

Developing an Inventory to Measure Anger in Mexican Children

Desarrollo de un Inventario para la Medición de la Ira en Niños Mexicanos

Desenvolvimento de um Inventário para a Mediação da Ira em Crianças Mexicanas

RAÚL J. ALCÁZAR-OLÁN

Universidad Iberoamericana Puebla, México

JERRY L. DEFFENBACHER

Colorado State University, Colorado, United States

VERÓNICA REYES PÉREZ

WILSON JESÚS POOL CIBRIÁN

Universidad Nacional Autónoma de México, México D.F.

Abstract

Based on the state-trait model of anger (Spielberger, 1988, 1999), the aim was to develop a reliable and valid inventory to measure anger in Mexican children. Exploratory factor analyses on responses from 592 children (302 boys, 290 girls) ($M=10.35$ years old, $SD=1.14$) revealed four factors suggesting construct validity: 6-item state anger (e.g., "I am upset"), 5-item trait-temperament (e.g., "I get mad easily"), 7-item anger-out (e.g., "I fight with whoever made me mad"), and 12-item anger control (e.g., "I try to relax"). Alpha reliabilities were .76, .76, .73, and .88, respectively. Anger control correlated negatively with other factors, whereas other factors correlated positively with each other. The inventory also had concurrent validity with an instrument that measured physical aggression.

Keywords: anger, children, emotional regulation, inventory, assessment.

Resumen

Este estudio tuvo como objetivo desarrollar un inventario válido y confiable para medir la ira en niños mexicanos, basado en el modelo estado-rasgo (Spielberger, 1988, 1999). Los resultados de análisis factoriales exploratorios de las respuestas de 592 niños, 302 niños y 290 niñas, ($M=10.35$ años y $DE=1.14$), revelaron cuatro factores que sugieren validez de constructo: 6 reactivos de ira estado (e. g. "Estoy molesto"), 5 reactivos de temperamento-rasgo (e. g. "Me enojo fácilmente"), 7 reactivos de ira-externa (e. g. "Me peleo con quien me hizo enojar") y 12 reactivos de control de la ira (e. g. "Intento relajarme"). Las confiabilidades alfa fueron .76, .76, .73 y .88, respectivamente. El inventario tuvo validez concurrente con un instrumento que midió agresión física.

Palabras clave: regulación emocional, inventario, ira, niños, evaluación.

Resumo

Este estudo teve como objetivo desenvolver um inventário válido e confiável para medir a ira em crianças mexicanas, baseado no modelo estado-traço (Spielberger, 1988, 1999). Os resultados de análises fatoriais exploratórias das respostas de 592 crianças, 302 meninos e 290 meninas ($M=10.35$ anos e $DP=1.14$), revelaram quatro fatores que sugerem validade de constructo: 6 reativos de ira estado (por exemplo "Estou bravo"); 5 reativos de temperamento-traço (por exemplo "Fico bravo facilmente"); 7 reativos de ira-externa (por exemplo "Eu brigo com quem me faz ficar bravo") e 12 reativos de controle da ira (por exemplo "Tento ficar calmo"). As confiabilidades alfa foram .76, .76, .73 e .88, respectivamente. O inventário teve validade concorrente com um instrumento que mediu agressão física.

Palavras-chave: regulação emocional, inventário, ira, crianças, avaliação.

Correspondence concerning this article should be addressed to Raúl J. Alcázar-Olán, e-mail: raul.alcazar@iberopuebla.mx, rulet7@gmail.com. Department of Health Sciences, Blvd. del Nino Poblano 2901, U. T. Atlixcayotl, Puebla, México, Z.C. 72430.

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AGGRESSION IS one of the problems that lead to most severe consequences in the short and long term (Berkowitz, 1993). For example, aggression may lead to injury to the aggressor or others, to damaged relationships with peers, friends, and family, to conflict at school, work or in the community, to legal consequences, and the like. Although aggression may have multiple causes (Carrasco & González, 2006), one of the largest risk factors is anger. According to the Anger-Hostility-Aggression syndrome (AHA) (Ramírez & Andreu, 2008; Spielberger et al., 1985), anger is the first step toward developing hostility and aggressive behaviors.

While related, anger, aggression, and hostility are different constructs. Although hostility generally involves angry feelings, this construct primarily refers to a complex set of attitudes leading one to be mean, vicious, vindictive, and cynical (Spielberger et al., 1985). Aggression has to do with behavior, the deliberate intent of which is to harm, hurt, or injure another person, object, or social system (Berkowitz, 1993). Anger is an emotional state that includes feelings which vary in intensity from slight irritation to fury or rage, and generally is the response to the perception of injustice or provocation (Spielberger & Reheiser, 2009).

The study of anger is relevant not only to understand the experiences of youth, but also because anger is a significant predictor of aggression in children and adolescents (Ayala, Pedroza, Morales, Chaparro, & Barragán, 2002; Cornell, Peterson, & Richards, 1999). Children who frequently become angry are at higher risk to (a) aggress, (b) develop delinquent and criminal behaviors, (c) exhibit more problems in peer relationships, and (d) show a variety of antisocial behaviors (Fabes & Eisenberg, 1992; Gottman & Katz, 1989; Strayer & Roberts, 2004).

Within the state-trait model, anger is measured in terms of state anger, trait anger, and forms of anger expression (Deffenbacher et al., 1996; Spielberger, 1988, 1999). State anger is transitory and reflects the intensity of the

physical-emotional arousal that individuals feel during a moment or over a short period of time in response to a specific event (e.g., when one is treated unfairly). State anger has at least two components: the desire to express anger in certain situation (e.g., “I feel like insulting someone”), and the presence of the emotion (e.g., “I am upset”). Unlike transitory state anger, trait anger is a relatively stable characteristic of the person across situations. That is, trait anger reflects an individual difference or personality trait (e.g., “I am hot-headed”) in the propensity to react generally with anger across time and circumstances. Besides state and trait anger, there are several different ways in which anger is expressed (Spielberger, 1988, 1999). Anger-in refers to suppressing the emotion or “boiling in the inside” but not showing it (e.g., harboring grudges or keeping the anger many hours). Anger-out describes outward expression, generally showing others that one is angry (e.g., arguing or yelling at others). There are also two forms of controlled anger expression. Anger control-in reflects the person’s efforts to reduce their angry feelings (e.g., deep breathing), whereas anger control-out reflects the person’s efforts to initiate positive, constructive behavior when angry (e.g., trying to be patient with others). In summary, the state-trait model proposes that anger can be assessed in terms of a momentary experience (state anger), a tendency to experience anger across time and situation (trait anger), and how anger is expressed (anger expression).

To our knowledge, the state-trait anger model has not been employed to measure anger in Mexican children. Since this model is widely recognized and accepted (Kerr & Schneider, 2008), we decided to use it to develop an initial version of an inventory to measure anger in Mexican children. This might seem unnecessary, because there is a Spanish inventory to assess anger, the State-Trait Anger Expression Inventory for Children and Adolescents (STAXI-CA, Del Barrio, Spielberger, & Aluja,

2005). This inventory, however, was developed and standardized with samples from Spain. As a result, it includes items (e.g., “Estoy rabioso”, “Siento rabia pero me lo callo”, etc.) that pilot testing showed were not easily understood or used by Mexican children. We, therefore, undertook the development of an instrument guided by the state-trait model (Deffenbacher et al., 1996; Spielberger, 1988, 1999). The instrument was linguistically sensitive to and based on what Mexican children report experiencing, doing, and saying when angry.

In summary, the goals of the present research project were twofold: (a) to develop a reliable measure of anger in Mexican youth that was consistent with the state-trait model (i.e., measures of state and trait anger and anger expression), and (b) to conduct an initial validation study of the measure.

Method

Participants

Two samples participated in the study. The first or instrument development sample consisted of 592 children (302 boys, 290 girls) ages 8 to 12 ($M=10.35$, $SD=1.14$): 220 fourth graders, 172 fifth graders, and 200 sixth graders from elementary schools in Puebla and Tlaxcala. These cities are located in the central region of Mexico. This large sample size was necessary for factor analyses which are the recommended technique for developing instruments (Comrey, 1988; Hair, Anderson, Tathan, & Black, 1998) and met the need of at least 10 individuals per item (Hair et al., 1998). The second sample provided the initial validity study correlating the measure developed in the first sample with a measure of physical aggression. This sample consisted of 132 children (67 boys and 65 girls) from fourth to sixth grades in an elementary school in Puebla. Ages ranged from 8 to 12 ($M=10.10$, $SD=0.93$). All schools sampled were private, that is, parents paid for the student's attendance. Children who study

in Mexican private schools are usually from the middle or upper socioeconomic classes.

Instruments

Item Development for the Anger Inventory for Mexican Children. Since the goal was to develop a linguistically sensitive and culturally appropriate inventory for Mexican children, we developed items based on how Mexican children describe their experience and expression of anger. Guided by the state-trait model (Spielberger, 1988, 1999), we employed open-ended questions to solicit potential items. To obtain items about trait anger, we asked: “What are the characteristics of a person who is always angry?” To obtain items about state anger the questions were: “How do you know that you are angry?” and “What do you feel in that moment?” To obtain items about anger-out, we asked children two questions: “What things do you say when you are angry?” and “What do you do when you are angry?” To obtain items about anger control, we asked: “What do you do to calm down when you are angry?”

These questions were presented in written form to 75 fourth through sixth graders, with approximately 25 students at each grade level. Although these students do not represent the anger experience of the entire population of Mexican children, the goal was to include items in the idiom and language of Mexican children. The research team identified common items. Some items were retained for the inventory (e.g., “I say ugly things”), but others were not (e.g., “To calm down I play with the dog or I play videogames”) because not all children have these options when angry. The final item pool consisted of 44 items which were identified by many children and available to all. State anger was represented by eight items (e.g., “I am angry”), trait anger by 14 items (e.g., “I get into a bad mood”), anger-out by 10 items (e.g., “I argue with others”), and anger-control by 12 items (e.g., “I try to calm down as soon as possible”).

Items were then organized into a questionnaire. State anger items were preceded by the phrase: "How I feel at this moment..." Trait anger items were preceded by "How I feel generally..." Anger-out and control were preceded by "When I get angry..." Items were rated on three-point scales. Options for state anger items were *not at all* (score=1), *a little* (score=2), and *a lot* (score=3). Options for all other items were *almost never* (score=1), *sometimes* (score=2), and *almost always* (score=3). Higher scores indicated higher reports of state anger, trait anger, anger-out and anger-control (see results section for instrument development in the first sample.)

Anger Index. The 27-item Anger Index (Mendoza, Ortiz, & Ayala, 1997) assesses physical aggression (e.g., hitting) when children experience frustrating situations (e.g., when a classmate breaks a favorite toy). Children select one of four behaviors in which they engage: hitting, going away, telling on the person, and arguing. Selection of "I hit him/her" indicates a physically aggressive reaction, and greater selection of this category across times reflects greater physical aggression. This instrument was developed for Mexican children between ages 8 to 12, possesses good reliability ($\alpha=.90$) and factor structure, and has been used as a measure of aggression in other studies with Mexican children (Ayala et al., 2002; Mendoza, 2000; Ortiz, 2000).

Procedure

Five schools were recruited. A description of the project and copies of instruments were sent or presented personally to school administrators. The purpose was described as developing an anger scale appropriate for Mexican children. Participation was described as anonymous (except for age, gender, and grade) and completely voluntary. When school personnel approved the project, they recruited teachers and classrooms.

During class hours, research assistants administered the questionnaires. Classes varied in size from 7 to 25, with about 20 students in most classes. Research assistants read instructions and answered all questions. Teachers were present, but to the side of the room where they could not see students' responses. When instruments were completed, which took about 20 minutes, students and teachers were thanked, and the research assistant left, taking all questionnaires with him/her.

Results

Initial Item Reduction in Sample 1

First, we wanted to retain items that correctly identified high and low anger children. This was done in the following way. We constructed a distribution from low to high anger by summing responses across all 44 items. Since high responses on anger-control items reflected lower anger, these items were reverse scored prior to being summated. High anger students were defined as the upper quartile (scores 81-100) and low anger students as the lower quartile (scores 48-64). Point biserial correlations between the item score and the high/low anger categorization revealed that all but one item correlated positively with the categorization (point biserial correlations=.21 to .71). The item which did not, "When I get angry, I prefer to be alone," was eliminated.

Factor Analyses

The Bartlett's test of sphericity, identifying whether correlations among the 43 items were different to zero, was significant, $X^2(903)=7570.98$, $p<.001$, and the Kaiser-Meyer-Olkin index of sampling adequacy was .890. These indices suggested that data could be appropriately examined by factor analyses.

We used exploratory factor analysis (EFA), specifically the principal factor method (Fabrigar, Wegener, MacCallum, & Strahan, 1999), to

examine the underlying structure of the scale and identify the latent variables. The use of EFA is appropriate for the initial development of a scale or instrument (Comrey, 1988), which is the case of the present study. Oblique, rather than orthogonal, promax rotation was used because factors were likely to be correlated (Fabrigar et al., 1999) and to obtain theoretically meaningful constructs (Hair et al., 1998). Genders were combined to maximize the reliability of factors by having the highest ratio of participants to the number of items analyzed.

The first EFA including 43 items yielded an 11-factor solution with Eigen values above 1 and accounted for 57% of the variance. The scree plot, however, suggested five factors. We used the scree test as criteria to extract the number of factors based on two reasons. First, five factors would map most closely onto theoretical areas of the state-trait model (state anger, trait anger-reaction, trait anger temperament, anger-out, and anger-control). Second, fewer factors would provide a more parsimonious and interpretable solution for understanding anger constructs in children.

The EFA extracting five factors accounted for 40.92% of the variance. Four items cross loaded or did not fit conceptually and were eliminated. The following EFA extracting again five factors accounted for 43.35% of the variance. All the items fit conceptually on their factors. However, the scale reliability was still not established.

A 5-item factor of trait anger-reaction (e.g., "It bothers me when somebody steals my things") had alpha reliability of .56, which was unacceptably low. Additional analyses showed that reliability of this scale could not be increased by eliminating items from the scale. These five items were, therefore, dropped. Two additional items were eliminated because their elimination increased the reliability of other scales.

Since one factor was eliminated, in the next EFA we extracted only four factors which accounted for 45.36% of the variance. Now, one

state anger item (i.e., "I want to say ugly things") loaded on the anger-out factor, and the item "I want to say bad words" cross loaded. Both items were eliminated.

The final EFA extracted four factors and accounted for 46.23% of the variance (see Table 1). The first factor (Eigenvalue [E]=7.57, percentage of variance [%]=25.25) had 12 items of anger-control (α =.88) indicating the child's behavioral and emotional efforts to reduce his/her anger (e.g., keeping anger under control and doing something relaxing). The second factor (E =2.72, %=9.09) included six items of state anger (α =.76) reflecting the intensity of angry feelings at the time of answering the inventory (e.g., "I am upset"). The third factor (E =1.98, %=6.60) with five items (α =.76) addressed trait temperament or the characteristics that identify a person who generally gets angry easily (e.g., "I am quick-tempered"). The fourth factor (E =1.58, %=5.25) had seven anger-out items (α =.73) indicating the outward, negative behavioral and verbal reactions toward others (e.g., "I fight with whoever made me mad").

In summary, the final EFA yielded four factors: anger-control, state anger, trait anger-temperament, and anger-out. Items loaded on conceptually relevant factors, did not cross load, and formed reliable factors or scales.

Additionally, we used the Item Response Theory (IRT) to examine factors through the model of graded responses (Samejima, 1969), which is appropriate for polytomous items. With Xcalibre 4.1 (Guyer & Thompson, 2011), we calibrated item parameters using the method of maximum likelihood, and the estimation was completed in 13 iterations. All the items and the factors showed a good fit, normed $\chi^2(\chi^2/df) < 4$, $p > .05$. Given this fit, parameters were further examined. Following Baker's (2001) criteria, discrimination parameters were high for the first factor (anger control), and moderate for the others (Table 2).

Table 1
Exploratory Factor Analysis of the Anger Inventory for Mexican Children

Item	Factor	Loading	Alpha if item deleted
I maintain control of my anger	1	.78	.86
I control my angry feelings	1	.77	.86
I control my anger	1	.76	.86
I can control my angry reactions	1	.73	.87
When I get angry I know how to control myself	1	.68	.87
When I am angry I stay calm	1	.66	.86
I can control my anger	1	.61	.87
I try to calm down as soon as possible	1	.53	.87
I do things that calm me down	1	.50	.87
I try to relax	1	.48	.87
I do reassuring things	1	.44	.88
I take a deep breath in order to calm down	1	.42	.88
I am angry	2	.71	.71
I am upset	2	.68	.71
I am in a bad mood	2	.59	.72
I feel anger	2	.58	.72
I am upset	2	.55	.73
I want to insult someone	2	.40	.75
I get mad easily	3	.69	.66
I am quick-tempered	3	.62	.68
I have a strong personality	3	.60	.68
I am grumpy	3	.55	.69
I have tantrums	3	.49	.71
I fight with whoever made me mad	4	.78	.70
I hit whoever made me mad	4	.66	.72
I face up to whoever made me mad	4	.58	.73
I pick fights	4	.42	.73
I lose control	4	.37	.72
I argue with others when I get angry	4	.30	.74
I show my anger	4	.26	.75

Table 2
Factors' Average Discrimination and Position Based on Item Response Theory

Factor	Number of Items	Average discrimination		Average position			
		a	SD	b1	SD	b2	SD
Anger-control	12	0.86	0.20	-0.53	0.34	1.46	0.26
State anger	6	0.45	0.06	2.15	0.43	5.25	0.78
Temperament	5	0.46	0.05	-0.15	0.62	2.98	0.77
Anger-out	7	0.59	0.12	0.19	0.58	2.29	0.52

The four factors were analyzed with the information function and the standard error of estimate. Anger-control and anger-out scales were more informative to examine individuals with average levels of control and anger-out, but less informative in cases of extreme scores. The state anger scale was more informative in the examination of high scores, contributing with less information about individuals with average or low scores. Finally, the trait anger-temperament scale was more informative to examine individuals with high and average scores, but less informative in cases of lower scores.

Factors formed small to moderate correlations with each other in Samples 1 and 2 (Table 3). State anger, trait anger-temperament, and anger-out correlated positively with each other,

and negatively with anger-control. These findings indicated that factors were correlated in logical ways, but that they measured different anger constructs as demonstrated by the small to moderate degree of correlation.

A one-way (Gender) multivariate analysis of variance revealed a significant multivariate gender effect, $F(4, 587)=9.42$, $p<.001$, $\eta^2=.060$. Univariate analyses (Table 4) showed gender differences on state and trait anger, but boys reported higher anger-out and lower anger-control. According to Cohen's criteria (Cohen, 1988), the effect size on anger-out is small (i.e., between .01 and .04). However, the effect size for anger-control is below the lower limit of a small effect size (i.e., $<.01$) and, therefore, should be interpreted cautiously.

Table 3
Correlations between Factors

Factors	F1	F2	F3
F1 Anger control	--		
F2 State anger	-.24** (-.21*)		
F3 Trait-temperament	-.32** (-.33**)	.32** (.18*)	
F4 Anger-out	-.50** (-.42**)	.27** (.28*)	.45** (.51**)

Note: Correlations in parenthesis correspond to Sample 2. * $p<.05$, ** $p<.001$.

Table 4
Gender Differences on Factors.

Factors	Boys ($n=302$)		Girls ($n=290$)		Univariate Anger	Anger Effect
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	$F(1, 590)$	Size
Anger-control	26.05	5.63	27.03	5.66	4.50*	.008
State Anger	7.26	1.84	7.28	1.94	0.01	.000
Trait Anger	7.95	2.20	8.27	2.43	2.91	.005
Anger-out	11.52	3.22	10.42	2.90	18.89**	.031

Note: * $p<.05$, ** $p<.001$.

Initial Validation (Sample 2)

In Sample 2 Alpha reliabilities were .75 for state anger, .74 for trait anger-temperament, .76 for anger-out, and .90 for anger-control. Correlations between factors (Table 3) were similar to those found in Sample 1, supporting the factor structure. The Anger Index (measure of physically aggressive behavior) correlated positively with state anger ($r=.18, p<.05$), trait anger-temperament ($r=.35, p<.001$), and anger-out ($r=.58, p<.001$), and negatively with anger-control ($r=-.20, p<.05$). That is, higher momentary (state anger) and general (trait anger) and outward negative expression of anger (anger-out) and lower controlled expression (anger-control) were associated with increased physically aggressive behavior (Anger Index) in Mexican children, supporting the concurrent and construct validity of the Anger Inventory for Mexican Children.

Discussion

Guided by prior theory and research on the state-trait model of anger (Deffenbacher et al., 1996; Spielberger, 1988, 1999), the present research project developed an initial Anger Inventory for Mexican Children. It was linguistically sensitive to and appropriate for Mexican children, because items were drawn from the descriptions of what Mexican children say they feel, experience, say, and do when angry.

Four factors emerged —state anger (6 items), trait anger-temperament (5 items), anger-out (7 items) and anger-control (12 items). Factors were reliable ($\alpha=.73-.90$), and correlations between factors were highly similar in two studies, suggesting consistency in relationships between factors. Measurement characteristics were generally supported by analyses based on IRT. Trait anger-temperament demonstrated its greatest sensitivity in the upper range of the distribution, which is most likely to be associated with negative conditions such as verbal and physical aggression, peer conflict, delinquency, legal difficulties, and the like. Additionally, factors

formed meaningful and logical correlations with a measure of physical aggression (Sample 2), further supporting the validity of scales and the measure's usefulness in understanding anger-related issues and providing a set of potential risk-factors for important social behaviors. In summary, the four factor measure developed in this research and anchored in the state-trait model of anger may provide a useful measure of anger in Mexican children and extend to utility of the state-trait model to assessing anger in this population, as it has with children in other countries (Brunner & Spielberger, 2010; Del Barrio et al., 2005).

Although the present inventory measures some aspects of anger and anger expression, it does not measure other areas. For example, we did not obtain reliable factors to assess trait anger-reaction (i.e., the propensity to react with anger when facing frustrating situations), and anger-in (i.e., the tendency to suppress anger or harbor grudges). Future studies should develop new item sets framed in the language of Mexican children and from which reliable measures of these constructs can be developed.

One limitation of the present inventory, and of any self-report questionnaire, is the potential for increased self-awareness and reflection when responding. That is, children have the opportunity to think before answering. As a result, answers might not reflect what they actually do. This is important because when a person becomes angry sometimes he/she may react quickly and impulsively without thinking. Future studies should test whether the anger inventory correlates with other measures like direct observation of angry behaviors in provocative situations. Another limitation is the reduced number of items in some factors. Although few items provide for more rapid assessment, the risk is that the measure may miss other important aspects of the construct and/or be relatively insensitive for some purposes (e.g., measurement of treatment effectiveness). A final limitation is the nature of

the sample, that is, a non-random sample of private schools in central Mexico. While this sample probably addresses language issues related to Mexican children, further research is needed to assess whether the factor structure and other relationships generalize to broader samples of Mexican youth. Therefore, the factor structure of the Anger Inventory for Mexican Children (see Appendix A) awaits replication.

In summary, this research project provided a four-factor inventory to measure anger in Mexican youth. It is anchored in a well-documented model of anger (Deffenbacher et al., 1996; Spielberger, 1988, 1999) and possesses acceptable scale reliabilities, replicated between-factor correlations, and reasonable correlations with physical aggression, all of which support its concurrent and construct validity and potential value for measuring important aspects of anger in Mexican children.

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Appendix A**Anger Inventory for Mexican Children**

Factor	Item	Answer choices		
	Cómo me siento en este momento...	Nada	Poco	Mucho
2	Estoy enojado	1	2	3
2	Estoy de malas.....	1	2	3
2	Tengo ganas de insultar	1	2	3
2	Estoy molesto	1	2	3
2	Estoy disgustado.....	1	2	3
2	Siento coraje.....	1	2	3
	Cómo me siento generalmente...	Casi nunca	A veces	Casi siempre
3	Soy enojón	1	2	3
3	Hago corajes.....	1	2	3
3	Tengo un carácter fuerte.....	1	2	3
3	Es fácil que yo me enoje	1	2	3
3	Tengo mal humor	1	2	3
	Cuando me enojo...	Casi nunca	A veces	Casi siempre
1	Tengo el control de mi enojo.....	1	2	3
1	Hago cosas que me tranquilizan	1	2	3
1	Controlo mis reacciones de enojo	1	2	3
1	Cuando me enojo sé controlarme	1	2	3
4	Discuto con los demás cuando me enojo	1	2	3
	Cuando me enojo...	Casi nunca	A veces	Casi siempre
4	Soy peleonero.....	1	2	3
1	Respiro profundamente para tranquilizarme	1	2	3
1	Controlo mis sentimientos de enojo	1	2	3
1	Hago cosas que me calman	1	2	3
4	Demuestro mi enojo	1	2	3
1	Controlo mi enojo.....	1	2	3
1	Trato de relajarme.....	1	2	3
4	Pierdo el control	1	2	3
4	Le pego al que me hizo enojar	1	2	3
4	Me peleo con el que me hizo enojar	1	2	3
1	Cuando me enojo mantengo la calma.....	1	2	3
1	Mantengo el control de mi enojo.....	1	2	3
4	Me enfrento con el que me hace enojar.....	1	2	3
1	Trato de calmarme lo más pronto posible.....	1	2	3