Development and Validation of a New Aggression Inventory

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Abstract

A three-dimensional measure of aggression – the Aggression Inventory (AI) – was designed to assess three types of aggression: relational, physical and verbal. The dimensions were predicted to correlate between each other. The scale construction process, the psychometric properties of the scales and ways to gather validity evidence for the scales were described. The factor analysis revealed a four-dimensional correlated structure of the scale. Physical aggression displayed the highest internal consistency level (α = .847). Neither other constructs nor the total scale were in the adequate range for acceptable reliability (> .7). All but two factors correlated well between each other. To increase the scale reliability, it is necessary to increase the test length and remove items 38 and 43 from the analysis.
Development and Validation of a New Aggression Inventory

People encounter aggression in their daily lives. There are numerous situations that allow for a possibility of running into an aggressive person, such as interaction with peers, grocery shopping and other routine daily activities. A common belief regarding aggression is that it is necessarily a physical act with the intention to harm another one. It has also been shown that females exhibit more submissive patterns than males in their acts (Veno, 1976).

It is not surprising that extensive research has been conducted, attempting to identify causes and factors associated with aggression. However, the research has also shown that aggression does not consist solely of physical aggression, but encompasses other subtypes, such as relational and verbal, which is true for the different ethnic subtypes of the population (Xie, Farmer & Cairns, 2003).

The common scales to assess psychological aggression, as shown by Connelly, Newton and Aarons (2005) are called The Conflict Tactics Scales (CTS). The researchers show that CTS consist of the two main versions: the CTS2 and CTSPC. CTS2 is used to measure violence against a partner in a dating or marital relationship, with a specific focus on victimization and perpetration scales. These scales focus on three tactics that are most common in the conflict between the partners: physical assault, psychological aggression and negotiation. There are also scales that measure sexual coercion of and by a partner. The CTSPC is used to measure maltreatment of a child by parents and is not used as widely. Essentially, the CTS is a list of behaviors that seeks to measure the behavior of an examinee and his or her partner. CTS exclude emotions and attitudes. CTS2 measures 39 behaviors across five categories: reasoning and negotiation, psychological aggression, physical assault, sexual coercion and consequence. The behaviors are classified as either mild (restraining physically) to severe (choking/beating up).
The responses are presented on an eight-point scale, ranging from “never” to “more than 20 times” to “not in the past year, but did happen before”.

CTS demonstrate high internal consistency reliability level with a mean coefficient of .77 across forty-one studies with the maximum of .94. The test-retest reliability for CTS2 was found for only two samples, with coefficients ranging from .49 to .9 with a mean of .72. The content validity of CTS is harder to assess because the scales only include a sample of possible violent behaviors and the method used to select behaviors does not indicate that it is an adequate sample. Some studies also suggest that CTS can be confounded with social desirability, but there is little empirical support regarding this concern. The construct validity of CTS is argued to be very high because the findings by CTS are consistent with theoretical and empirical assessment of the variables that CTS are supposed to measure (Connelly et al., 2005).

In this paper, I will explain the process of developing a measure of aggressive behavior as a three-dimensional construct with correlated dimensions: physical, relational and verbal. The physical aggression construct is usually defined as harming or threatening to harm another person through direct physical damage (Crick, Casas, & Mosher, 1997). The relational aggression construct is associated with harming a peer through purposeful manipulation or damage to relationships and social status (Crick, 1996). Verbal aggression involves direct attempts to hurt someone’s feelings using words or gestures (Linder & Gentile, 2009). In addition to that I will also assess the reliability and validity of the aggression scale.

The original aggression scale was comprised of thirty items selected based on the Rational Scale Construction method. The aggression inventory is based on self-report; therefore it makes sense to use the method of rational scaling. This method is also useful because it increases the internal consistency of the scale. The questions for the scale were selected in a
logical way based on their conceptual relation to the main construct of the scale: aggression. The selected items were further correlated with each other and with the total score of the scale and the items with the low content validity were dropped from the scale. The questionnaire was trimmed down to 20 items and then to 15 items based on the feedback received in class during the peer review session. The items that were dropped from the scale did not exhibit good face validity, did not have positive correlations with other items and did not make logical sense in relation to the main construct of the scale.

It is also important to perform a gender differences analysis when examining aggressive behavior. A common belief regarding aggression is that males tend to be more violent than females and exhibit more aggressive qualities. This statement is partially true because research has shown that males do tend to express themselves more aggressively than females (O’Leary et al., 2008). However, females do exhibit aggressive qualities, but in the form of manipulation, gossip and backstabbing. Therefore, the gender difference analysis seems appropriate. I predict males to be more physically and verbally aggressive than females, but females to exhibit a higher level of relational aggression. I also hypothesize that males will display a very low level of relational aggression because men, in general, tend to express their feelings and concern openly during a conflict, rather than engage in the process of passive-aggressiveness.

I also think that it is appropriate to examine different forms of aggressive behavior in relation to the antisocial behavior on the MCMI scale. The antisocial personality disorder is associated with a “pervasive pattern of disregard for and violation of the rights of others occurring since age of 18” as indicated by the DSM-IV characteristic of this disorder (Hare, Hart & Harpur, 1991). People diagnosed with this disorder exhibit a wide variety of symptoms, specifically in the different forms of aggressive behavior as measured by the aggression
inventory. I predict that the antisocial behavior will be strongly correlated with all three different
types of aggression, indicating that people who exhibit more aggressive qualities also display
more symptoms of antisocial behavior.

Method

Participants

There were a total of 59 undergraduate students from the Introductory Psychology class at Wake
Forest University. Students participated in the study as a part of a course requirement. Of the 59
participants, 25 were male and 34 were female.

Materials

Each questionnaire consisted of two parts. The first part asked for the basic background
information and included variables such as biological sex (biological sex is a dichotomous variable in
our study; male = .00, female = 1), year in school (freshman = .00, sophomore = 1, junior = 2,
senior = 3), cumulative GPA, siblings (yes = .00, no = 1) and birth order (first-born = .00,
second-born or later born = 1).

The second part consisted of 10 different tests, such as Big Five Inventory (BFI), Millon
Clinical Multiaxial Inventory (MCMI), Family Sense of Coherence scale (FSC), Aggression
Scale and six other inventories, each measuring different psychological constructs.

The first scale used in our analysis was the Aggression Scale, which consisted of three
different subscales each measuring a different type of aggression. The first subscale consisted of
four questions that measured physical aggression on a 5-point scale with 5 being the highest
physical aggression score. The questions that addressed physical aggression were “I believe that
sometimes physical aggression is an inevitable part of an argument” or “a heated argument, I
often have to restrain myself from hitting the other person”. The second subscale assessed verbal
aggression as a measure of five different items, such as “I often upset people with my sense of
humor” or “I find it easier to say something negative about someone than to say something nice”. The items were measured on the Likert scale, with the answers ranging from 1 (disagree strongly) to 5 (agree strongly). The third subscale had six items that were designed to measure relational aggression on a scale from 1 to 5 (for example, “Sometimes I take a small amount of pleasure in another’s misfortune” or “To get back at someone, I think it is better to attack their reputation than confront them directly”), with the higher score indicating a higher level of relational aggression.

The second scale used in the analysis was the MCMI. It consisted of 16 different true or false items, which measured two different dimensions: Antisocial PD and Schizotypal PD. I used Antisocial PD scale in my analysis. This scale consisted of eight items, each measuring antisocial behavior on a true or false scale. The scale included questions, such as “I do what I want without worrying about its effect on others” or “I’m very good at making up excuses when I get into trouble”.

Procedure

The anonymous surveys were handed out to students during their class sessions. Participants could omit any question they did not feel comfortable answering. Upon the completion of data collection, it was entered into PASW file to conduct various statistical procedures on the data.

Total Aggression. The total aggression score (totalaggr) was assessed as a sum of scores of three aggression subscales.

Physical Aggression. Four variables were assessed in order to measure physical aggression. The third variable (easier to ignore the person, than confront them) was reverse scored. Then the new variable (totalphys) was created to assess the total physical aggression score.
Verbal Aggression. There were five items that comprised the participant's verbal
aggression score. The new variable (totalverb) was created to measure the participant's total
verbal aggression score.

Relational Aggression. The participant's total relational aggression score was calculated
based on the six items (totalrel). The sixth item (take someone else's side in an argument than let
an argument end in disagreement) was reverse scored.

MCMI-Antisocial PD. The antisocial score was assessed as a measure of eight items. The
eighth item (People tell me that I'm a very proper and moral person) was reverse score. Then the
new variable (totalantisocial) was created in order to calculate the participant's total antisocial
score.

Results

Descriptive statistics

At first, to analyze the data, I performed the basic descriptive statistics analysis to obtain
the means and standard deviations of the items. The mean score on the 15-item Aggression
Questionnaire was 34.27 (SD = 7.25) with the scores ranging from 23.00 to 53.00, with the
higher score indicating a higher level of (general) aggression. The items mean score ranged from
1.47 (SD = .817) for item 30 ("In an argument, I have no problem with being the one to escalate
the issue into a physical confrontation") to 3.98 (SD = 1.09) for item 43 ("I'd rather just take
someone else's side in an argument than let an argument end in disagreement") (See Table 1).
The mean score for total aggression for males was 36.12 (SD = 7.22) and 32.88 (SD = 7.05) for
females.

Furthermore, the following means and standard deviations were obtained for physical
aggression, relational aggression and verbal aggression: physical aggression (M = 7.49, SD =
3.05), relational aggression \((M = 15.07, SD = 3.33)\), verbal aggression \((M = 11.66, SD = 3.78)\)
(See Table 2).

In addition to that, I conducted descriptive statistics analysis on the Antisocial PD scale, which revealed the mean of 6.46 \((SD = 1.79)\) for the total scale, with the scores ranging from two to 15, with the higher score indicating a higher level of antisocial personality traits.

**Factor analysis**

A series of factor analyses were performed on the items in order to assess the dimensionality of the aggression scale. The initial analysis revealed a four-factor structure, with the coefficients less than 0.3 being excluded from the analysis. This was inconsistent with my original prediction of a three-dimensional scale. The scree plot also revealed a four-factor item loading (see Figure 1), and the examination of the eigenvalues table confirmed the finding.

Moreover, the items were analyzed using the Promax rotation because I expected the factors to be correlated with each other. I suppressed the coefficients lower than 0.4 in order to look at The Promax rotation also revealed a four-factor structure of the scale, with the first component explaining 29.21% of the total variance (eigenvalue = 4.38) and the four components accounting for 62.9% of the total variance.

The items 29, 31 and 32 (see Table 3 for factor loadings) had the highest loadings \(> .6\) on the fourth factor. These three items are associated with manipulation of feelings with no personal gain, which is a component of relational aggression. However, factor four showed a strong positive correlation with the three remaining factors, indicating the similarity between the measured dimensions. The items 30, 33 and 39 loaded cleanly on factor two, revealing the physical aggression component of the scale. The item 30 ("In an argument, I have no problem with being the one to escalate the issue into a physical confrontation") also loaded well \((.551)\) on
factor four. Factor two showed a small positive correlation \((r = .167)\) with component one, a medium positive correlation with factor four \((r = .395)\) and was uncorrelated with factor three \((r = -.021)\). Items 34, 36, 37 and 41 displayed the highest loadings on factor one \(> .6\). These items, except for the item 34, are associated with the direct verbal aggression. The item 34 (“Sometimes I take a small amount of pleasure in another’s misfortune”) also loaded on factors three and four (both \(> .4\)), and item 36 loaded well \(> .4\) on factor four. Factor one also showed a positive correlation with the remaining factors. Items 35, 40 and 42 loaded well on factor three \(> .6\), but the item 42 (“To get back at someone, I think it is better to attack their reputation than confront them directly”) also loaded well on factor one \(0.465\). These three items are associated with the manipulation of another person’s feelings for personal gain, which is a part of relational aggression. Factor three correlated highly with factor one \((r = .301)\) and factor four \((r = .206)\) and was uncorrelated with factor two \((r = -.021)\). The items 38 (“I find it easier to just ignore a person I have a problem with than to confront them about it”) and 43 (“I’d rather just take someone else’s side in an argument than let an argument end in disagreement”) loaded negatively on factors one and three and were excluded from the analysis.

Based on the strong correlations between factors and the fact that many items loaded on two or three components, I forced a three-factor solution for the aggression inventory to see whether the items associate well with the expected dimensions. This analysis yielded six items that loaded well on factor one, eight items that loaded on factor two and five items loaded on factor three. However, items 31 (“If I hear a negative rumor about someone I don’t like, I will more than likely pass the rumor on to another person”) and 32 (“In an argument with a close friend, I often make comments that I know will upset them the most but are irrelevant to the argument”) loaded equally well \(> .4\) on factors one and two, indicating that these items can be
attributed to both physical and verbal aggression. Items 34 ("Sometimes I take a small amount of pleasure in another’s misfortune") and 42 ("To get back at someone, I think it is better to attack their reputation than confront them directly") also loaded highly (> .4) on factors two and three, indicating the similarities between the verbal and relational aggression. The correlation matrix revealed no correlation between factors one and three (r = .064), but a medium positive correlation between factors one and two (r = .292) and factors two and three (r = .288).

**Secondary analysis**

A correlational analysis was performed on the data to analyze the association between the antisocial behavior and different types of aggression. The only statistically significant correlation was obtained between the verbal aggression and the antisocial score (r = -.310, p = .017), indicating that more verbally aggressive people tend to display less antisocial qualities.

I further ran the gender analysis examining the difference between males and females for the different types of aggression. The analysis showed a strong negative correlation between gender and verbal aggression, which was also the only statistically significant correlation obtained (r = -.288, p = .027). This indicates that females tend to be less verbally aggressive than males.

**Reliability analysis**

The factor analysis revealed four components of the aggression inventory. I further examined reliability of each component indicated by the factor analysis, as well as the total reliability of the aggression scale. The Chronbach's alpha for the first component ("Direct Verbal Aggression") was .699, which is an acceptable internal consistency coefficient for the exploratory research. The inter-item correlations were positive, with coefficients ranging from .256 to .423 (see Table for correlation matrix). The Chronbach's alpha for the second factor
("Physical Aggression") was .847, indicating good internal consistency. The inter-items correlations ranged from .595 to .723, indicating a rather homogenous set of items. The Chronbach’s alpha coefficient for the third component ("Manipulation for Personal Gain") was .632, which was not in the acceptable range for the good internal reliability. However, the inter-item correlations ranged from .293 to .415. The Chronbach’s alpha for the fourth component ("Manipulation without Personal Gain") was .674, which also was not in the acceptable internal consistency range. The inter-item correlations ranged from .334 to .529. The Chronbach’s alpha for the total scale was .8, indicating a good internal consistency of the entire scale. However, when the reliability analysis included items 38 and 43, the internal consistency estimate dropped to .677, indicating an unacceptable range for the internal reliability of the total scale.

The additional reliability analysis was conducted on the Antisocial PD scale as well as on the total MCMI scale. The Chronbach’s alpha coefficient for the Antisocial PD was .251, which is not an acceptable measure of the internal consistency. The Chronbach’s alpha coefficient for the total MCMI scale was .476, which is also not a good indicator of internal reliability.

Discussion

The developed aggression scale seeks to assess the central components of aggression, as measured by its physical, verbal and relational components. The subtypes of aggression were expected to correlate between each other because of the assumption that an aggressive person will exhibit equally aggressive qualities across all of the dimensions. However, the factor analysis revealed a four-dimensional structure of the scale, instead of the predicted three-dimensional structure. It is important to examine the scale in terms of reliability of the subscales because a higher reliability coefficient increases the probability of results obtained by the scale to
be statistically significant. The physical aggression scale possessed the highest reliability coefficient across all of the subscales, even though it was comprised of only three items. The results show that the observed physical aggression scale would explain approximately 84.7% in the hypothetical true score scale comprised of all the possible items that measure physical aggression.

The second highest reliability coefficient was revealed by the verbal aggression scale. However, the coefficient of .699 is outside the adequate range for the internal consistency scale, which indicates the need for the further test refinement. The Chronbach’s alpha for verbal aggression can be interpreted as the correlation between the observed score and the scores obtained on all other possible scales that measure the same construct and are comprised of the same number of items.

The third and the fourth components of the factor analysis were both subtypes of relational aggression. However, the internal reliability coefficients obtained for both of them were not within the acceptable range for the adequate scale. This means that the relational aggression measure needs revision and adjustments in order to increase the variance explained in the hypothetical true score.

The MCMI-Antisocial Personality Disorder measure did not possess high internal consistency, with the Chronbach’s alpha coefficient only at .251 and .476 for the total scale. However, this might be due to the fact that only a small subset of items from the original MCMI scale was used to analyze the scores. In order to increase the internal consistency for the entire questionnaire, it is important to use the full scale and not such a small subset of items.

However, the obtained factors did correlate well between each other, revealing a multi-dimensional test with correlated dimensions. However, the physical aggression factor and
manipulation for personal gain factor did not exhibit a strong correlation between each other. This might be related to the fact that people who are more physically aggressive are more likely to confront others directly for personal gain, rather than through a careful manipulation of feelings or thoughts.

It is important to address the possible ways that the developed aggression inventory can be improved for the future use. Since the inter-item cor relational analysis for the total scale revealed a relatively high correlation between the items, it might be important to increase the length of the test in order to increase the reliability of the scale. It is also important to take a closer look at factors that do not show a strong correlation with each other. It is a necessary step in the refinement process because it allows us to analyze the consistency between the physical aggression and the subtype of relation aggression. The relative increase in the number of items across all the scales, while making sure the items maintain a good internal structure, will lead to a more reliable and a more comprehensive measure of aggression.

The additional analysis conducted on the different types of aggression in relation to the antisocial behavior revealed a surprising pattern of results that was inconsistent with my original prediction. I hypothesized that all the types of aggression would be positively associated with the antisocial behavior. However, the only significant correlation revealed by the analysis was in the opposite direction from the original prediction. The verbally aggressive people are less likely to show the signs of the antisocial behavior. This may be explained by the fact that the antisocial personality disorder is characterized by a severe disregard of others’ rights, deceitfulness and manipulation. Verbally aggressive people may tend to express their feelings openly and not necessarily use manipulation in order to obtain personal gain. In addition to that, a verbal score was found to be negatively correlated with the gender. Intuitively, it makes sense that females
are less verbally aggressive than males because men are usually perceived to be more short-tempered and impulsive than women.

It is also important to analyze the validity of the developed aggression scale in order to see whether the designed test actually measures what it is supposed to measure – aggression. The convergent validity of the scale can be evaluated through comparing the correlations between the aggression inventory and the CTS or a similar scale that is designed to evaluate aggression. In addition to that, the discriminant validity of the test can be analyzed through comparing the scale with another measure it should not theoretically correlate with. For example, I would expect aggression to be negatively correlated with friendliness. If we obtain the scores that indicate that aggression is, in fact, positively correlated with friendliness, then it might indicate a problem with the discriminant validity of the designed scale. I can also assess the content validity of the scale by evaluating whether the content of the aggression questionnaire covers a representative sample of the aggressive behaviors.

In summary, the aggression inventory appeared to measure four different factors of aggression instead of the predicted three. The internal consistency of the total scale was maximized after two of the items that displayed negative factor loadings were dropped. The scale appeared to be a good measure of physical aggression, as well as of the total aggression. However, in order to improve the internal consistency of the verbal and relational subscales, it is important to increase the length of the test, as well as increase the item-level correlations within the factors.
References


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Table 2

Scale-level Descriptive Statistics

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Figure 1

Scree Plot
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Factor Loadings

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