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Confirmatory factor analyses of the children's attitudes and behaviors towards animals scale in two eastern cultural contexts

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Abstract The purpose of the present study was to investigate the factor stability of the Children's Attitudes and Behaviors Towards Animals Scale (CABTA) across two eastern contexts: China and Malaysia. Confirmatory factor analyses (CFAs) were conducted on data collected from 700 Chinese mothers and 700 Chinese fathers, and 385 Malay parents of children aged 6–12 years. The CFA results suggested that the model was a good fit for both the Chinese and Malaysian responses. Furthermore, invariance testing showed that although there was factor loading invariance across cultures, the assumption of intercept invariance did not hold. This suggests that although the scale is suitable for use in both cultures, mean comparisons across contexts could be problematic. The internal reliabilities for the Typical and Malicious cruelty subscales were adequate across the samples. All findings show that the CABTA is a promising scale for international use.

Keywords Cruelty to animals · Confirmatory factor analyses · Malaysia · China

Childhood cruelty to animals has been of particular interest to psychology due to its reported association with interpersonal violence in later life. The research examining this association highlights the need to identify children who are at risk of engaging in animal cruelty. For example, Luk et al. (1999) and Ascione et al. (1997) suggested that the development of assessment protocols related to childhood cruelty to animals would assist in both the definition and understanding of quantitative and qualitative variations in childhood animal cruelty, and would facilitate earlier detection of such problems in the clinical environment.

In one attempt to achieve this end, Boat (1999) developed the Boat Inventory on Animal-related Experiences (BIARE) as a screening tool and information-gathering instrument. Amongst the wide-range of animal-related experiences explored by the BIARE are ownership of animals, the use of animals as support in times of stress, loss of animals, cruelty to,

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and killing of animals, and sexual interaction with animals. Boat reported that the instrument was piloted as a structured interview in clinical settings for screening for trauma indicators in hospitalized adolescents. However, the BIARE has been used in only two reported studies, one by Flynn (1999) who modified it for use with a sample of undergraduate students in the United States, and the other by Yamazaki (2010) in a study of maltreated and non-maltreated children in Japan.

In another approach to identifying children who engage in cruelty to animals, Pearse (1999) developed a specific interview schedule designed to obtain qualitative accounts of children's behavior and emotion towards different types of animals. The Parent's Account of Children's Relationships with Animals (PACRA) was compared to item 15 (cruelty to animals) on the child behavior checklist (CBCL; Achenbach 1991) in a small sample of 20 children. The CBCL item failed to identify 50% of the children who were found in clinical interview with parents to be cruel to animals. Consistent with the work of Frick et al. (1993), Pearse suggested that cruelty to animals was early in onset and could be useful as a marker of early disruptive behavioral disturbances in children.

In a more direct assessment of childhood cruelty to animals, Ascione et al. (1997) developed a semi-structured interview for use with children. The Children and Animals Assessment Instrument (CAAI) was field-tested with community and clinical samples of 15 boys and 5 girls ($M = 10.4$yrs) in day treatment and residential programs for emotionally disturbed youth, incarcerated adolescents, and children accompanying their mothers to shelters for battered women. From this study, Ascione et al. (1997), like Pearse (1999), concluded that the use of checklists including only one brief item may sometimes provide misleading information or fail to capture the level of cruelty.

Whilst both the PACRA (Pearse 1999) and CAAI (Ascione et al. 1997) provide detailed qualitative data, both of the schedules are prohibitively long to be used in research contexts. Hence, Guymer et al. (2001) developed a parent-report screening instrument in Australia to assess cruelty to animals. The Children's Attitudes and Behaviors Towards Animals (CABTA) is based on both Ascione's and Pearse's work, and following the CAAI assesses 9 dimensions of cruelty to animals: severity of cruelty; frequency of cruelty; duration of the cruelty; recency of the cruelty; diversity of animals harmed; intention to cause harm; covertness of the cruelty; in a group or isolation; and finally, empathy. It was piloted on 360 elementary school children. Two factors were derived: Typical and Malicious cruelty to animals Test-retest reliability was established through the parents of a small sample of children ($n = 17$), and finally, validity was established when the reports of parents of 19 children who had been diagnosed with either a Disruptive Behavioral Disorder or Attention Deficit Hyperactivity Disorder were compared with the outcome of a semi-structured interview with parents regarding their child's behavior toward animals.

The purpose of the current study is to investigate if, when it is translated and used in other cultural contexts, the CABTA structure proposed by Guymer et al. (2001) is stable. Data from studies conducted in China and Malaysia will be analyzed using confirmatory factor analysis (CFA).

1 Method

1.1 Participants

In China, parental dyads of 380 female and 320 male children ($N = 1,400$) attending elementary school in Chengdu, the capital of Sichuan province, participated in this study. The

children were aged between 6 and 12 years, with an average age of 8.7 years (SD = 1.69). Twenty-four percent of children owned a pet.

In Malaysia, parents of 385 children (153 boys and 232 girls) were recruited through elementary schools located in various rural and urban areas of the state of Selangor that reflected a range of socioeconomic standings. The gender of parent respondent was not recorded. The mean age of boys was 8.76 (SD = 1.73), and the mean age for girls was 9.22 (SD = 1.78). Parents reported that 30.7 percent of children owned a pet.

1.2 Materials

The CABTA consists of 24 questions that are spread over three sections. Section A consists of six general demographic questions and basic pet ownership questions. Section B is made up of eight general questions which relate to the child's experiences with animals and attitudes and behaviors towards animals (e.g., "My child has ridden a horse," "My child is afraid of animals," and "My child enjoys spending time with animals"). Section C consists of 13 questions which relate specifically to cruelty to animals. Two factors were derived using CFA with oblique rotation. The factors are labeled Typical and Malicious cruelty. One item, Item 21 (Intention to harm), loaded on both factors, and is included on each factor because it is theoretically relevant to each. Typical cruelty involves being rough with animals, harming one's own pets, harming animals alone and so forth, perhaps out of curiosity. Malicious cruelty on the other hand involves intentionally or secretly harming animals, harming animals with others, and taking pleasure in harming animals. A total score (total cruelty) can also be obtained by summating the Typical and Malicious scores and subtracting the score for the item that loads on each subscale. Guymer et al. (2001) have shown the CABTA to be both reliable (within subscales and overall, and test-retest) and valid against a semi-structured interview using the PACRA.

1.3 Scale translation

The CABTA was translated into Mandarin for use in China, by one of the authors (XX) who is fluent in both English and Chinese. The instrument was then back-translated by a Chinese professor and two Chinese PhD graduates who live in Australia, and adjustments were made to the original translation by consensus as appropriate.

For Malaysia, the CABTA was translated into Bahasa Malaysia by a Malaysian psychology student studying in Australia who was fluent in both English and Bahasa Malaysia. The instrument was then back-translated by a professor and another bi-lingual student in Malaysia, and adjustments made to the original translations as appropriate.

1.4 Procedure

Approval for the study was sought and gained from the Deakin University Human Research Ethics Committee (DU-HREC), the Research Committees at University College Sedaya, and Sichuan Normal University, the Educational Planning and Research Division of the Malaysian Ministry of Education, and the Jabatan Pelajaran Negri Selangor (State of Selangor Education Department).

In China principals of four primary schools in urban areas of Chengdu gave permission for data to be collected in their school, and in total 15 classes were randomly selected within these schools. One questionnaire pack was sent home with each child in the selected classes. The pack included an invitation to participate in the study, a Plain Language Statement and

Consent Form, mother and father questionnaire sets, and return envelopes. The questionnaires sets included the CABTA and two other measures not being analyzed here. If parents were willing to participate in the study, they completed their questionnaires separately and returned them in separate sealed envelopes to the school. The completed questionnaires were then collected from the schools. Eight hundred survey sets (i.e. 800 mothers and 800 fathers) were distributed, with a return rate of 91%.

In Malaysia, three primary schools in the areas of Damansara, Subang Jaya, and Kuala Selangor were selected with the aim of recruiting a sample that was diverse with regard to urban and rural representation, socio-economic status, and ethnicity. Principals of those schools were invited to participate in the study. All agreed to facilitate the study. A pack inviting parents to participate in the research was sent home with each child in one class at each year level in each school. If parents were willing to participate, they completed the CABTA and another scale, and returned them in a sealed envelope to the school, where they were collected by the researchers. The response rate was 90%.

2 Results

2.1 Analytic procedure

The validity of the factor structure was examined using confirmatory factor analysis (CFA) in Mplus 6.11. Initially, the established two factor model (Guymer et al. 2001) was fit separately for the Chinese and Malaysian samples to ensure it was appropriate for both samples. Following this, consistent with the procedures outlined by Ho (2006), the model was fitted simultaneously in both samples. An unconstrained model (where loadings and intercepts are free to vary across samples) was compared to two constrained 'measurement invariance' models: one where loadings are held constant across groups (weak measurement invariance) and the other where loadings and intercepts are constrained to equality across both samples (strong measurement invariance). Measurement invariance is established if the fit of the constrained model is does not fit the data significantly worse than the unconstrained model. Nested models are traditionally compared using chi-square statistics. However, with large sample sizes such as in this study chi-square becomes too sensitive and can show significant differences between models even when measurement non-invariance is present (Meade et al. 2008). Given this, nested models were compared using difference in CFI as recommended by Meade et al. As recommended by Hu and Bentler (1999), overall model fit was evaluated using four fit indices: CFI, TLI, RMSEA and SRMR.

2.2 Analyses

Data were screened for missing values; the few missing values (4.4%) were missing at random. Tabachnik and Fidell (2001) suggest that for large data sets with less than 5% of missing data, most procedures for handling missing values generate similar results. Therefore, missing values were replaced using the mean score for that item. Screening revealed some evidence of univariate non-normality in the data (skew values greater than 2). Rather than transform the data, an alternative estimator was used. Specifically, Mplus offers a maximum likelihood estimator with robust standard errors that is valid for non-normal data and this was used for all CFA models.

Results from the initial separate CFAs showed that the two factor structure was a good fit for both the Chinese ($\chi^2(34) = 84.7$, CFI = 0.95, TLI = 0.93, RMSEA = 0.03, SRMR =

Table 1 Fit of measurement invariance CFA models

Model	χ^2(df)	CFI	TLI	RMSEA	SRMR
Free	128 (68)	0.96	0.94	0.03	0.04
Weak measurement invariance	132 (76)	0.96	0.95	0.03	0.05
Strong measurement invariance	567 (86)	0.64	0.62	0.08	0.07

Table 2 Factor loadings for CABTA scale

Item	β
Typical cruelty	
15 Child is rough with animals	0.62
16 Child causes harm to animals	0.90
17 Child has harmed an animal recently	0.78
18d Child has harmed his/her own pets	0.28
19 Child has harmed animals alone	0.64
Malicious cruelty	
20 Child has harmed animals when with another person or in a group	0.55
21 Child has harmed animals intentionally	0.81
18a Child has harmed small insects	0.40
23 Child has secretly harmed	0.54
24 Child has shown pleasure when harming animals	0.63

0.04) and Malaysian samples ($\chi^2(34) = 43.0$, CFI = 0.98, TLI = 0.97, RMSEA = 0.03, SRMR = 0.05). However, in contrast to previous research, in both samples, item 21 did not cross-load on to both factors. Given this, the cross-loading was removed for the multiple group CFA and instead item 21 was used as an indicator variable for only the malicious cruelty factor.

Results from multiple-group CFA supported only weak measurement invariance; that is, there was no meaningful difference in fit between the unconstrained and weak invariance models (ΔCFI = 0.00) and both models were a good fit for the data (see Table 1 for fit information). However, the assumption of intercept invariance did not hold with the strong invariance model showing a large decrease in fit relative to the weak invariance model (ΔCFI = 0.32). Factor loadings were generally high (see Table 2).

The Cronbach alphas for the Malaysian and Chinese animal cruelty sub-scales were low but acceptable for the typical cruelty sub-scale (0.78 and 0.72 for Malaysian and Chinese data respectively). For the malicious cruelty sub-scale alphas were lower (0.71 and 0.68 for Malaysian and Chinese data respectively).

3 Discussion

The purpose of the current study was to examine the structural stability of the CABTA when used in different cultural contexts: China and Malaysia. To date, there have been no studies examining the factor structure of the CABTA through CFA. In general, the results of this study support the structure of CABTA across these new contexts. A minor difference was

that one item that cross-loaded on both subscales in the original version of the CABTA only loaded on the Malicious cruelty subscale in these samples. However, the factor structure was the same in both contexts (loadings were invariant).

Despite this, two issues are worthy of note. Firstly, although the factor loadings were invariant across cultures (supporting the two factor structure in both samples), the intercepts were not. In concrete terms, this means that for some given level of animal cruelty, participants in one group were endorsing items more or less strongly than participants in the other group. The consequence of this is that factor scores cannot be directly compared across cultures as they do not necessarily have the same meaning (i.e., in terms of level of animal cruelty, a score of ten in one culture does not necessarily mean the same thing as a score of 10 in another culture). There are a number of possible reasons for this. First, the scale was administered using two different languages (Simple Chinese for the Chinese sample and Bahasa Malaysia for the Malaysian sample). Thus, issues with the translation may have led to some items being more or less difficult to endorse within each group, which may have resulted in the lack of intercept invariance. Alternatively, there may be different types of response bias operating in each culture. Either way, it is worth noting that the lack of intercept invariance does not undermine the use of the scale and the two factor structure within each culture individually, it only makes it difficult to compare levels of animal cruelty across cultures.

A second point worth noting is that the internal reliabilities of the subscales, as assessed with Cronbach's alphas, were marginally adequate despite items having decent factor loadings. Cicchetti (1994) suggested that an alpha of 0.7 was required to demonstrate adequate internal reliability. Here the alphas for the typical cruelty sub-scale were 0.78 and 0.72, while for the malicious cruelty sub-scale alphas were 0.71 and 0.68 for Malaysian and Chinese data respectively. It is possible that the addition of a small number of extra items would improve the reliability of the malicious cruelty subscale for the Chinese and Malaysian samples respectively.

While the findings of this study generally support the structural stability of the CABTA across Chinese and Malay cultures, the results need to be viewed in light of the following limitations. The first limitation is that the Malaysian sample was selected from both urban and rural areas, while the Chinese sample was selected only from urban areas. Attitudes towards animals may vary between those living in urban areas and those living in rural areas. Tallichet et al. (2005) found that urban and rural socialization differences have an impact on animal cruelty, in regards to the type of animals targeted and exposure to animal abuse. In addition, parent-child relationships differ among cultures. In some cultures, parents may take a more active role in their children's life compared to other cultures. In China for example, many grandparents play a significant role in the upbringing of their grandchild. Parents who do not have much interaction with their children may know much less about their child's behaviors than those who actively engage in their child's life. This may suggest that a direct way to assess children's behaviors to animal is necessary.

In conclusion, the two-factor model in the CABTA remained relatively stable across the two different contexts, with generally adequate reliabilities and stable CFA structures. The finding suggests that it is a promising scale for use of other contexts. Further work however is required in these contexts to determine community norms and criterion validity for the CABTA.

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