Social factors

The items on family environment will be based on two dimensions i.e. family relationship and family personal growth dimensions. These dimensions are adopted from the 18 items of Brief Family Relationship Scale developed by Fok, Allen, Henry and Team in 2015 (30). It measures one's perception of the family relationship functioning quality using these three options: (1) *not at all*, (2) *somewhat* and (3) *a lot*. It assesses how family members feel about their sense of belonging in their family; the extent to which open expression is acceptable among family members; and lastly, the degree to which conflictual interactions have occurred in their family. High scores in this scale signify high family cohesion and expressiveness but less conflict (related items are in reversed scoring). The scale has been tested among adolescents in schools in Klang Valley, Malaysia, and is considered as reliable with Cronbach's Alpha range of .63 -.70 (39).

As for the single-parent status, the analysis is made based on the number of parents (single or both) specified in the questionnaire.

Peer deviant affiliation questions will be based on the 13 items of the National Youth Survey (40). The questions include 13 items regarding deviant activities such as destroying property, cheating and stealing from respondents' close friends in the past six months. The responses are scored on a five-point Likert scale, ranging from (*1*) *none of them* to (*5*) *all of them*. The questions have shown a good reliability score (Cronbach alpha .78) in a study of aggression among Iranian secondary school students (20).

The questions on domestic violence in this study (12 items) will be adapted from the Violence and Other Victimisation questions of Children's Exposure to Domestic Violence (CEDV) scale (41). Each question will be designed using four-point Likert scale choices of '*Never*', '*Sometimes*', '*Often*' and '*Almost Always*'. Getting a high total score for each category indicates more violence involvement, risks or other victimisations among respondents while scoring a low total score indicates less engagement in each category.

As for smoking and alcohol consumptions, history of substance usage for the past 30 days was asked to identify active smokers and drinkers (12). For drug consumption, any number of usage (even once) of these drug substances such as marijuana, ecstasy pill and heroin, or glue sniffing or intravenous drug will still be considered as being involved with substance abuse (42).

As for the qualitative study research design, the researcher herself is the study instrument (50) who will undergo several trainings from basic to intensive courses related to qualitative data collection method. The interview will be considered as a semi-structured design in the Interview Protocol based on previous literatures on contextual factors of adolescent aggression (19, 25). It will include the introduction and general rule statements, ice-breaking and warming-up conversations followed by questions on the main points and other probing questions. The interview questions will also undergo a pilot-test by interviewing one of the participants who will be selected from the sampling population.

Data Analysis

For quantitative findings, data will be collected and analysed using IBM SPSS version 24 which involves descriptive and inferential statistics. As part of the quality control, the psychometric properties of the questionnaire will be assessed by performing reliability check and Exploratory Factor Analysis check upon the completion of the pre-test. The descriptive analysis for continuous variables includes percentage, mean, median and mode. Data transformation will be applied if the data are not normally distributed. Statistical analysis on the quantitative data will involve the application of Pearson's Correlation and Simple Linear Regression for bivariate analysis. From the simple linear regression, independent variables with a p value of less than 0.25 will be chosen to be included in multivariate analysis of Multiple Regression to determine the predictors of adolescent aggression. The level of significance □ will be set at 0.05 with 95% Confidence Interval not including one.

With regard to qualitative findings, recorded interviews with the respondents will be transcribed verbatim. The steps in the qualitative analysis will begin with reading through all the answers for all the interviews. Then the data will be coded by segregating and labelling the text into subcategories. The codes will be verified through an inter-coded agreement check and will be used to develop themes by aggregating similar codes together. These themes will be connected and interrelated. The case study narrative which comprises descriptions and themes will be constructed. Then a group-case thematic analysis will be conducted using ENVIVO software application. The thematic analysis will follow six phases as described by Braun and Clarke (2006) which are data familiarising, generating initial codes, searching for themes, reviewing themes, defining and naming themes and finally, producing the report.

Ethical consideration and approval

Simultaneous application for ethics approval involves three levels of permissions which are campus-based institutional review boards, Ethics Committee for Research Involving Human Subject of Universiti Putra Malaysia (JKEUPM Ref No: JKEUPM-2018-228), individuals who are in charge of the research site

(Ministry of Education, Selangor State Department of Education (JPNS), District Department of Education and respective school principals), and people who provide the data (permission from parents/guardians of student respondents) since they are below 18 years old. As the researcher is also a staff of the Ministry of Health, National Medical Research register number has been obtained (Research ID: 40262) with the exemption from the Medical Review & Ethics Committee (MREC) review and approval.

Some of the sensitive questions on domestic violence in the quantitative survey may result in emotional distress as respondents recall the traumatic memories, particularly respondents who they themselves or their parents have been or are still involved in domestic violence. This matter will be highlighted in the information sheet before getting the consent from the guardians or parents, allowing respondents to withdraw from the survey at any time for any reasons, and keeping anonymity of information.

However, the researcher is also bound to the Malaysian Domestic Violence Act 1994 (Act 521) and needs to report any domestic violence act elicited from the survey to respective authority to protect the life and dignity of human subjects. Therefore, once domestic violence exposure is being elicited from the survey ('sometimes', 'often' and 'almost always' to any types of domestic violence questions), the respondent and his/her guardian will be asked for their written consent to be referred to the school counsellor or social worker of respective district directly via a sealed envelope. For those who refuse to be referred to a counsellor, helpline contact information will be given in the pamphlets on domestic violence management options.

Currently, data collection and some parts of data analysis have commenced. However, the final results of the study are expected to be completed and published in the following year.

DISCUSSION

In Malaysia, understanding and empirical studies on the factors that contribute to adolescent aggressive behaviours particularly with regard to biological, psychological and social contexts as a whole are still lacking. Many local evidences only focus on quantitative findings (14, 22, 43) even though such findings may only represent the tip of the iceberg. Further exploration through in-depth interviews has been recommended (43) to better understand factors that contribute to adolescent aggressive behaviours. As such, a mixed method research design such as the quantitative or qualitative research design is more relevant than a single approach as the strengths of both research designs are able to provide the best perspective in understanding the phenomenon (26).

Findings on the contributing factors of adolescent aggression from this study will be instrumental to local stakeholders especially the family, healthcare providers, policy makers, school counsellors and educators. Primarily, the young generation can be educated on proper social interactions, impulse control and coping mechanisms to handle their frustration and anger. Secondarily, specific interventions can be directed to aggressive adolescents based on the significant predictors that could minimise or neutralise their risk factors. As for rehabilitation programme in tertiary prevention programmes, the affected adolescents can be encouraged to enhance their protective factors to help avoid aggression and/or minimise the frequency of aggression.

Nevertheless, the cross-sectional nature of the study limits its temporal causality of the investigated predictors towards adolescent aggression. The findings of the study cannot be generalised to other districts in Selangor and other states in Malaysia due to the time constraint of this study. It will also not be possible to investigate all the bio-psychosocial factors of adolescent aggression in this study, particularly on early life factors such as birth complications and nutritional deficiency, which are not possible to obtain from existing adolescents.

Aggression consequences can be a reproducible legacy as the new generation learns violence from the past, and victims learn from their perpetrators. This cycle of aggression needs to be terminated by understanding the concept of aggression to help develop a better intervention model which should reflect effective and practical prevention approaches.

CONCLUSION

Biological, psychological, social and contextual factors of adolescent aggression need to be determined and explored for a better understanding of the complex phenomenon. The findings of this study are important as they can be used to solve related public health problems which can have immediate practical implications that do not withhold the developmental progress of our next generation.

ACKNOWLEDGEMENTS

We would like to thank the Director General of Health Malaysia for his permission to publish this article. Special thanks to Professor Dr. Zamberi Sekawi, the Dean of Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, for allowing us to publish this paper. We also would like to thank the Director General of Health Malaysia for his permission to publish this article and all the related authorities for the study approval (KPM.600-3/2/3-eras(2664)). Putra Research Grant (*Geran Inisiatif Putra Siswazah*; GP-IPS) being

used in this study execution for expenses assistance to the researcher.

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