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Psychometric Properties of Online Adolescent Anger Instrument

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Abstract: Anger is a topic that requires intervention from teachers, counsellors, psychologists, parents, and all communities. The expressions of anger are subjective and sometimes hard to identify. Thus, anger should be measured more objectively, while the expressions need to be examined closely. The purpose of this study is to provide valid confirmation for development of an online instrument to measure the types of anger expression among adolescents. Data were collected from 935 adolescents from nine schools in northern Malaysia and the theoretical literature search. The data were analysed to provide evidence of construct validity in terms of item factor analysis, reliability estimates, and correlation between the types of anger expressions. Findings were used to develop an online Adolescent Anger Instrument. It measures five types of anger expressions, namely, physical, verbal, intrinsic, extrinsic, and passive. The results showed that the instrument is internally consistent with high evidence of construct validity. Exploratory factor analysis, with varimax rotation, suggested the existence of five distinct types of anger as conceptualised. Meanwhile, the correlation between types of anger expressions indicates the strength of the relationship between them. Discussions on the findings are provided, while suggestions for future research are also described.

Keywords: *Adolescent, anger expressions, exploratory factor analysis, online instrument.*

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Introduction

Anger among adolescents is considered an important topic, especially among teachers as well as other stakeholders. Violence and other aggressive behaviour not only have a direct effect on students, but they also influence teaching in the classroom by creating an unhealthy environment. Anger is always related to emotion. Anger is a major emotion experienced by everyone because of a certain dissatisfaction that does not meet their expectations. According to Carrión (2012), anger is an emotional state that can range in intensity of mild irritation to great fury and rage. Anger frequently appears when the path to accomplishing goals or satisfying wants is obstructed (Dortaj et al., 2010). When we feel threatened, violated, or unfairly treated, our emotional response is to become enraged. Anger is widely believed to be a form of the fight-or-flight response that evolved to keep us safe from harm.

Anger is not solely a negative emotion; intense anger that spirals out of control may cause severe problems and affect individuals' quality of life. The negative influence tends to trigger thoughts, memories, expressive-motor reactions and rudimentary furious sensations linked with rage and aggressiveness. Subsequent thought can consequently intensify, suppress, enrich, or differentiate the initial reactions through attributions, assessments, and schematic conceptions. It is crucial to note that anger is a natural and developmental phenomenon from infancy to adulthood. In addition, various researchers have shown that anger can lead to unwanted behaviours such as a disturbance to physical, emotional, and interpersonal traits (Dunbar, 2004), or even health problems such as coronary heart disease (Davidson & Mostofsky, 2010) or unhealthy lifestyle (Musante & Treiber, 2000). Numerous researchers have examined the "anger superiority effect" or "face in the crowd effect" over the last three decades and hypothesised based on the assertion that angry faces elicit greater early attentional capture than happy facial expressions do in the context of other faces (Fox et al., 2002). These effects follow from the premise that the capacity to locate, recognise, and respond to potential threats in the environment rapidly and without conscious awareness confers adaptive advantages (Horstmann & Bauland, 2006). According to Abigail et al. (2021), the primary goal of negotiators who frequently use anger as a strategic manoeuvre is to sway the outcome of the negotiation in their favour, leaving their counterparts with almost nothing. This is a classic case of unethical bargaining, which is frequently associated with a high price tag. These costs include the facilitation of a

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new dispute between the negotiators, which has a detrimental effect on both the outcome of the negotiation and the ongoing relationships of the disputants.

Even though anger is considered as a normal expression of feeling just like happiness or love, excessive anger can cause damage to self-functionality. Ahmad et al. (2012) expressed that anger has more negative rather than positive effects on students. Therefore, anger should be controlled and addressed seriously. In Malaysia, according to the previous Education Minister Datuk Seri Mahdzir Khalid, there are statistics of school violence and malfunction behaviour from the recent year 2017. According to his statements, from nearly five million primary and secondary students across the country, 134,108 students were involved in school violence. Around 1.40 percent was from truancy behaviours, which consisted of 67,053 students. The second school violence behaviour recognised is impolite behaviour, which was 0.29 percent (14,509 students) of the statistics stated above. Meanwhile, about 0.28 percent had time management problems, consisting of 13,415 students. Other malfunction behaviours that were also stated are personal hygiene (0.23 per cent or 10,946 students), smoking (0.18 per cent or 8,514 students), a crime (0.14 per cent or 6,917 students), mischievousness (0.12 per cent or 5,825 students), bully (0.06 per cent or 2,795 students), obscene (0.05 per cent or 2,266 students) and destructive behaviour (0.04 per cent or 1,868 students). Therefore, parents, teachers, and the police must cooperate to prevent and reduce school violence and malfunctioning behaviour among primary and secondary students (Hasnan, 2018). All these problems seldom start with anger emotion among students.

There are three methods to exhibit anger: anger-in, anger-out, and anger-control. Anger-in is defined as holding anger or not expressing it, whereas anger-out is exhibited either physically by beating and injuring items or orally by swearing, affronting, or criticising. Anger-control refers to a general inclination to behave in a patient, calm, tolerant, and understanding manner, with the primary goal of restraining anger and calming down (Spielberger, 1991). The instrument of anger can be used to identify anger in objective ways. There are some well-known anger instruments such as Adolescent Anger Rating Scale by Burney (2001), State-Trait Anger Expression Inventory-2nd Edition (STAXI-2) (Spielberger, 2000), and State-Trait Anger Expression Inventory-2 Child and Adolescents (Brunner & Spielberger, 2009).

Clearly, there is a need for more studies to identify anger in objective ways. This is because studies related to anger measurement among students are scarce in Malaysia. To date, a search in the literature has not revealed any psychometrically sound instrument in measuring anger specifically for Malaysian students. Moreover, there are still no manual and online anger instrument that take into consideration the cultural factors and values of the people in Malaysia. Hence, relevant studies are pertinent as adolescents are the assets of the nation's natural wealth that will play a crucial part in shaping the future of the country's politics, economics, and culture (Zainudin & Norazmah, 2011).

According to related studies, students are exposed to a range of aggressive behaviours in the classroom. According to Hicks (2018), aggression is associated with a variety of significant difficulties in people of all ages, especially in young children, adolescents, and developing adults. Counsellors in schools, who provide appropriate psychological counselling services particularly during the pre-adolescent period, will aid in the positive development and growth of adolescents during this time (Ladd et al., 2014). Moreover, according to Kabasakal and Bas (2010), nearly 40% of pre-adolescent students are engaged in at least one act of physical violence during their eighth-grade years. School-related violence is becoming more prevalent (Bacioğlu & Özdemir, 2012). This has made it even more critical for young people to develop self-awareness and insight into their lives, as well as to learn how to manage destructive emotions in some ways so as to ensure their future happiness (Kara & Deniz, 2021). Therefore, this study is dedicated to developing an anger instrument that is unique to the Malaysian culture and setting specifically among the adolescents. The purpose of this study is to provide validated evidence for the online instrument to measure the types of anger expression among adolescents.

Literature Review

Anger

Anger is one of the most fundamental emotions that human beings experience. Anger can range from a passing annoyance to a full-fledged outrage, depending on the circumstances. According to some researchers (Hogan, 2011), anger is a natural occurrence and that, like other feelings and emotions, it can be used as a barometer of mental health, hygiene, and human effect. Anger may be considered desirable because it allows a person to express emotions in a constructive manner.

Anger, rather than being a negative feeling related to violence or hostility, is a normal emotion as well as a transcendental and universal feeling, contrary to popular belief. Anger can be used as a form of character armour. The ability to express one's anger in a positive manner is considered a healthy function; on the other hand, if one's anger presentation is outrageous, it can be detrimental to the individual as well as to her or his social environment (Kemp & Strongman, 1995; Özyeşil, 2012). Even though many philosophers and authors have expressed concern about the dangers of spontaneous and uncontrolled anger, there is no conclusive agreement among them on the intrinsic value of anger. Sometimes, the expression of anger can be used as a social influence manipulation strategy to manipulate others. Most of the time, anger is a response to harmful and/or unexpected interpersonal relationships. Frustration and anger can be triggered in interpersonal relationships if there is any conflict or dissatisfaction between the parties. Anger, on the other hand, can contribute to dissatisfaction by increasing annoyance, and this void cycle can consequently exacerbate social tensions. It

is possible that even if anger is not expressed, it can increase an individual's hostility, impairing his or her actions and functions in interpersonal and social situations, as well as his or her adaptation, goal attainment, family life, and job opportunities (Beshkar, 2009; Kemp & Strongman, 1995).

Meanwhile, Fischer and Evers (2011), Kopper and Epperson (1996), and Sharkin (1993) classified hostility, anger, and aggression as distinct, though related, emotions and behaviours. Anger, as an emotional state with varying degrees of intensity and expression, is not limited to outward hostility or aggression; it can manifest internally as well. However, quantifying and comprehending an individual's internal experience of anger can be challenging. This requires "perception and a willingness to label affective experience that varies between individuals and groups" (Van Voorhees et al., 2018). Measuring observable behaviour is more straightforward than relying on individuals to quantify their internal experiences. Context is critical in expressing emotions, as "emotions never occur in a vacuum" (Ma-Kellams & Wu, 2020).

The purpose of anger, like the definition of anger, is a source of debate. As a mobilizer in response to threats, anger has been mentioned by Charak et al. (2016) and Goldner et al. (2019), who both refer to the fight or flight response, as an example of this adaptive function. Several researchers, including Fischer and Evers (2011), defined anger as a response to the presence of an impediment to achieving one's objectives. Van Voorhees et al. (2018) identified anger as a symptom of post-traumatic stress disorder (PTSD) when triggered by reminders of the trauma. Anger, which is also known as a retaliatory emotion, is a strong emotion that occurs in response to the feelings of shame, guilt, or fear. As stated by Goldner et al. (2019), seeking retribution is a natural response to the feelings of anger and injustice. According to Hall (2008), anger serves as a protective mechanism, as "rage protects against overwhelming loss". All these different definitions and manifestations of anger may have an impact on how individuals perceive it as a complex emotional experience with many different layers of meaning.

People who engage in support seeking behaviours do so to increase their own ability to act and decrease their own sense of helplessness when confronted with provoking stimuli. In order to garner support for one's angry behaviour, one may form a group or hide behind the authority of a larger group of people. Anger can be diffused by combining it with other emotions, as well as with mental and behavioural processes. However, in the context of anger, it may appear that these unifications of emotion, cognition, and behaviour are all intertwined. Keeping one's distance from someone who feels helpless in the face of provoking stimuli is called avoidance. Over time, people who ruminate on a particular subject engage in a type of repetitive thinking. Replaying the stimuli repeatedly causes the person to feel unpleasant sensations, but he or she will not try to deal with the stimuli. This is known as rumination.

Assessment and Measurement of Anger

Since anger plays a significant role in both the personal and social lives of people, assessment and measurement of anger have received a lot of attention in recent years, particularly in psychological and social approaches because irregular anger expression can have a major negative impact on social capital and adhesion. As a result, different anger-assessment measures which are largely based on self-report have been developed. Individuals administer self-report questionnaires, and they respond with respect to their subjective states. The results are then interpreted as a measure of the frequency, intensity, and type of anger expressed by respondents (Lu et al., 2013). A few measures for assessing anger have been created based on objective evaluation and the opinions of attendants and observers (Craig et al., 2008).

Unfortunately, there are limited studies on anger assessment instruments. In Persian, there are only two exclusive standard anger assessment instruments, namely STAXI-II (Asghari Moghaddam et al., 2008; Craig et al., 2008) and the second version of AQ (Mohammadi, 2007). Furthermore, due to the similarities between anger and constructs such as aggression, hostility, violence, and impulsivity, many authors deemed them to be synonymous and therefore used the same assessment tool to measure anger. This has caused several interferences in the results and inaccurate interpretations as a result of assessing one construct in favour of measuring and interpreting the data for another (Shahsavarani & Noohi, 2014).

The State-Trait Anger Expression Inventory (STAXI) is now one of the most widely used instruments for assessing various aspects of anger (Iacovelli et al., 2013). The first version of

Spielberger released the initial version of STAXI in 1988, based on his anger model with 44-Likert items. In 1996, this Inventory was revised and some subscales and items were added. The number of items increased to 57 in the revised version, which was published as the State-Trait Anger Expression Inventory, version II (STAXI-II) (Amianto et al., 2012).

STAXI-II has 57 items in the form of a 4-degree Likert structure (from Almost Never=1 to Almost Ever=4), as well as six scales, five subscales, and one anger expression index, which reflects respondents' overall level of expression and control of anger. The inventory is appropriate for respondents aged 15 and above, and its interpretation needs expertise in psychology, psychiatry, and/or educational assessments. State anger (anger feeling, intense need for verbal anger expression, intense need for physical anger expression), anger trait (angry temperament, angry reaction), anger externalisation, anger internalisation, anger externalisation control, anger internalisation control, and anger expression index are among the scales and subscales of this inventory. This Inventory has been used to examine anger in the general population, healthy and non-clinical populations, clinical and pathological populations (Spielberger, 1996).

The Adolescent Anger Rating Scale (AARS) is a 41-item, self-report, Likert-type rating scale designed to measure specific expressions of anger: instrumental anger, reactive anger, and anger control (Burney, 2001). It was created to assist researchers and practitioners in identifying specific types of anger in adolescents. The AARS obtains primary and secondary demographic information from adolescents aged 11 through 19 years. Age, grade, gender, and ethnicity are the primary demographics. Secondary demographics include etiological characteristics associated with high-risk behaviours of youth pathology (SED, ODD, and CD) such as academic achievement, family structure, peer relationships, and school suspensions. McKinnie Burney and Kromrey (2001) provided technical details on evidence supporting the reliability and validity of the AARS (Burney, 2001), with reliabilities ranging from .81 to .96.

According to Mat Hussin et al. (2014), aggressive-related behaviours (e.g., bullying, physical fighting) were reported by 28 percent of adolescents in Malaysia, an advanced developing country in Southeast Asia, compared to 13.3 percent of Dutch adolescents. As a result, the Malaysian government has been advised to prioritise prevention. There are questionnaires in the Malaysian national language (Malay) that measure various forms of aggressions (e.g., physical/verbal aggression, fury, and hostility) (Mazlan & Ahmad, 2012).

However, there is currently no questionnaire that measures the motivation behind this aggression of anger. Prevention and intervention efforts can be more focused, efficient, and effective if the motivations for the aggression are understood. The question is whether a questionnaire designed and validated in Western samples may be used in non-Western samples such as Malaysian samples. Ambak et al. (2017) developed an instrument to identify the contributing factors of anger in drivers and to evaluate the Driver Anger Scale (DAS) in Batu Pahat, Johor. The sample size of their study consisted of 250 randomly selected car drivers in Batu Pahat, and the questionnaire was used as the instrument to gain information from respondents. The study found that the major contributing factors of anger in drivers were discourtesy, hostile gestures, slow driving, illegal driving and traffic obstruction. Discourtesy was reported as the most dominant factor contributing to anger in drivers. Besides, descriptive factors such as age, driving experience, driving distance, traffic crash involvement, and receiving traffic tickets also influenced the anger. In terms of demographic characteristics, this study reported that drivers who were young, less experienced, driving more than 10km, experiencing traffic crashes and receiving traffic summons were likely to be angry.

Since anger is one of the elements that is important to measure in various settings, anger expressions and levels of anger must be developed and studied. Moreover, anger should also be measured more objectively and accurately in the Malaysian context. The purpose of this study is to provide valid and reliable evidence for the development of an online instrument to measure the types of anger expression among adolescents.

Methodology

Research Design

This study utilised a mixed-method, qualitative and quantitative approach. It consisted of two phases of the study; the first was an open-ended question that was given to 935 high school students. The second phase involved a library search on theoretical literature on anger.

Sample

All the students were adolescents aged between 14 to 16 years old from nine local public schools in Malaysia's northern states of Penang, Kedah, and Perak. All the schools involved were suggested by the Department of Education in each state. The sample comprised 565 male (60.4%) and 370 female (39.6%) students.

In the first stage we survey 350 students (male = 180, female = 170) to validate the instrument using the exploratory factor analysis approach. After that, we survey another 585 students (male = 385, female = 200) to confirm the items using the conformatory factor analysis (CFA) approach.

Analysis

The instruments on anger-related have also been studied and analysed. The instruments that are used as references in this study are State Trait Anger Expression Inventory-2nd edition (STAXI-2) (Spielberger, 2000), State-Trait Anger Expression Inventory-2 Child and Adolescent (Brunner & Spielberger, 2009) and Adolescent Anger Rating Scale (Burney, 2001).

Data from the open-ended questions and library searches were analysed using thematic analysis. From the themes developed, the finalised 35 items were composed. It is referred to as Adolescent Anger Instrument. The pilot test of this instrument was administered to 270 school students. Based on the findings, the reliability of Cronbach's alpha is 0.78.

The psychometric properties of the Adolescent Anger Instrument are discussed within three aspects, namely, reliability, construct validity, and correlation between the anger types. This validation study employed exploratory factor analysis (EFA) to identify the types of anger that in turn provide evidence of construct validity of the instrument. Suitability of the dataset for EFA procedure was assessed using three criteria, namely, the Kaiser-Meyer-Olkin (KMO) measure of sampling

adequacy, Bartlett's Test of Sphericity and the anti-image correlation matrix. The dataset is considered as suitable for EFA analysis if the value of KMO > .5, significant result ($p < .05$) for Bartlett's Test of Sphericity and anti-image correlation matrix of > .50 between the items. In addition, reliability coefficient was also reported for each factor and for the overall scale. Finally, correlations between the different types of anger were examined to determine the strength of the relationships between them.

Findings/Results

The Psychometric of the Adolescent Anger Instrument

Suitability of the data for factor analysis was assessed using the Kaiser-Meyer-Olkin (KMO), Bartlett's Test of Sphericity and anti-image correlation matrix. The results showed that the KMO measure of sampling adequacy was .807, while Bartlett's Test of Sphericity was significant ($p < .001$). This means that the data are suitable for EFA and there was a patterned relationship. The study opted to constrain the number of factors to five based on the types of anger measured by the Adolescent Anger Instrument. All the five factors explained 47.369% of the anger constructs variance. As demonstrated in Table 1, Factor 1 consists of nine items that range from extrinsic anger which accounted for 16.419% of the variance explained. For Factor 2, all items are from physical aggressive expression, and these items explained 12.027% of the variance. Factor 3 involves items related to verbal anger that explains 8.908% variance, whereas we named Factor 4 as the intrinsic anger (explains 5.32% variance). Meanwhile, Factor 5 includes items related to passive anger and this factor explained 4.695% variance in the measure construct. The range of factor loading in Factor 1 is between .425 to .771, indicating a moderate relationship between the items in defining the extrinsic expression of anger. Consistency of the measurement is considered as acceptable based on coefficient of .795 (Sekaran & Bougie, 2011). Meanwhile, Factor 2 consists of all the items from physical type with moderate loadings (between .411 to .756) and acceptable reliability coefficient ($\alpha = .785$). Meanwhile, Factor 3 (Intrinsic), Factor 4 (Verbal), and Factor 5 (Passive) share the same characteristics – moderate item loadings and acceptable reliability coefficient. The overall reliability for the Adolescent Anger Instrument is .819, indicating that the result is replicable if the instrument is administered to a comparable group of students.

Table 1. Items in Adolescent Anger Instrument - Factor Analysis

Items	Factor 1 Extrinsic	Factor 2 Physical	Factor 3 Intrinsic	Factor 4 Verbal	Factor 5 Passive	α
B1		.564				.785
B2		.756				
B3		.554				
B4		.427				
B5		.477				
B6		.411				
B7		.755				
B8		.626				
B9		.450				
B10				.706		.731
B11				.631		
B12				.643		
B13				.594		
B14				.616		
B15				.547		
B16			.534			.681
B17			.715			
B18			.778			
B19			.719			
B20			.587			
B21			.388			
B22			.554			
B23	.425					.795

Table 1. Continued

Items	Factor 1 Extrinsic	Factor 2 Physical	Factor 3 Intrinsic	Factor 4 Verbal	Factor 5 Passive	α
B24	.546					
B25	.771					
B26	.709					
B27	.724					
B28	.630					
B29	.576					
B30	.531					
B31	.466					
B32					.736	.777
B33					.788	
B34					.650	
B35					.786	
Var*	16.419	12.027	8.908	5.32	4.695	

Var* = % of variance explained

With regards to the correlations between the types of anger expression, data presented in Table 2 report significant but weak to moderate relationship. Moderate correlation was found between both anger-out expressions, namely, aggressive physical and verbal. A weak and negative correlation between aggressive physical and intrinsic expression was also reported.

Table 2. Correlations Between Types of Anger

	P	V	I	E	P
Physical (P)	1.00				
Verbal (V)	.401*	1.00			
Intrinsic (I)	-.079	.098*	1.00		
Extrinsic (E)	.190*	.183*	.342*	1.00	
Passive (P)	.076	.343*	.184*	.182*	1.00

*p < .05

Findings from the CFA procedure confirmed the adequacy of the items in measuring anger types. Table 3 provides information regarding the factor loading, the average variance extracted, composite reliability as well as Cronbach's alpha for the measurement made using the items. Meanwhile, Table 4 provides the model-data fit indices for all the anger types. All the statistics were within the values of the guideline.

Table 3. Factor Loadings, AVE, CR and Cronbach's alpha

Items	Factor Loadings	AVE	CR	Cronbach's α
B1	.620	.31	.798	.779
B2	.774			
B3	.590			
B4	.361			
B5	.499			
B6	.542	.31	.715	.714
B7	.630			
B8	.394			
B9	.530			
B10	.390			
B11	.369	.341	.771	.767
B12	.698			
B13	.662			
B14	.686			
B15	.417			
B16	.360	.341	.771	.767
B17	.740			
B18	.766			
B19	.671			
B20	.447			

Table 3. Continued

Items	Factor Loadings	AVE	CR	Cronbach's α
B21	.563	.321	.800	.798
B22	.396			
B23	.298			
B24	.583			
B25	.719			
B26	.645			
B27	.721			
B28	.573			
B29	.519			
B30	.501			
B31	.394	.449	.76	.751
B32	.559			
B33	.846			
B34	.598			
B35	.640			

Table 4. Fit Indices

Fit Indices	Guideline	Anger Type				
		Physical	Verbal	Intrinsic	Extrinsic	Passive
Chi-square/df	< 5.00	3.623	4.787	4.459	4.052	1.662
TLI	> .90	.922	.923	.926	.911	.993
CFI	> .90	.946	.959	.957	.943	.998
RMSEA	Below .08	.066	.080	.076	.072	.033
SRMR	Below .05	.0406	.0374	.0448	.0439	.0146

The Online Adolescent Anger Instrument

The online Adolescent Anger Instrument is a self-report assessment device comprising 35 items taken from the research study and theoretical literature on anger. The instrument can be accessed online (imr.usm.my). It is a unique instrument prepared in simple Malaysian and English languages. Construct developed in this online instrument has three types of anger expressions, which are anger-out, anger-in, and anger-control. The sub-construct for anger-out are physically and verbally aggressive, whereas the sub-construct for anger-in is passive and the sub-constructs for anger-control are intrinsic and extrinsic. Details of online Adolescents Anger Instrument are shown in Table 4.

Table 4. Types of Anger Expressions and Items

Types of Anger Expression/Construct	Sub-Construct	No. of Items	Example of Items <i>When I am angry, I normally will...</i>	Details
Anger-out	Physical	8	Start a fight	Demonstrated through the expression involving physical contact against an individual, group or object. These include hurting someone, damaging property, punching, hitting, and fighting.
	Verbal	7	Screaming	Shown through verbal expression to another individual, group, or object. Verbal expression is through shouting, screaming, and expressing themselves through words.
Anger-control	Intrinsic	7	Calm myself Watching movies	Involving themselves either in thoughts, feelings, and behaviour but do not involve other individuals, groups, or objects. These include patience, relaxation, and self-reflection.
	Extrinsic	9		Involving themselves either in thoughts, feelings, and behaviour but do not involve other individuals, groups, or objects. The include patience, relaxation, and self-reflection.

Table 4. Continued

Types of Anger Expression/ Construct	Sub-Construct	No. of Items	Example of Items <i>When I am angry, I normally will...</i>	Details
Anger-in	Passive	4	Withdrawal	Shown by individuals' kept feelings, thoughts, and behaviour. Examples include remaining anger inside, withdrawal, and remaining silent.
Total		35		

This online instrument system was created using a standard website with PHP programming language and MySQL database code. It was designed to cater for users' compatibility via mobile, tab, or even a computer. This system enables storage of users' data registration, along with online instrument answers. Users can log-in multiple times, and all the attempts are recorded. To log in to this system, the participants of this study had to either sign up or join via the participation link on social media. The participants needed to access the website on their phones or computer and create an account by using their email addresses and a password. Any suitable browsers such as Google Chrome, Mozilla Firefox, Safari, or Internet Explorer are compatible for accessing this system. If the participants did not answer the instrument within the intended timeframe, it would automatically time-out and the session would also end. This instrument ends with thanking the participants for their responses.

In the Adolescent Anger Instrument, each type of anger expression is operationalised by a set of items. The procedure of administering as well as scoring is given as follows. Firstly, the participants are told to select the responses based on a statement given in an item. Every response carries specific scores, as follows: "Hardly Ever" = 1 mark, "Sometimes" = 2 marks, "Often" = 3 marks and "Very Often" = 4 marks. The marks are then added to provide the raw scores for the types of anger. A composite score for each anger type is calculated based on the proportion of the marks obtained over the maximum number of scores, that is, $35 \times 4 = 140$. For example, in aggressive physical anger, the maximum score is $8 \times 4 = 32$. As such, for a student who obtains a raw score of 24, his or her composite aggressive anger score is given as $(24 \times 140) \div 32 = 105$. Adjustments, however, are made to calculate the raw score for missing data. For example, if a student obtains 24 by only responding to 7 items, his or her adjusted raw score is then given as $(24 \times 8) \div 7 = 27.4$, while the composite score is $(27.4 \times 140) \div 32 = 119.9$. In the online instrument, the scoring is automatically calculated in the system and participants will get their scores and descriptions for each anger type of expression.

Discussion

Based on the results presented above, there is enough evidence to support online Adolescent Anger as an instrument to provide a statistically reliable and valid measure of anger expression among Malaysian adolescents. First and foremost, the instrument was developed within the Malaysian context using Malay and English languages, making it possible for participants to fully understand the items. A predicted result from the factor analysis confirms that the inventory is measuring what it is conceptualised to measure and provides prime evidence of high construct validity. That is, the instrument does not include measurements of unintended dimension (noise) that may pose a threat to construct validity (Messick, 1993). In addition, since this instrument exhibits an acceptable factor loading ($> .32$), it gives an indication that all items are working together in defining the types of anger expression. Thus, it provides information on consistency between theory and the operationalised items. This is further supported by the high reliability estimates for each of the anger expressions, giving an indication that the result is replicable if the instrument is administered to other comparable participants. In addition, correlations between the types of anger expressions also provide evidence of validity in terms of interpretations from the instrument. Higher correlation is expected between both anger-out and anger-control expressions. For example, it is highly likely that an aggressive physical adolescent will scream or shout in order to start a fight. Similarly, there is a tendency for extrinsic adolescents to like being alone when he or she is going out to cool off his or her anger. This may also impact the adolescence's surroundings such as family, friends and teachers or community.

Even though the findings provide strong evidence of the psychometric properties, the work does not end here. Like any other newly developed instrument, the online Adolescent Anger Instrument must undergo rigorous testing before it can establish itself. With regards to evaluating its psychometric properties, there is a need to test the instrument using different comparable participants with a more stringent analysis, such as the confirmatory factor analysis (CFA). This is important to ensure that the instrument exhibits stable factor which is essential for good measurement. In addition, a study on measurement invariance should also be conducted to provide evidence of fairness in testing.

Despite positive findings from the EFA, results from the CFA procedure is not encouraging. Measurement of anger types using the items did not provide strong evidence of construct validity based on low values of the AVE. Nevertheless, the result is not unexpected since this is the very first time the instrument was used, and therefore were subjected to further refinement especially when tested to different samples.

Finding the types of anger expressions was conceptualised based on past studies, especially by Spielberger (1991), Burney (2001), Blake and Hamrin (2007), Varghese et al. (2010), and Fernandez (2008). Theoretically, the types of anger expressions can be divided into three main classifications, namely, anger-out, anger-control and anger-in (Spielberger, 1991). Anger-out is expressed physically or orally. The two types of anger-out are physical and verbal anger. Physical anger expressions involve physical contact with the individual, group, or object, that includes hurting someone, damaging property, vandalism, punching, hitting, and fighting. According to Robertson et al. (2015), physically aggressive individuals are those who fail to attend to their emotions and therefore encounter on-going frustrations. As such, aggressive behaviour may then be used to overcome the frustrations. About 25% of university students, especially the male students, admitted involvement in physically aggressive behaviour (Tremblay et al., 2008). Verbal anger is demonstrated through verbal expression to another individual, group, or object, especially in terms of spoken words or speech that includes shouting and screaming.

According to Neuhart and Carney (2020), to elicit a desired emotional response from an elderly victim, verbal aggression is the verbal equivalent of punching the victim in the face. Bullying is a form of verbal abuse that is committed by someone who is physically stronger than, or in a position of power over, the victim. Even though verbal and relationship abuse can still be seen, it might be less of a punishment than physical abuse. However, recent research has shown that adolescents who are verbally and relationally aggressive, as well as those who are physically aggressive, are more likely to be rejected by their peers, have depression, and be alone. In addition, adolescents who are physically or verbally/relationally aggressive are more likely to blame others for their actions when things are not clear, which can lead to more aggressive behaviour (Lefler & Hartung, 2017).

Anger-control is related to the behaviour of a person in control of his or her anger. This is especially done by calming down or cooling off when angry (Spielberger, 1991). Intrinsic individuals will engage themselves in thoughts, feelings and behaviours like relaxation, self-reflection, and delighting of themselves, which do not involve other individuals, groups or objects. However, extrinsic individuals express themselves to others without having physical or oral contact. The activities include listening to music (most of the time, loud music), surfing the internet, or sleeping. Meanwhile, anger-in refers to one's behaviour to keep anger under stress and not expressing it (Spielberger, 1991). A person who practices anger-in is commonly known as someone with passive anger, where he or she is highly likely to keep silent, withdraw and avoid engaging with other individuals, groups or objects. In recent studies of Kupcewicz et al. (2022), the general emotion control index and scores on the anger, depression, and anxiety subscales all correlated negatively with positive orientation, confirming that a stronger sense of positive orientation in nursing students is associated with greater expression of negative emotions and a weaker sense with their suppression. This may impact the student's education. According to Lök et al. (2018), anger management education has a positive effect on students' anger-related symptoms and behaviours. Similarly, Farisandy and Hartini (2020), who studied the effects of an anger management skills programme on adolescents' levels of aggressiveness, discovered and reported that aggression levels in the experimental group decreased significantly.

Conclusion

The study outlines the validation processes of a scale to measure adolescents' anger types. The psychometric evidence from the study conducted provided strong evidence that the items defined types of anger expression, namely, anger-out, anger-control and anger-in. Each construct developed sub-constructs such as aggressive physical, verbal, intrinsic, extrinsic, and passive. Through the analyses, the online Adolescents Anger Instrument is shown to have high reliability and construct validity. Nevertheless, to establish itself as a prime instrument to measure anger, the instrument suggested must undergo more rigorous testing. Even though anger is a common and natural emotion, it has the potential to lead to aggression and a variety of negative consequences, including violence and even murder in extreme cases. As a result, it is necessary to control one's anger. It was discovered through research that anger management training for high school students has been effective in reducing their proclivity to act violently.

Recommendations

Today, adolescents face an increasing level of violence daily. Adolescents' academic achievement, mental health, family life, and physical health, both their own and that of those around them, are all harmed by violence (Fry et al., 2018; Pang & Thomas, 2020; Saglam & Ikiz, 2017; Won & Chang, 2020).

This measuring instrument identifies three types of anger expressions among adolescents. These three types of anger expressions similar to the types of anger as in past studies. However, we would like to suggest that the variables of the passive anger expression be studied further. As this is because suppressions of anger by adolescents is difficult to identify and requires a sufficient number of relevant items to ensure that the score obtained accurately represents the passive anger. Understanding how adolescent students express anger can influences important intervention to manage their anger and facilitate a conducive and harmonious school atmosphere.

Through measuring instruments to identify anger expressions, training should also be provided to decrease violence in schools, which serve as a critical social platform for society, to identify students at risk of violence, and to conduct anger management workshops with regular screening programmes provided by family therapists and health professionals.

Teachers should be trained to use anger instruments for them to identify the students' anger expressions. Teachers also should receive in-service training to enable them to educate more students and expand their knowledge and abilities in each school. Similarly, family plays vital roles at home. Through family therapist-led education programmes, training should be provided to assist families in developing awareness, knowledge, and skills regarding anger management.

In terms of motivational orientation communication through expressions, the experimental section conceptually replicated Aragón and Bargh (2018). In both the positive and negative contexts, anger and sadness expressions communicated appetitive and consummatory motivations, respectively in the United States and South Korea. As previously demonstrated, smiling expressions did not consistently convey information about appetitive or consummatory orientations. This pattern of findings suggests a possible functional explanation for why smiles are not the only positive emotion expression. When highly intense positive feelings are combined with an antsy desire to move or a consuming desire to stop, anger and sadness displays respectively communicate those feelings more effectively than smiles. This appears to be critical social information to communicate when emotions are running high in order to facilitate social interactions through coordination, cooperation, and compensatory behaviours.

Limitations

This study focused exclusively on adolescents within a specified age range. Additionally, this study only involved local public schools in the states of Penang, Kedah, and Perak in the northern part of Malaysia.

Ethics Statements

The studies involving human participants were reviewed and approved by the Universiti Sains Malaysia. The participants provided their written informed consent to participate in this study.

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