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DISEÑO Y VALIDACIÓN DE LA ESCALA DE BIENESTAR ANIMAL: *EDUCACIÓN EMOCIONAL DE LOS NIÑOS PARA PREVENCIÓN DEL MALTRATO*

Design and validation of the animal welfare scale: Emotional education of children to prevent abuse

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Resumen

Es importante disponer de instrumentos fiables que logren evaluar la actitud hacia el bienestar animal de los estudiantes de educación primaria. El abuso o maltrato de los niños hacia los colectivos vulnerables merece total atención, por ello incidimos en que los animales constituyen un colectivo vulnerable que requiere ser estudiado. El presente estudio de tipo descriptivo, transversal y correlacional, con objetivo de diseñar y validar una escala de actitud hacia el bienestar animal (ABA) en 100 estudiantes de segundo y tercer ciclo de primaria (primaria alta) que incluye niños entre 9 a 12 años residentes de comunidades del estado de Sonora, México. El análisis factorial arrojó dos factores que explican el 39.32% de la varianza total con un índice de Keiser-Meyer-Olkin (KMO) de 0.86 y altos índices de consistencia interna para la escala total (α= 0.90) y las subescalas. Adicionalmente, el análisis factorial confirmatorio produjo un adecuado ajuste práctico y estadístico en el modelo de covarianzas y el modelo de segundo orden. El análisis de covarianzas también evidenció validez convergente y divergente. Los análisis de comparación por grupos demostraron que el sexo y el grado escolar no influyen en las actitudes a favor o en contra de la especie animal. Finalmente, se

encontró que, a mayor edad de los niños y habitar en familia extensa, influye al desarrollo de actitudes a favor del cuidado y protección animal.

Palabras clave: Bienestar animal, cuidado y protección animal, maltrato animal, Sonora.
Summary

Abstract

It is important to have reliable instruments that can evaluate the attitude towards animal welfare of elementary school students. The abuse or mistreatment of children towards vulnerable groups deserves full attention, therefore we emphasize that animals constitute a vulnerable group that needs further studies. This is a descriptive, cross-sectional and correlational study aimed to validate the design of a scale that measures the attitude towards animal welfare (ABA) in 100 students from fourth to sixth grade of elementary school. It includes children between 9 to 12 years old residents of communities in the state of Sonora, Mexico. The factor analysis yielded two factors that explain 39.32% of the total variance with a Keizer-Meyer-Olkin (KMO) index of 0.86 and high internal consistency index for the total scale (0.90) and the subscales. Additionally, the confirmatory factor analysis produced an adequate practical and statistical fit in the covariance model and the second order model. The covariance analysis also evidenced convergent and divergent validity. Comparison analyzes by groups showed that sex and school grade do not influence attitudes in favor or against the animal species. Finally, we found that older children living in an extended family develop better attitudes in favor of animal care and protection.

Keywords: Animal welfare, animal care and protection, animal abuse, Sonora.

1. INTRODUCTION

Gandhi (1957) highlighted the importance of how a society is defined by the treatment of its animals. In the last four decades, the classical definition of "animal welfare" was reduced to the understanding that animals should be in healthy conditions, with a healthy diet and not be exposed to aggressions from the environment. Since then, this concept began to be based on the scientific field based on the measurement of animal suffering and their adaptation process in a certain environment where they could satisfy their physiological and ethological needs (Broom, 1986).

One of the most cited concepts of animal welfare is that established by Broom (1986), who argues that the welfare of an individual is the state it presents to the conditions it is exposed to in the environment in which it is found. Both humans and animals face a variety of physiological, immunological, behavioural and other brain-regulated strategies in their environment. Feelings such as pain, fear, sadness, and pleasure are some of the coping mechanisms that are critical to their well-being (Broom and Fraser, 2015; Broom, 2008).

Animal welfare" is an issue that is perceived in different dimensions, for some it simply means not physically mistreating an animal, however, animal welfare is based on the ability of animals to successfully adapt to a given environment and develop their full physiological and ethological potential (Mazas, 2015). For their part, Fraser, Weary, Pajor, and Milligan (1997) argue that "animal welfare" did not emerge in science to express a scientific concept, but arose due to ethical concerns regarding the quality of life of animals, which years later became the object of study for the scientific community in relation to the adaptive capacity of animals in their environment, as well as psychological, physiological and behavioural states. In this regard, Broom (1986) considers that animal welfare is related to the ability of animals to cope with challenges and difficulties arising from the environment.

In order to achieve favourable changes in the treatment of animals and to instil individual responsibility, it is important to educate and understand the meaning of animal welfare, which includes two important components, the physical health of the animal and its emotional state. The first component includes aspects related to the absence of bruises and diseases, a healthy and nutritious diet and being kept in a state of physical and thermal well-being. The second component involves the presence of positive emotions and the absence of negative ones such as pain, fear, sadness, annoyance, stress and others (Broom, 2014). There are several factors that influence children's attitudes, empathy and attachment to animals such as direct contact with animals, age, gender, cultural, ethnic and social component and geographical space (Muldoon, Williams, Lawrence, Lakestani, & Currie, 2009).

According to statistics from the National Institute of Statistics and Geography (INEGI, 2015) Mexico is the Latin American country with the highest number of dogs in the region. The high rate of pet abandonment not only represents a social problem due to health implications, such as diseases transmitted to humans and environmental pollution, but also the lack of empathy and social responsibility are important variables to consider. According to the Mexican Chamber of Deputies (2016) of the 18 million dogs in the country, only 30% of them are owned and 70% live on the streets. Hermosillo, capital of the state of Sonora, tops the list of animal cruelty nationwide, according to data from the head of Rescate Animal en Hermosillo (Rodriguez, 2020). The figures are denominated by the number of complaints received on social networks and testimonies from citizens who report cruelty to pets such as stoning, burns with acid or hot water, dehydration due to abandonment in yards or roofs at high temperatures, malnutrition, among others. These alarming data make it increasingly necessary to educate from a very early age in the various social institutions in order to address the problem of animal care and respect. To achieve this, it is important to have instruments that can measure the attitude towards animal welfare of primary school children in Hermosillo, Sonora. It is worth mentioning that in recent years some progress has been made in education and currently, Mexican schools have incorporated subjects related to physical and emotional health care, as well as environmental education. However, animal care and respect is a topic that has remained pending on the educational agenda, as knowledge and attitudes associated with respect for animals, their habitat and care for the planet have not yet

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been incorporated into the content of the educational curriculum. Even though some decades ago, Jiménez, López and Pereiro (1995) had already pointed out that the ultimate aim of environmental education was precisely to bring about changes in people's attitudes and behaviour in the quest to protect and conserve biodiversity.

Individuals, unlike other species, have the ability to voluntarily control their behaviour and attitudes. This control strategy has evidently been neglected with respect to the protection of and respect for animals, although citizens are now beginning to consider a type of "environmental ethics" as part of the moral commitment that people should have towards the care of the natural substrate and biodiversity. This, considering that caring for animals represents a reality in which all people have a commitment and obligation to respect them (Albareda, 2015). However, the importance of introducing animal welfare in the educational sphere is reiterated, with the aim of raising awareness among students about what animal abuse represents and improving attitudes towards the preservation of the species.

2. ANIMAL WELFARE IN SONORA

According to the records of the National Institute for Social Development in Sonora (INDESOL) through a request for information, it was not until 1983 that the Sociedad Protectora de Animales A.C. was created in the State of Sonora, its founder being the Veterinary Doctor Rafael Tabaré Monzalvo Pérez. Since then, different groups and civil associations have arisen in the state that fight for the protection of animals. In spite of the advances in animal protection in the last decades, it is still essential to know how children in Sonora treat domestic animals and how their parents or guardians orientate them to respect and care for animals. According to the Animal Protection Law for the State of Sonora, published in Number 45 Section II of the Official Gazette of the State of Sonora, on Monday, December 3, 2018; there are only 3 people to date who have received any type of punishment for animal abuse since its creation and reports of pet abuse are continuous and increasing. This is an underlying issue for our society that, in the midst of an economic and social crisis, violence is present in everyday life, both in people and animals. "Education must prepare for life; or, to put it another way: all education aims at human development" (Bisquerra, 2005, p.96).

Currently, the contents of educational models do not include animal care and respect at the basic level, and although more and more teachers are concerned about including environmental care contents, the subject of animal care has been relegated to the background. According to Bisquerra (2005), when no behavioural dysfunction has occurred, primary prevention tends to converge with education to maximise constructive tendencies and minimise destructive ones. This would imply that emotional education could prevent aggressive behaviour towards other living beings in the environment.

The issue of animal welfare has been approached from different disciplinary fields and recently a set of scales that measure animal welfare in different cultural contexts have been validated. A study by Mazas, Fernández, Zarza, and María (2013) focused on validating a scale of attitudes towards animal welfare in secondary and higher

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education students. The scale presented appropriate psychometric properties and it was found that gender and educational level condition the appreciation of animal welfare, i.e. women and university students value animal welfare more highly. On the other hand, Philips, et al., (2012) analysed attitudes towards animal welfare in terms of the integrity of specials associated with utilitarianism. They found significant differences between European, Asian and Scandinavian students, finding that the latter held more favourable attitudes towards animals than the other two groups of students.

Numerous studies have used prison population samples to analyse the potential relationship between acts of cruelty to animals and violence towards humans (Reolid, 2016; Querol, 2008; Wright and Hensley, 2003). A US survey reported that people who had been cruel to animals as children were more likely to perpetuate this behaviour into adulthood and were more likely to be victimised by a partner in adulthood than people who had not acted aggressively towards animals (Knight, Ellis and Simmons, 2014). Other studies have found that, while children's abuse of their pets is multifaceted, it is generally due to following family patterns (McDonald, Collins, Nicotera, Hageman, Ascione, Williams, & Graham-Bermann, 2015) and that even these children are more likely to take on the role of perpetrator and develop aggressive and cruel behaviours towards animals and other people in the future (Varela, 2017; Vaughn, Fu, DeLisi, Beaver, Perron, Terrell, & Howard, 2009).

Other studies have predicted that there is a significant relationship between animal cruelty and the development of antisocial behaviour (Gullone, 2012; Kavanagh, Signal, & Taylor, 2013). In this sense, animal abuse co-occurs with other violent behaviours such as bullying, sexual abuse, and these behaviours have been identified through a diagnostic assessment of antisocial disorder. Additionally, high rates of animal maltreatment are higher in abused and maltreated children. A study by Ascione and Shapiro (2009) found that in clinical samples of children with symptoms of distress and living in hostile family environments, children are more likely to develop violent behaviours towards animals than those living in favourable living conditions. In contrast, Herzog (2012) argues that animal abuse is not a predictor of delinquency, but is a sign present in children with severe childhood psychopathology and that many of these psychopathological disorders develop during their developmental stages of life. When a child grows up in an environment of violence, a number of factors may arise that may motivate the child to harm animals. Experts on animal abuse and interpersonal violence have associated acts of animal abuse with bullying, corporal punishment, sexual abuse, school shootings and psychopathic behaviour in children, so animal abuse can clearly be a predictor of violence in children (Reolid, 2016; Wright and Hensley, 2003).

As we can see, there are variables related to animal abuse that are found to be associated with aggressive behaviour towards animals and that significantly predict aggression towards other people in adulthood, which is called a 'progression pattern'. It is so called because it constitutes behaviour that begins with animal abuse and culminates in violence towards other people (Beirne, 2016). Undoubtedly, people's attitudes towards animal care are largely influenced by the upbringing they receive from

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an early age in their context of belonging, i.e. by traditional practices, experiences, experiences and general beliefs (Broom, 2005).

The aforementioned studies have focused on studying animal welfare from different components and have focused on particular aspects of the construct. Although our study follows a similar line, we have designed a new scale of attitude towards animal welfare in primary school children, since none of the existing studies were adapted to the characteristics that we consider relevant to study animal welfare in primary education in the state of Sonora. For example, we could analyse beliefs about animal welfare, the emotional bond that children develop with animals and the intention to act and behave in certain situations involving animals. According to Sabater, this could shed light on the efforts of educators of all kinds interested in the manipulation or education of humans (Sabater, 1989. p.160).

Emotional aspects are certainly a key factor in considering educating children and the development of empathy. In recent decades, there has been a growing interest of researchers to study empathy with children's personality including: prosocial, antisocial, aggressive behaviour, peer acceptance, emotional stability, self-concept, intelligence and creativity. (Garaigordobil and García, 2006). Drane (2009) defines empathy as the ability to feel what others are feeling, considering human beings and/or animals, and a correlation has been found between empathy towards animals and humans (Paul, 2000). As we can see, sensitising children to promote respect for animals can have an impact on preventing violent behaviour. Programmes that take into account the emotional intelligence of both teachers and students are necessary in the midst of the current crisis, not only because of the pandemic (COVID-19) that generates emotional imbalance in the population, but also because of the social and economic problems that prevail in Mexico. For his part, (Rothe, 2017) points out that pets represent one of the first affective bonds in a child's life and that compassion and respect cultivate basic values that help them to respect and live in society. Similarly, Salovey and Sluyter (1997) identify five basic dimensions of emotional competencies such as cooperation, assertiveness, responsibility, empathy and self-control.   Animal welfare is a very important issue in Mexico, which has been very controversial and has caused conflicting opinions. For this reason, the present study aims to design and validate a scale of attitudes towards animal welfare in primary school students in the state of Sonora.

3. METHOD

3.1. Participants

The present quantitative, descriptive, cross-sectional and correlational study (Bhattacherjee, 2012) worked with a convenience sampling that allowed the selection of 100 students from fourth, fifth and sixth grade of primary school (upper primary) of which 66% (n=66) were girls and 34% (n=34) were boys. The students were from public and public schools in Carbó, Guaymas, Huepac, Banamichi, Ures and Hermosillo in the state of Sonora. Students ranged in age from 9 to 12 years old. Of these children, 10% (n=10) belonged to a single-parent family type, 64% (n=64) to a nuclear family and 26% (n=26%) to an extended family. According to the operational definition of family types by

Roman, Martín and Carbonero (2009) the single-parent family consists of mother or father and child, the nuclear family consists of parents and children, while the extended family may consist of three or more generations, i.e. parents, children, grandparents and great-grandparents.

Table 1. *Descriptive statistics of the study participants.*

Variable	FE	%
Biological sex		
Male	34	34%
Female	66	66%
School grade		
Fourth grade	15	15%
Fifth grade	35	35%
Sixth grade	50	50%
Age		
9 to 10 years old	36	36%
11 to 12 years old	64	64%
Type of family		
Single-parent family	10	10%
Nuclear family	64	64%
Extended family	26	26%

n=100, FE= Frequency

The items of the animal welfare scale were developed according to the dimensions of attitudes described by Ajzen (2005), i.e. cognitive, affective and behavioural aspects. The cognitive dimension considers the knowledge that people have about a stimulus that consequently provokes an attitude. The affective dimension refers to the feelings of liking and disliking that can be derived from a stimulus that produces people's attention. In other words, it consists of the individual's predisposition towards the object that provokes a positive or negative attitude and which is accompanied by an emotional charge. Based on the above, the Animal Welfare Attitudes (ABA) scale consisted of two subscales: animal care and protection with 8 indicators and "no animal abuse" with 10 indicators. The scale scheme presents sentences written in positive or favourable and negative or unfavourable positions. Finally, the behavioural dimension consists of the individual's predisposition to act in a certain way in the face of a stimulus; in this case, the behaviour of primary school students towards animals is analysed. The items of the scale encompass a generalised attitude towards animal welfare considering the dimensions mentioned above, but some groupings of items related to two components related to animal care and protection and animal mistreatment can be seen. The objective of differentiating the components was done with the purpose of conforming the attitude on the basis of these two elements, considering that it can be both favourable and unfavourable.

The design and elaboration of the scale contemplates two factors called "animal care and protection" and "no animal abuse". This scale consisted of a total of 18 items with a four-point Likert-type response scale ranging from 1 (strongly agree) to 4 (strongly

disagree). The concept of "animal welfare" includes aspects related to attitudes towards animals from cognitive, emotional and behavioural dimensions.

4. DATA ANALYSIS

The authors were unable to personally visit the schools to invite them to participate in this study due to the COVID-19 pandemic. To initiate the research, they first contacted the school principals by electronic means and by telephone. The invitation letter was sent to participants to pass the questionnaire. This was done with the prior request and acceptance of the school management and parents, as well as the teachers responsible for each classroom. The application of the animal welfare attitude scale (ABA) was carried out in compliance with all ethical requirements. The statistical treatment of the data was carried out with the support of SPSS version 23.0 (Field, 2013). For construct validity from the exploratory factor analysis, factor extraction analysis was carried out using the principal components method and Varimax rotation, with Keiser-Meyer-Olkin (KMO) normalisation, which according to Kaiser (1974) fluctuates between $0.80 \geq KMO \geq 0.70$, and with a cut-off point of $\geq .0.40$. Respectively, the EQS 6 program was used to perform the Confirmatory Factor Analysis. Reliability coefficients were calculated to assess internal consistency by means of Cronbach's alpha index for each scale.

With the Confirmatory Factor Analysis (CFA), two structural equation models were specified and tested with the EQS statistical package (Bentler, 2007). The first model was constructed for the description and estimation of the covariances of the factors associated with the animal welfare scale. The second model presents the structural model of the second-order factor (animal welfare) predicted by the first-order factors (animal care and protection and no animal abuse) and their manifest indicators represented in plots considering the recommendations of Hau and Marsh (2004). Reliability coefficients were calculated to assess internal consistency by means of Cronbach's alpha index for each scale. In addition, convergent and divergent validity of the plots or lambdas, and covariation between the factors of the structural models were performed. Finally, Pearson's correlation analysis was performed to observe the interrelationships between the factors of the animal welfare scale.

Finally, the Average Variance Extracted (AVE) and its difference between the square root of the AVE (SAVE) and the covariances of the factors were calculated to measure convergent and divergent validity. According to Hair, Black, Babin, and Anderson (1995) the convergent validity of the AVE should be greater than .50, and the discriminant validity is determined if the SAVE is greater than the covariances of the factors (Henseler, Ringle, and Sinkovics, 2009).

Additionally, Pearson's correlation analysis was performed with the resulting factors of the scale to check the strength or degree of association between variables taking into consideration the proximity to +1 and the significance index of .05 to .01. (Restrepo and González, 2007). Finally, in order to compare the variables by sex and corroborate the existence of significant differences between the two groups, a Levene and Student's t-

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test was carried out to identify the existence of differences by sex and an analysis of variance (ANOVA oneway) to identify differences by school grade (Field, 2013). Previously, the normality of the data was verified through the skewness and kurtosis test (Pérez, 2004).

4.1. Exploratory Factor Analysis

The PFA showed a 2-factor structure to be extracted with the principal components method and Varimax rotation on the 18 items of the total scale that reached factor weights above .40. An internal consistency of 0.90, KMO of .869 and Bartlett's test of sphericity of 1321.450, p= .000 were obtained (See Table 1).

Table 2. *Values of fit index, percentage of total variance explained and Cronbach's alpha.*

Kaiser-Meyer-Olkin measure of sampling adequacy.		.869
Bartlett's test of sphericity	Approximate Chi-square	1321.450
	gl	153
	Sig.	.000
Explained variance		39.32
Cronbach's alpha		0.90

Table 3. *Adequacy index and percentage of total variance explained*

	Exploratory factorial			Factorial with extraction		
Componente	Total	% of variance	% accumulated	Total	% of variance	% accumulated
1	7.078	39.321	39.321	7.078	39.321	39.321
2	3.805	21.141	60.462	3.805	21.141	60.462

n=100

The first component represents "animal care and protection". It is made up of 8 items that explain 39.32% of the variance with factor weights ranging between .66 and .87. This factor has a Cronbach's alpha of 0.93 with an overall mean of M = 1.41 (SD = .60). The item with the highest index was "If I could not take care of my pet, I would give it up for adoption" (M = 1.58 SD = .83). On the other hand, the indicator with the lowest score was "When I have a pet I like to be responsible and take care of it" (M = 1.30, SD = .67).

The second component called "no animal abuse" is composed of 9 items that explain 21.14% of the variance with scores between .52 and .91 with an internal consistency of 0.88 with an overall mean of M = 3.64 (SD = 0.655). The items with the highest ratings were "When I have a pet at home and we no longer want it, it is best to leave it on the street" (M = 3.80, SD = .49) and "It amuses me to see an animal being beaten" (M = 3.80, SD = .49). In contrast, the lowest mean was for the item "Street animals are a nuisance and give my city a bad image" (M = 3.45, SD = .79). Finally, the

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values of communality (H2) were adequate since 66% of the total number of items presented values above .50 (see Table 3).

Table 3. *Factorial distribution of the items of the animal welfare and communality scale (H2).*

Reagents	Average	DE	Factors		H²
			1	2	
5. When I have a pet I like to be responsible and take care of it.	1.30	.674	**.802**		.644
6. We treat animals well at home.	1.33	.637	**.865**		.777
8. I would like to give water or food to animals in the street.	1.40	.765	**.872**		.779
9. If I see an animal being mistreated, it is my duty to defend it.	1.55	.796	**.851**		.725
10. I have been taught at home that I should respect animals.	1.42	.699	**.741**		.587
14. When I see an animal in the street, I would like to help it.	1.39	.680	**.879**		.802
15. If I couldn't take care of my pet, I would give it up for adoption.	1.58	.831	**.664**		.465
17. I would like to support an institution that takes care of abandoned animals.	1.38	.722	**.879**		.797
1. When I have a pet at home and we don't want it anymore, the best thing to do is to leave it on the street. (R)	3.80	.492		**.814**	.664
2. Animals don't feel when you hit them because they are animals.	3.76	.474		**.915**	.858
3. Birds should be kept in cages so that people can admire them (R)	3.71	.537		**.731**	.548
4. I am amused when I see an animal being beaten (R)	3.80	.492		**.816**	.667
7. I believe that, if a dog misbehaves, you should hit it (R)	3.60	.696		**.670**	.455
11. Animals are only for people's amusement (R)	3.55	.796		**.711**	.535
12. If an animal has ticks, the best thing to do is to throw it out in the street (R)	3.66	.699		**.668**	.488
13. In my house we beat our pets if they do something wrong. (R)	3.49	.810		**.528**	.363
16. Animals in the street are a nuisance and give my city a bad image (R)	3.45	.796		**.589**	.346
18. Fights between animals are fun (R)	3.63	.761		**.607**	.382
Internal consistency index (α)			0.93	0.88	
Percentage of variance			39.32%	21.14%	
Factor 1= Animal care and protection; **Factor 2** = no animal abuse					

4.2. Pearson correlation matrix

To test for concurrent validity, the correlation between the components of the animal welfare scale and the association between these factors and socio-demographic variables (age and family type) was estimated. A positive and significant correlation was

obtained between not mistreating animals and the animal care and protection factor (r = .31) with a significance level of p<0.01. This indicates that as children care for and protect animals they know the importance of not mistreating them.

In turn, correlations were estimated between socio-demographic variables such as age and family types (single-parent family, nuclear family and extended family) with the factors of "care and protection of animals" and "no animal abuse". It was found that as age increases, children's care and protection of animals increases (r = .47, p<0.01), while age correlated positively and significantly with non-abuse of animals (r = .45, p<0.01), indicating that the older the children are, the greater the abuse of animals.

As for the type of family, a positive and significant correlation was obtained with the animal care and protection factor (r = .46, p<0.01), which indicates that as the number of family members increases, the care and protection of animals also increases. In turn, family type correlated positively and significantly with non-mistreatment of animals (r = .44, p<0.01), indicating that as the number of family members increases, non-mistreatment of animals also increases. Finally, family type did not correlate with the age of the infants (r = .13) (see Table 4).

Table 4. *Pearson correlation matrix of animal welfare factors.*

Factores	CPE	NAA	AGE	TF
Animal Care and Protection	1			
No Animal Abuse	.31**	1		
Age	.47**	.45**	1	
Type of Family	.46**	.44**	.13	1

**p <.01 *CPE* Animal Care and Protection, *NAA* No Animal Abuse, *TF* Type of Family (single-parent, nuclear and extended).

4.3. Confirmatory Factor Analysis

The covariance model of the animal welfare scale consisted of two first-order factors called animal care and protection and non-mistreatment of animals with their respective indicators (plots), all indicators had high and significant factor loadings. The covariance between animal care and protection and no animal abuse was significant (p<.05). Figure 1 shows the covariance model with an acceptable goodness of fit χ2 =8.99, (19 gl), p=.342; BBNFI=.98, BNNFI=.99, CFI= .99, RMSEA= .03. The above results reveal that the model is supported by the data.
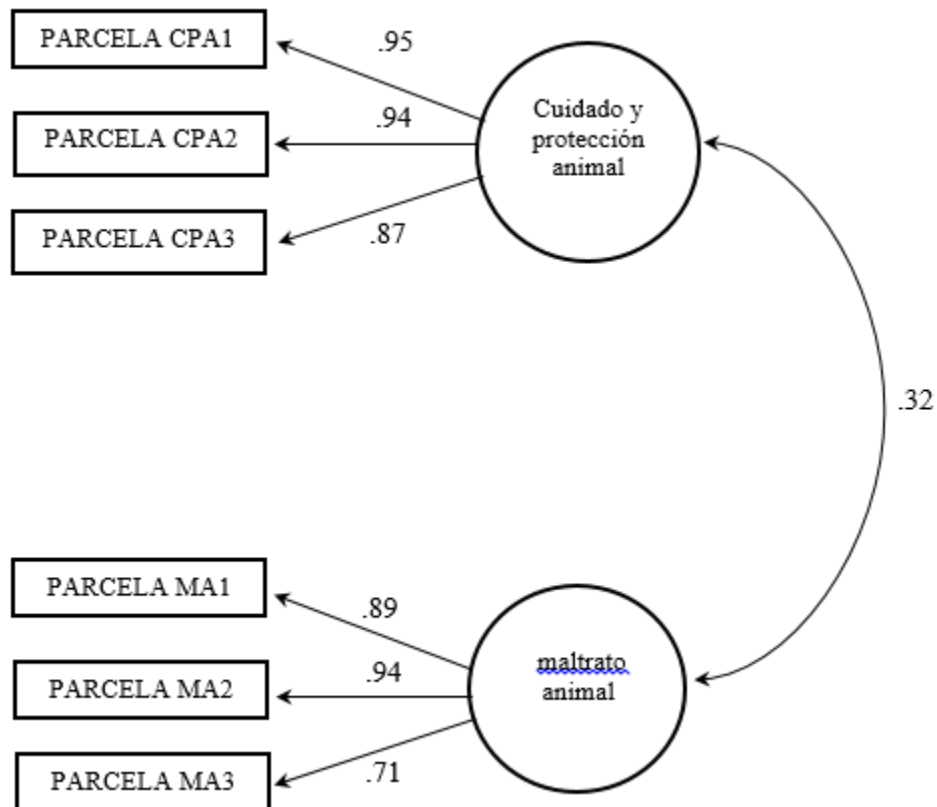
Figure 1. *Covariate model of the animal welfare scale. χ^2=8.99, (19 gl), p=.342; BBNFI=.98, BNNFI=.99, CFI= .99, RMSEA= .03.*

4.4. Convergent and divergent validity

Once the models had been tested, the convergent and divergent validity was assessed by calculating the AVE in a standardised way, and the difference between the square root of AVE and covariances. For the calculation of AVE the factor weights of each factor were extracted and squared. They were then aggregated and divided by the total number of indicators for each of the constructs. The square root of the sum was then taken for the calculation of the square root of AVE. Convergent validity can be satisfactory if the construct measured is higher than 0.50 (Gabini, 2017). Furthermore, it is suggested that discriminant validity will be obtained if the square root of AVE is greater than the covariance. In the structural model of the factors associated with the animal welfare scale, both convergent and divergent validity was obtained between the factors of the scale. In Figure 2, the results of the structural model of the animal welfare scale were presented, showing that the first-order factors (animal care and protection and no animal abuse) and their respective indicators (plots) significantly predict the animal welfare construct. The model also showed convergent construct validity as the relationships of the first-order factors (structural vulnerability and cultural vulnerability) are high and significant. The statistical goodness-of-fit of the model was non-significant

($χ2=8.993$, [7 gl], p=.253), and the practical indicators were acceptable (BBNFI=.99; BBNNFI=.98; CFI=.99; RMSEA=.06). The statistical and practical goodness-of-fit indices of the model indicate that the model fits the data.
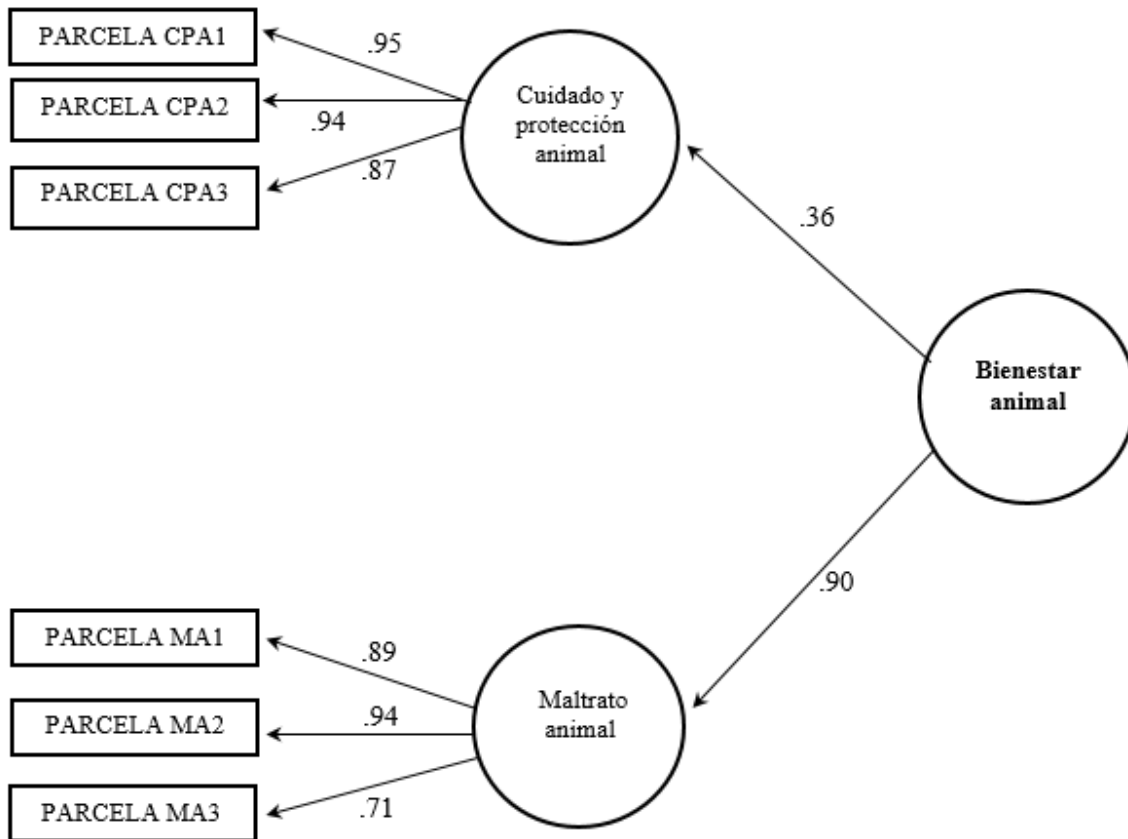

Figure 2. *Structural model of the animal welfare scale. $χ^2=8.993$, (7 g.l.), p=.253; BBNFI=.98, BNNFI=.99, CFI= .99, RMSEA= .05.*

In order to corroborate the influence of sex as a dependent variable and considering the skewness and kurtosis values as tests of normality of the data, a Student's t-test was run. The results showed no statistically significant differences between boys and girls, suggesting that both perceive animal care and non-mistreatment equally with respect to the variable animal care (t = -0.883; p >.05; l.g. = 96) and non-mistreatment (t = -1.67; p >.05; l.g. = 98).

Respectively, a one-way ANOVA analysis was performed to determine the existence of significant differences by school grade (fourth, fifth and sixth) with respect to the animal welfare factors. The results of the univariate analyses showed no significant differences in attitudes towards animal welfare. For both the animal care and protection factor (F=.443, [2 g.l.], p>.05) and the no animal abuse factor (F=.850, [2 g.l.], p>.05) there were no significant differences. This indicates that school grade does not determine animal protection and animal abuse.

5. DISCUSSION

As expected, the Attitude towards Animal Welfare (ABA) scale, composed of 18 items, demonstrated adequate construct validity and an acceptable internal consistency index (Cronbach's α: .90) as well as the subscales that obtained adequate reliability indices (α ≥ 0.88) indicating that it is relevant for assessing attitude towards animal welfare in primary school children. The scale shows that the attitude towards animal welfare is manifested in two factors: "Animal care and protection" and "no animal abuse", which explain the interrelationships between the items. Convergent and divergent validity also demonstrates the construct validity of the animal welfare scale.

The results of the factor analysis revealed a two-factor solution with acceptable goodness-of-fit (see Figure 1). Since the covariances between the animal welfare latent variables were found to be high and significant. An additional model was also tested with two first-order factors (animal care and protection and no animal abuse) that formed the second-order factor (animal welfare); the latter model obtained adequate goodness-of-fit indices (see Figure 2).

Correlation analysis showed that the older the age of the children, the higher the animal care and protection. These findings are congruent with the literature on attitudes towards animal welfare in primary school children, where it has been proven that as age increases, girls assume a more favourable position towards animal welfare than boys (Mazas and Fernández, 2018). In terms of family type, it was found that children who belong to more extended families develop more favourable attitudes towards animals than those who live with only one parent (nuclear family) or with both parents (nuclear family).

Also, the analysis of variance showed no statistically significant differences between school grade (fourth, fifth and sixth) and the factors of the animal welfare scale. This indicates that children develop pro-animal attitudes irrespective of the school grade in which they are enrolled. These results are consistent with a study of a sample of secondary school students, where no significant differences were found with respect to the variable "school grade". This indicates that pro- or anti-animal behaviour is not determined by the educational level of the students (Mazas and Fernández, 2018).

As for the variable "sex", there were no statistically significant differences between girls and boys in primary school, which suggests that both sexes express the same attitude towards animals ($p>.05$). This is in contrast to the literature, which has shown that girls have more favourable attitudes towards animals than boys, who have lower attitudes towards animals (Mazas, 2015; Mazas, et al., 2013).

The analysis of the descriptive statistics shows that there are aspects that should be worked on with children to promote animal welfare. Despite the structure of the scale, our results indicate that children in Sonora do take care of their pets; however, some items indicate that there is a lack of empathy with regard to the treatment of animals. 72% of the children consider it right to hit the animal if it misbehaves, as a result of item 13 "In my house we hit the pets if they do something bad". On the other hand, only 67%

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of the children report having received instruction to respect animals, result of item 10 "At home I have been taught that I should respect animals". Another result that shows the need to take action for the protection of animals is the result that indicates that 78% of the children consider that animals only serve to amuse people. On the other hand, 77% consider that if an animal has ticks, the best thing to do is to throw it out in the street, as shown in item 12 "If an animal has ticks, the best thing to do is to throw it out in the street" and 78% of the respondents consider that animals do not feel when you hit them, as shown in item 2 "Animals do not feel when you hit them because they are animals".

It is necessary to advance animal protection laws and to understand the vulnerability to which domestic animals are subjected in the state of Sonora. In addition, results can be obtained that can help to raise awareness about the existing problem, as previous literature has shown that attitudes or behaviours towards animal abuse are generally the consequence of a hostile family environment that perpetuates violence and triggers a set of psychological problems or psychopathological disorders that result in behaviours of abuse and cruelty towards animals (Ascione and Shapiro, 2009; DeGue and DiLillo, 2008). Previous studies have also found that when non-abuse of animals occurs early in life, it is often a predictor of interpersonal violence in adulthood (Henderson, Hensley and Tallichet, 2011).

The results also showed that there is a lack of empathy towards the treatment of animals, hence the importance of taking action for their protection. We consider it important to take the results into account and contribute to the creation of more effective laws, but above all to educate and raise awareness among children to avoid behaviour that hurts and causes suffering to animals. It is recommended that textbooks include topics that promote animal welfare and encourage the development of empathy and sensitivity towards other living beings.

This study is not without limitations. The sample size was modest, so these results may not be generalisable to the general population. Furthermore, the null association between sex and the factors on the animal welfare scale could be attributed to this condition and it is possible that a larger sample size could have revealed robust associations between these variables. It is important to work with a larger sample in future research, as the type of sampling used in this study (convenience sampling) did not consider several locations in the state of Sonora that would allow for a larger sample size.

This research needs to be carried out with larger and more representative samples in different cultural settings, in both rural and urban areas, in public and private schools or at other educational levels (secondary, high school, university and postgraduate) in order to assess possible differences in attitudes towards animals. Although the aim of this study was to validate the design of the scale, it is considered important to take the results into account, as they can contribute to proposals for educational reforms, including the dissemination of existing laws for the punishment of those who violate the integrity of animals, especially to educate and prevent behaviour that hurts and causes suffering to animals. For such a task, both parents and teachers, who play an important

role in the formation of attitudes and behaviours towards animals, should be contemplated (Díaz, 2017).

Despite these limitations, the findings of this study have important implications, as they provide insight into Mexican children's attitudes towards animal welfare. These results may be useful for government authorities to make decisions for the development of legislative actions and to understand the vulnerability to which domestic animals are subjected in the state of Sonora. In addition to obtaining results that can help raise awareness of the problem of violence and non-mistreatment that exists towards the most vulnerable (such as animals), and how these behaviours generally emerge from the socio-cultural context of belonging and have a direct impact on animal non-mistreatment. The use of scales with adequate psychometric properties, as is the case of the animal welfare scale, are extremely useful to find out about these behaviours.

It is important to have reliable instruments that can assess children's attitudes towards animal welfare in order to create programmes that can raise awareness at an early age through interventions in schools. Although there is little evidence that children who abuse animals later in life will abuse them as adults remains partial and limited (Tallichet, Hensley, O'Bryan, & Hassel, 2005; Hensley, Tallichet, & Dutkiewicz, 2009), from the empirical base there is no general agreement about the actual source of non-abuse. Empirically, it has been found that this behaviour is rooted in the evolutionary development of humans, while others consider that the feeling of opposition in children towards animals is instilled from the culture of belonging and is based on human survival, such as meeting food needs (hunting and eating meat) (Herzog, 2012).

An important component is the development of empathy in children so that they acquire the necessary tools to prevent violence in our society (Reolid, 2016).

Despite the favourable changes that have been achieved in the treatment of animals among the youngest children, and the favourable average attitude of children to the treatment of their pets that resulted from this study. On the other hand, it is also recommended to include in textbooks topics that promote animal welfare and enhance the development of empathy and sensitivity towards other living beings. The contents and programmes should consider aspects of emotional intelligence that promote the development of empathy. The control and regulation of emotions stems from the need for people not to let themselves be carried away by emotional impulses, as the opposite would have very negative consequences both personally and socially (Dueñas, 2002). It is necessary to address the issue of animal welfare in educational content so that students improve their attitude and treatment of different species of animals, and become aware of the reality that animals live in different social environments. For example, the rearing of farm animals for food production, the advancement of animal welfare regulations, the use of animals in scientific research, exhibition in entertainment events, or those living in conditions of neglect. For as Bradley, Mennie, Bibby and Cassaday (2020) put it, depending on the type of species, it is possible to arouse different attitudes of sympathy towards animals.

The results of this study will allow the development of actions aimed at improving the treatment of animals in order to raise awareness of people's attitudes towards animal welfare and to achieve a greater understanding of the importance of the issue in question.

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Supplementary materials

Annex 1. Animal Welfare Attitude Scale (ABA)
1= Strongly Agree; **2=** Agree, **3=** Disagree, **4=** Strongly Disagree.

1. When I have a pet at home and we no longer want it, the best thing to do is to leave it in the street.
2. Animals don't feel when you hit them because they are animals.
3. Birds should be kept in cages so that people can admire them.
4. I am amused when I see an animal being beaten.
5. When I have a pet I like to be responsible and take care of it.
6. In my house we treat animals well.
7. I think that if a dog misbehaves, you should hit it.
8. I would like to give water or food to the animals in the street.
9. If I see an animal being mistreated, it is my duty to defend it.
10. I have been taught at home to respect animals.
11. Animals are only good for people's amusement.
12. If an animal has ticks, the best thing to do is to throw it out in the street.
13. In my house we beat our pets if they do something wrong.
14. When I see an animal in the street, I would like to help it.
15. If I couldn't take care of my pet, I would give it up for adoption.
16. Street animals are a nuisance and give a bad image to my city.
17. I would like to support an institution where abandoned animals are cared for.
18. Animal fights are fun.