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F. Caruso et al.

Humans and jaguars

People and jaguars—new insights into the role of social factors in an old conflict

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Abstract Throughout its range in Latin America, the jaguar *Panthera onca* is threatened by habitat loss and fragmentation, and by conflict as a result of coexistence with people. This Near Threatened species is a top predator, often illegally hunted throughout its range. Understanding people's attitudes and perceptions and the factors that could influence them is crucial for the conservation of this species. In this study we assess how degree of knowledge,

attitudes and perceptions among people in northern Argentina regarding jaguars vary depending on their level of education, age and activity. We interviewed 810 people living in and around 10 protected areas in northern Argentina. Positive perceptions and attitudes towards the jaguar were associated with economic benefits that people may receive from the species' presence, such as tourism. Unexpectedly, higher levels of formal education were not associated with more positive attitudes and perceptions. Negative attitudes and perceptions towards the species were determined by fear; people see jaguars as a threat to their lives. This study shows that the socio-economic factors that affect the level of tolerance towards jaguars are not related only to economic losses. Our findings provide information for the design, orientation, execution and evaluation of conservation programmes and projects in Argentina.

Keywords Argentina, Conservation, human–wildlife conflict, jaguar, *Panthera onca*, Semi-arid Chaco, social perceptions, Yungas

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Introduction

Understanding people's attitudes and perceptions and the factors that could influence them is crucial for the conservation of species whose coexistence with people leads to conflicts, such as in the case of large carnivores preying on domestic animals (Ripple et al., 2014). Castaño-Urbe et al. (2017) highlight the extent and complexity of human–felid conflicts in Latin America, where the jaguar *Panthera onca*, categorized as Near Threatened on the IUCN Red List (Caso et al., 2008), provides a poignant example of this conservation challenge (Botero-Cruz et al., 2017; Caruso et al., 2017; Marchini et al., 2017).

The largest reduction (95%) of the species range has occurred in Argentina, where remaining populations are confined to small and probably disconnected areas in the Yungas, the Chaco and the Atlantic Forest. For these reasons, the species is categorized nationally as Critically Endangered (Perovic & Herrán, 1998; Altrichter et al., 2006; Aprile et al., 2012; Di Bitetti et al., 2016). The species' present distribution in Argentina is c. 90,500 km², 4.4–5.1% of the historical range in the country (Di Bitetti et al., 2016). This range contraction is a result of conversion of natural habitats into livestock pasture and farmland, habitat fragmentation, reduction of natural prey and illegal hunting (De Ángel, 2009; Perovic et al., 2015; Di Bitetti et al., 2016). Hunting was formerly practiced for pelt commercialization, but the species continues to be persecuted because of predation on livestock and because it is perceived as a threat to human life (Perovic, 2002; Altrichter, 2006; Altrichter et al., 2006; Perovic et al., 2015).

Large carnivores such as the jaguar have cascading effects on ecological communities and ecosystem functioning (Ripple et al., 2014). The jaguar's requirement for extensive and continuous habitat and its dependence on large prey species often result in overlap with local

farmers and settlers, which increases the potential for conflicts (Conforti & De Azevedo, 2003; De Azevedo, 2008) and the risk of persecution and eradication (Paviolo, 2010). Jaguar conservation could be facilitated by taking into account its role in ecosystems and the need to generate a change in both attitudes and human actions (Ripple et al., 2014).

Understanding how people perceive the jaguar and which factors influence perceptions will help shape conservation to protect the remaining populations. Perceptions are understood as a hierarchy of knowledge that ranges from the basic knowledge of an individual about an object, in this case the jaguar, to cognitive properties as beliefs (Dickman et al., 2013). An attitude is a person's favourable or unfavourable evaluation of an object (e.g. a specific species, a management action). Attitudes have both cognitive and evaluative elements; i.e. a combination of beliefs and negative and/or positive views about an object (Pierce et al., 2001).

Perceptions of and attitudes towards large carnivores are not solely determined by direct costs associated with living alongside them, such as a livestock predation (Treves & Bruskotter, 2014), but rather they are 'the product of a dynamic and complex net of social factors such as age, educational level, main economic occupation of the people, and cultural factors' (Dickman et al., 2013, p. 111). For example, perceptions and attitudes towards large carnivores tend to be more positive among young people (Williams et al., 2002) and those with higher levels of formal education (Consorte-McCrea et al., 2017). Hostile perceptions, on the other hand, are more frequently found among people whose primary occupation is livestock husbandry (Porfirio et al., 2016).

Socio-cultural factors, such as popular beliefs, also affect attitudes towards carnivores; thus social attitudes are closely connected to individual life styles and, once established, become deep-rooted (Naughton-Treves et al., 2003). Jaguars tend to generate multiple emotions, ranging from admiration to irrational terror (Hoogesteijn et al., 2016). For some people the presence of large carnivores may produce positive feelings such as joy, whereas for others it may evoke negative feelings such as fear (Altrichter et al., 2006; Johansson & Karlsson, 2011; Jacobs et al., 2014). Wildlife knowledge can influence attitudes towards big cats, and reduce fear and conflict between people and them (Marchini & Macdonald, 2012; Porfirio et al., 2016; Engel et al., 2017). Previous research has also shown that people with more formal education express greater appreciation and/or concern for protection of species than those with less formal education (Kellert et al., 1996; Luksenburg & Parsons, 2014).

In Argentina little is known about the socioeconomic factors that influence the perceptions and attitudes of people towards jaguars. For example, in Misiones and Corrientes the species is culturally important and is valued positively, even though it disappeared in Corrientes 50 years ago (Paviolo, 2010; Caruso & Jiménez Pérez, 2013), whereas in the Chaco it is considered dangerous and is perceived in negative terms (Altrichter et al., 2006). Thus perceptions and attitudes are context-specific (Caruso et al., 2017). The attitudes and perceptions of local people towards jaguars have not been studied in the northern region of Argentina, hindering the promotion of coexistence between people and jaguars.

In this context our objective was to identify which socioeconomic factors (level of education, age, and occupation) could explain the level of knowledge, perceptions and attitudes regarding jaguars in northern Argentina. As attitudes towards wildlife may be influenced by past and present interactions (Kellert et al., 1996), we hypothesized that negative perceptions and attitudes towards jaguars would more likely be found among older people. Based on previous studies we also expected that negative perceptions would be found among livestock farmers and those with lower educational levels.[Is this one hypothesis or two hypotheses?

Study area

The study was carried out in and around 10 Protected Areas in Jujuy, Salta, Santiago del Estero and Chaco provinces (×Table 1). These sites are part of the Yungas and Chaco ecoregions and their selection was driven by the importance of these areas for the remaining jaguars of northern Argentina (Perovic et al., 2015; Palacios, 2016; Ramadori et al., 2016) (×Fig. 1).

Yungas

Lying along the eastern slopes of the Andes from Venezuela to north-west Argentina (Cabrera & Willink, 1980), the Yungas is a fragile and threatened ecoregion comprising 52,000 km² in Argentina, of which 4.8% is protected (Brown et al., 2002). Annual rainfall is 900–1,000 mm, concentrated in the summer rains during December–April. During the cold months, rainfall ceases and condensation from the mists that characterize these cloud forests is important for water uptake (Burkart et al., 1999). The average annual temperature varies from 5 °C in wintertime to 23 °C in summertime (Ibisch et al., 2003). The main economic activities are extensive livestock farming, small-scale agriculture, extensive tobacco and sugar farming, selective logging, and fossil fuel extraction. Nature-based tourism is an emerging activity (Perovic et al., 2015). Illegal hunting of jaguars and their prey is common throughout the region (Perovic, 2002; Chalukian et al., 2004). Until c. 1950, the jaguar occurred throughout the Yungas ecoregion (Perovic et al., 2015), but its current distribution is restricted to an area of 1,160 km² in Jujuy and Salta provinces, c. 22% of its original range. The species has a high probability of survival in 73% of this area as a result of the geo-environmental heterogeneity and remoteness from human activities (Perovic et al., 2015).

Semi-arid Chaco

The semi-arid Chaco is located in the central Chaco ecoregion, which extends over 1.2 million km², covering parts of Argentina, Paraguay and Bolivia, with c. 660,000 km² in Argentina (Dinerstein et al., 1995). The climate is markedly seasonal, with a mean annual temperature of 24 °C and annual rainfall of 400–800 mm concentrated in October–April (Caziani et al., 2003). Three rivers cross the semi-arid Argentine Chaco from north-west to south-east, but large parts of the region lack permanent water sources other than artificial ponds constructed for livestock (Caziani et al., 2003). The main economic activities are agriculture and extensive cattle husbandry and logging (Fahrig, 2003), which have resulted in habitat fragmentation and other alteration of the natural environment (Periago et al., 2015). Subsistence hunting by rural settlers is commonly practiced (Altrichter, 2006). As a result of these anthropogenic impacts, the jaguar population of the semi-arid Chaco is the most threatened in the country (Quiroga, 2013); the potential range of the jaguar in the semi-arid Argentine Chaco is c. 520 km² (Quiroga, in press).

Methods

During 2014–2016 we interviewed 20% of the people living in and around (<25 km) the 10 protected areas, using convenience sampling, a non-random method used to create samples according to ease of access and people's availability to be part of the sample (Kothari, 2004). We conducted a pilot test to help design an effective and efficient questionnaire, during which we interviewed 127 people of different socioeconomic and educational profiles, to obtain a representative and balanced sample. We first explained the project's objectives to potential interviewees and only conducted an interview if the person consented verbally. We coded and analysed the responses to determine if the definition of the problem was adequate and to limit the profile of the desired sample by defining key variables such as age, place of residence, time in the region, occupation and level of education. The pilot test also helped us to define the type, format and wording of the questions, to avoid ambiguity. We also used as a guide our own experience in the region and our familiarity with the local culture, as well as the results of our previous research projects.

We interviewed men (n=423) and women (n= 387) who had lived for at least 5 years in the area, using a structured questionnaire, in Spanish, with open and closed questions in four sections: (1) profile of the interviewee (age, place of residence, time living in the region, occupation and level of education), (2) attitudes towards jaguars, (3) perceptions of jaguars, and (4) knowledge of the ecological role of jaguars.

The independent variables were: (1) education (coded according to the highest level of formal education reached by the interviewees: no school, elementary (1st–7th grade), secondary (8th–12th grade), and college; (2) age (coded as young, 13–20 years; adult, 21–50; and older, 51–92 years); and (3) occupation, coded according to how the interviewees passed most of their time and/or their main source of income (coded as farming and cattle ranching, college or school student, tourism, and other). The category other (42% of the interviewees) included housewives, teachers and government employees.

To determine attitudes towards jaguars we asked: Do you support jaguar conservation in the region? For perceptions towards jaguars, we asked two questions: How would you feel if the jaguar became extinct in the region, and what would you feel if you came across a jaguar in the forest? To determine knowledge about jaguars, we asked: Could you describe the ecological role that the jaguar plays in the ecosystem? For this last question we evaluated each response of the interviewees and considered correct those that mentioned concepts related to jaguars as top predators affecting the functioning of the ecosystem.

Data analysis

The response variables were: (1) support for jaguar conservation (categories: support, does not support, undecided); (2) identification of the ecological role that the jaguar plays in the ecosystem (categories: correct identification, incorrect identification); (3) feelings about jaguar extinction (categories: sad, happy, indifferent), and (4) feelings about an encounter

with a jaguar (categories: fear, joy, indifference). To test our hypothesis and identify factors (level of education, age classes, and occupation) that could potentially explain the response variables, we built a series of multinomial logistic regression models for response variables with more than two categories, and a logistic regression model for binary responses. The Akaike information criterion (AIC; Akaike, 1974) was used to evaluate the best model. The *R* (R Core Team ref) package *nnet* was used for building multinomial logistic regression models, package *MuMIn* for model selection (Kuznetsova et al., 2015), and the *glm* function with a binominal family for logistic regression.

Results

We found that level of education, age and occupation were all predictors of the four response variables (×Table 2).

Support for jaguar conservation More (68%) support for jaguar conservation was found among people with elementary education (×Fig. 2a). The odds that interviewees would be in favour of conservation was higher among interviewees with elementary and secondary education in comparison with those with no education (odds_ratio_{elementary} = 2.04; P = 0.003; odds_ratio_{secondary} = 2.47; P = 0.005), but interviewees with a college degree did not have a higher odd of supporting conservation (odds_ratio = 1.16; P = 0.67). Older interviewees (71%) tended to support the protection of jaguars (Fig. 2b), with the odds of being in favour of jaguar conservation higher for adults and older people than for younger people (odds_ratio_{adult} = 6.18; P = 0.013; odds_ratio_{older} = 29.80; P < 0.001). Occupation also influenced the level of support, with people engaged in tourism (100%) tending to support the protection of jaguars (Fig. 2c). If the person was a student or tourism worker the odds of being in favour of the protection of the species was higher compared to farmers and cattle ranchers (odds_ratio_{farmers and cattle ranchers} = 11.10; P = 0.001; odds_ratio_{tourism} = 1542323; P = 0.939; Supplementary Table 1).

Identification of the jaguar's ecological role A higher proportion of interviewees who recognized the ecological role of the species had elementary (52%) and college education (35%; Fig. 2d). The odds that people with college education recognized the ecological role of the jaguar was higher than for people without education (odds_ratio = 2.4; P = 0.002). The odds that people with secondary education recognized the ecological role of the species tended to be lower compared to people without education (odds_ratio = 0.57; P = 0.06). Most adults (76%) and elders (77%) did not recognize the ecological role of the species, whereas the majority of young people (80%) did recognize this (Fig. 2e). However, only the odds of the elders tended to be lower than the odds of the young (odds_ratio_{adult} = -0.64; P = 0.47; odds_ratio_{elders} = -1.55; P = 0.07). Knowledge also varied according to occupation. Most students (82%) recognized the ecological role of the species (Fig. 2f), with the odds of recognizing the ecological role of the jaguar higher for students compared to people engaged in farming and cattle ranching (odds_ratio = 15.7; P < 0.0001; Supplementary Table 2).

Feelings about jaguar extinction The majority of interviewees who completed secondary (85%) and elementary school (75%) felt sadness at the possible extinction of the jaguar (Fig. 2g). The odds that the person would feel sad if the jaguar were to go extinct was greater for those with elementary (odds_ratio = 4.93; $P = 0.001$) or secondary education (odds_ratio = 2.10; $P = 0.009$) compared to people without education. Most young (68%) interviewees felt sadness at the possible extinction of the jaguar (Fig. 2h), and for adults or elders the odd of feeling sad was lower compared to younger people (odds_ratio_{adult} = 0.03; $P = 0.016$; odds_ratio_{older} = 0.02; $P = 0.013$). Most people engaged in tourism (74%) felt sadness at the possible extinction of the jaguar (Fig. 2i), with the odds that an interviewee would feel sad about the possible extinction of the jaguar considerably higher if the person was a tourism worker (odds_ratio = 15.59; $P < 0.0001$) compared to farmers and cattle ranchers (online Supplementary Table 3).

Feelings about an encounter with a jaguar Regardless of level of education, age and occupation, most interviewees indicated they would feel fear in any potential encounter with a jaguar (Fig. 2). The lowest proportion (63%) was found among farmers and cattle ranchers (Fig. 2l). The highest percentage (35%) of interviewees who expressed to feel indifferent in relation to a possible encounter with a jaguar in the forest was recorded among those with college education (Fig. 2j)[Difficult to follow these sentences]. The odds of feeling indifference for interviewees with college education was the only category of education tended to be higher than for those with no formal education[Also difficult to follow] (odds_ratio = 1.67; $P = 0.052$). Most young (78%), adult (75%) and older people (74%) expressed fear in relation to a possible encounter with the species (Fig. 2k). The odds that the person would feel joy in encountering a jaguar was lower for adults or elders compared to young people (odds_ratio_{adult} = 0.02; $P < 0.0001$; odds_ratio_{older} = 0.05; $P = 0.001$). If the person was a student the odds of feeling joy at an encounter was lower compared to farmers and cattle ranchers (odds_ratio = 0.03; $P < 0.0001$; Supplementary Table 4).

Discussion

This study sought to address the socioeconomic factors that influence people's perceptions of jaguars in the southernmost area of its distribution. At the general level, our results showed that positive perceptions and attitudes towards jaguars seem to be closely influenced by people's occupation. This could be related to the economic benefits that people receive from the presence of the species (in this case, tourism). Thus, to gain more social support, jaguar conservation initiatives could consider promotion of economic alternatives such as tourism for people living within the species' range. Charismatic large cats tend to appeal to a wide audience and are therefore valuable to nature-based tourism, although the chance of spotting an individual in the wild is limited (Skibins et al., 2013). In northern Argentina nature-based tourism is a relatively recent activity, taking place primarily on private properties and in a few protected areas (Perovic et al., 2015). All interviewees engaged in tourism related activities supported jaguar conservation. Similar results were found in Corrientes, where the majority of local people agreed to a reintroduction plan for jaguars, identifying a potential

income source (Caruso & Jiménez Pérez, 2013). However, we found that people engaged in tourism did not understand the ecological role of the species; i.e. they were interested in jaguars mainly as a generator of income. This indicates the need to foster greater awareness in the local emerging tourism industry, and a need for education that emphasizes values associated with the existence of jaguars beyond their economic value.

Perovic (2002) found that jaguars in the Argentine Yungas are considered the sole or principal cause of livestock loss, and thus as long as the current land use and farming system continues, negative attitudes towards jaguars are likely to persist. However, we found that support for jaguar conservation among cattle ranchers was relatively high (55%). Ranchers commented repeatedly on compensation or other economic benefits for livestock losses that could explain this finding. Given that ranchers pose a direct threat to jaguars through retaliatory killings (Perovic et al., 2015), interventions that seek to make them more interested in jaguar conservation could positively impact the status of this species at the southern fringes of its distribution.

Fear for personal safety and a lack of knowledge of a predators' ecological importance can generate negative social perceptions and, hence, the persecution and death of jaguars (Soto-Shoender & Main, 2013). We found that the majority of people at secondary school and young were afraid of encountering a jaguar in the forest, and were convinced they could be attacked. In contrast, fewer ranchers expressed fear of an encounter. However, they were also convinced that jaguars could attack people. These results contrast with our hypotheses. Fear is an emotion that can be learned or is innate (that is, a consequence of biological evolution; Jacobs, 2009). Fear for personal safety amongst people with secondary education and amongst young people could be a result of lack of knowledge about the jaguar and of attitudes learned from familiar and popular beliefs; i.e. without having had direct experience with the species (McGovern & Kretser, 2015). It is possible that the lower per cent of ranchers expressing fear is based on experiences of encounters with the jaguar (in most cases when a rancher encounters a jaguar the animal is killed). These findings accord with a study in the tropical lowlands of Guatemala where it was found that 79% of the interviewees believed that jaguars are a threat to people (Soto-Shoender & Main, 2013). Hoogesteijn et al. (2016) found that jaguars do not pose a danger to people's physical integrity; of 184 jaguar sightings reviewed, only a single attack was reported, and it involved a mock attack by a male guarding a female in heat.

Fear of jaguars varies depending on people's knowledge (Cavalcanti et al., 2010), with some correlation between formal education and support for conservation (Williams et al., 2002). Few of our interviewees, however, had an understanding of the ecological importance of jaguars in maintaining the integrity of natural ecosystems. However, contrary to expectations we found there was no a clear relationship between people's knowledge about the ecological role of the species and their level of formal educational. This suggests that formal education is insufficient on its own; education about conservation should be locally-based, intentional and planned, inside and outside of schooling.

Promoting greater tolerance towards wildlife and thus reducing the killing of jaguars also depends on people's willingness to live with wildlife (Ripple et al., 2014). Improving the level of understanding of jaguar biology and ecology among the people that share the space with the species will probably reduce fear, increase tolerance and reduce hunting (Marchini & Macdonald, 2012; Porfirio et al., 2016). In further support of this idea, Slagle et al. (2013) highlighted the importance of information (i.e. the value of the species) in increasing acceptance of the black bear *Ursus americanus* (Slagle et al., 2013). Factors explaining attitudes and perceptions are context specific (Paviolo, 2010; Caruso & Jiménez Pérez, 2013). Our study shows that factors explaining attitudes and perceptions vary mostly in relation to people's occupation, and can determine the level of tolerance towards jaguar conservation. Our findings corroborate those of earlier research (Caruso et al., 2017; Tortato et al., 2017), showing that the benefits of tourism greatly exceed the losses caused by predation, and increase the acceptance of jaguars.

Considering attitudes and social factors is essential for understanding and elucidating ways to mitigate conflicts, design educational programmes and implement conservation projects. In Argentina, promoting tourism could be an economic alternative compatible with the conservation of the jaguar and could increase the level of appreciation of the existence of the species, thus fostering positive attitudes.

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Conflict of interest None.

Ethical standards This article derives from research carried out as part of FC's doctoral thesis. The National University of Salta and the thesis Committee reviewed the research proposal and provided ethical approval. This research abided by the *Oryx* guidelines on ethical standards.

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TABLE 1 Protected areas included in this study. Priority areas for the conservation of the jaguar *Panthera onca* in Argentina are indicated in **bold**. [Provide a full caption that describes all columns in table.]

['Chaco Seco' is not a term used in the text: please clarify] Semi-arid Chaco

| Province | Protected area | Category | Ecoregion | Jaguar presence | Area (ha) | Settlers within | No. of interviews |
|---------------------|---------------------------------|--------------------|------------------------|-----------------|-----------|-----------------|-------------------|
| Salta | Baritú | National Park | Yungas | Regular | 724 | Yes | 31 |
| | El Nogalar de los Toldos | National Park | Yungas | Regular | 325 | Yes | 96 |
| | El Rey | National Park | Yungas–Semi-arid Chaco | Extinct | 442 | No | 14 |
| | Pizarro | National Reserve | Yungas–Semi-arid Chaco | Extinct | 784 | Yes | 82 |
| | Los Palmares | Provincial Reserve | Semi-arid Chaco | Extinct | 60 | No | 27 |
| | Acambuco | Provincial Reserve | Yungas–Semi-arid Chaco | Regular | 330 | Yes | 81 |
| Jujuy | Calilegua | National Park | Yungas | Regular | 763 | No | 139 |
| | Las Lancitas | Provincial Reserve | Yungas–Chaco | Occasional | 95 | Yes | 39 |
| Santiago del Estero | Copo | National Park | Semi-arid Chaco | Occasional | 1,181 | Yes | 242 |
| Semi-arid Chaco | El Impenetrable | National Park | Semi-arid Chaco | Likely | 1,298 | No | 59 |
| <i>Total</i> | | | | | | | 810 |

TABLE 2 Multinomial logistic regression models for responses to four questions regarding the jaguar. Models are ranked according to their ΔAIC and weighting.

[The questions here are not in the same order as presented in the Methods: please re-order as required (either the text or the table). In the last three columns there are one, two and three decimal places, respectively: is this really necessary (i.e. why not the same number of decimal places throughout)?

Is there a reason why independent variables are in different orders (e.g. Education + Age + Occupation versus Age + Education + Occupation). If there is not, please place them in alphabetical order throughout]

| Model | df | Log-likelihood | AICc ¹ | $\Delta AICc^2$ | wAICc ³ |
|--|----|----------------|-------------------|-----------------|--------------------|
| Do you support jaguar conservation in the region? (support, no support, undecided) | | | | | |
| Education + Age + Occupation | 18 | -683,503 | 1403.9 | 0 | 0.923 |
| Age + Occupation | 12 | -692,230 | 1408.9 | 4.98 | 0.077 |
| Education + Occupation | 14 | -707,117 | 1442.8 | 38.89 | 0 |
| Occupation | 8 | -713,601 | 1443.4 | 39.51 | 0 |
| Education + Age | 12 | -739,322 | 1503.0 | 99.16 | 0 |
| Age | 6 | -750,471 | 1513.0 | 109.18 | 0 |
| Education | 8 | -754,038 | 1524.3 | 120.38 | 0 |
| Null | 2 | -766,247 | 1536.5 | 132.64 | 0 |
| Could you describe the ecological role that the jaguar plays in the ecosystem? (correct, incorrect) | | | | | |
| Age + Education + Occupation | 9 | -382.68 | 783.6 | 0 | 985 |
| Education + Occupation | 7 | -389.12 | 792.4 | 8.79 | 12 |
| Age + Occupation | 6 | -391.55 | 795.2 | 11.62 | 3 |
| Age + Education | 6 | -454.87 | 921.8 | 138.25 | 0.00 |
| How would you feel if the jaguar became extinct in the region? (sad, happy, indifferent) | | | | | |
| Education + Age + Occupation | 18 | -693,153 | 1423.2 | 0 | 0.957 |
| Education + Occupation | 14 | -700,413 | 1429.4 | 6.18 | 0.043 |

| | | | | | |
|---|----|----------|--------|--------|-------|
| Age + Occupation | 12 | -710,515 | 1445.4 | 22.25 | 0 |
| Occupation | 8 | -719,365 | 1454.9 | 31.74 | 0 |
| Education | 8 | -739,758 | 1495.7 | 72.53 | 0 |
| Education + Age | 12 | -735,665 | 1495.7 | 72.55 | 0 |
| Age | 6 | -768,931 | 1550.0 | 126.80 | 0 |
| Null | 2 | -777,973 | 1560.0 | 136.79 | 0 |
| What would you feel if you came across a jaguar in the forest? (fear, joy, indifference) | | | | | |
| Education + Age + Occupation | 18 | -523,033 | 1082.9 | 0 | 0.728 |
| Age + Occupation | 12 | -530,254 | 1084.9 | 1.97 | 0.272 |
| Education + Age | 12 | -544,105 | 1112.6 | 29.67 | 0 |
| Education + Occupation | 14 | -543,324 | 1115.2 | 32.24 | 0 |
| Occupation | 8 | -552,024 | 1120.2 | 37.30 | 0 |
| Age class | 6 | -554,393 | 1120.9 | 37.96 | 0 |
| Education | 8 | -558,545 | 1133.3 | 50.34 | 0 |
| Null | 2 | -574,734 | 1153.5 | 70.55 | 0 |

¹Akaike information criterion corrected for finite sample sizes.

²Difference in AICc between best model and each individual model.

³Model Akaike weight.

FIG. 1 Study area, protected areas (NP, National Park; NR, National Reserve; PR, Provincial Reserve; Table 1) and the current range of the jaguar *Panthera onca* in the Yungas (Perovic et al., 2015) and Chaco (Quiroga et al., 2014) in north-west Argentina.

Place latitude/longitude tick marks and labels inside bounding box, rather than on the outside
Delete 'REFERENCE' (it is not required)

Change 'Jaguar current distribution' to 'Jaguar range'

FIG. 2 Relationships between the responses variables Support for jaguar conservation (a–c), Identification of the ecological role that the jaguar plays in the ecosystem (d–f), Feelings about jaguar extinction (g–i), and Feelings about an encounter with a jaguar (j–l), and the independent variables education, age and occupation. [The four lines of this figure need to match both the order in the text and that in Table 2.