When good attitudes are not enough: understanding intentions to keep yellow-shouldered Amazons as pets on Margarita Island, Venezuela

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Abstract Unsustainable harvesting to supply the demand for pets is the second most significant threat to parrots (Psittacidae). Given that parrot keeping is widespread, in-depth and culturally sensitive research is needed to inform and develop interventions targeted at changing consumer preferences and purchasing behaviours. Parrot keeping is thought to be driven mainly by a desire for companionship (the affection hypothesis). Alternative hypotheses include a deeply ingrained culture of parrot ownership (the tradition hypothesis) or the influence of socio-economic context (the contextual hypothesis). We used the theory of planned behaviour to evaluate the relative importance of behavioural and contextual factors influencing the intention to keep the yellow-shouldered Amazon *Amazona barbadensis* as a pet. We interviewed 150 owners and non-owners of parrots in two locations in Macanao Peninsula, Margarita Island, Venezuela, where the primary population of this species is located. We found mixed evidence supporting both the affection and contextual hypotheses: intention to keep parrots was higher in non-owners with high education level, strong affective attitudes regarding human–animal relationships, and higher expectations about social norms (41% of explained variance). Our study expands previous research on the illegal parrot trade by taking into account behavioural measures beyond attitudes, highlighting the role of social norms frequently ignored in such research. We discuss how a behaviour change campaign could redirect affective attitudes in the human–parrot relationship, and promote new social norms that support parrot conservation. Future research should consider the inclusion of moral and injunctive norms, and monitoring of intervention effectiveness.

Introduction

Unsustainable harvesting to supply the demand for pets is the second most important threat to psittacines (parrots, parakeets and macaws) following habitat lost to agriculture (Rosen & Smith, 2010; Olah et al., 2016; Berkunsky et al., 2017). In high demand because of their beautiful plumage, endearing behaviour and ability to mimic human speech, a total of c. 12 million live psittacines have been reported in international trade since the inception of CITES in 1982, the majority of which (62%) were either wild-sourced or of unknown origin (Martin, 2017). The potential threats to wild populations posed by this trade have led to the entire order being listed in the Appendices of the CITES, with the exception of four relatively common species (CITES, 2020).

Research on psittacines trade has focused on documenting the number of individuals and species (Cantú Guzmán et al., 2007), as well as trade mechanisms and routes involved (Pires, 2014; Pires et al., 2016). Findings from these studies have mainly informed regulatory conservation interventions such as law enforcement, trade controls, and surveillance strategies (Dhanjal-Adams et al., 2016; Shepherd, 2017). However, given the cultural nature of psittacine ownership (Anderson, 2015; Shuttlewood et al., 2016) there is a need for more in-depth and culturally sensitive research to inform and develop interventions targeted at changing consumer preferences and purchasing behaviours (Biggs et al., 2017). Identifying the socio-economic context of consumers is a relevant first step, but examining social norms driving ownership, attitudes towards parrot conservation, and the social function of captive parrots is also important, to encourage behaviour change in the keeping of parrots (MacMillan & Challender, 2014).

In the last 10 years, social-psychological models such as the theory of planned behaviour (Ajzen, 2011), have been used to understand human–wildlife conflict (Marchini & Macdonald, 2012), predict compliance with wildlife trade regulations (Harris et al., 2019), examine motivations for

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hunting (Fishbein & Ajzen, 2010; Castilho et al., 2018), and provide the framework for conducting behaviour change interventions aimed at reducing demand for wildlife (Burgess et al., 2018). This theory suggests that the most proximal determinant of a person's behaviour is their intention to engage in that behaviour, and thus intention is used as a proxy of behaviour. Intention is, in turn, determined by three components: (1) an individual's attitude (beliefs and values about the outcome of the behaviour), (2) social norms (beliefs about what other people think the person should do or general social pressure), and (3) an individual's perception of their ability to perform the behaviour, i.e. their perceived behavioural control (Fishbein & Ajzen, 2010; Miller, 2017). In addition, background factors, including demographic and socio-economic context, past experience, and knowledge can influence attitudes, norms and perceived behavioural control (Miller, 2017).

Understanding the relative contribution of attitudes, social norms and perceived behavioural control on the intention to keep parrots, as well as the most relevant contextual factors involved, may help us select effective targets and approaches for behaviour change interventions (Steinmetz et al., 2016; Thomas-Walters et al., 2020; Sánchez-Mercado et al., 2021). For example, if attitudes against keeping wild parrots as pets already exist, an intervention designed to increase people's awareness about keeping wildlife as pets is unlikely to reduce parrot keeping rates. In contrast, if the evidence reveals the relatively high importance of social norms regarding keeping wild parrots as pets, an intervention designed to change or introduce new beliefs regarding social norms would likely be more effective.

Research suggests that parrot keeping is motivated by a desire for companionship (the affection hypothesis; Anderson, 2015). In this case, attitudes and beliefs regarding human–animal relations (i.e. misinterpretation of bird behaviour by attributing human characteristics to the birds), could play a key role in explaining parrot keeping behaviour (Anderson, 2008). Alternatively, keeping parrots as pets may be rooted in a culture of parrot ownership (the tradition hypothesis; Ritvo, 1987). In this case, beliefs about the normative expectations of other people (social norms) may be more important than attitudes in predicting the intentions to acquire wild parrots. Finally, intentions to acquire wildlife could be influenced by socio-economic factors such as gender, age, educational level and income (Castilho et al., 2018). Some evidence suggests that parrot trade is a luxury market in which only wealthy people have access to the most attractive, rare and hence expensive species (Tella & Hiraldo, 2014). However, other evidence suggests that most parrot trade occurs at domestic scales, and species present in domestic markets tend to be relatively inexpensive and widely available (Pires & Clarke, 2012), indicating that demand is not limited by wealth (the contextual hypothesis).
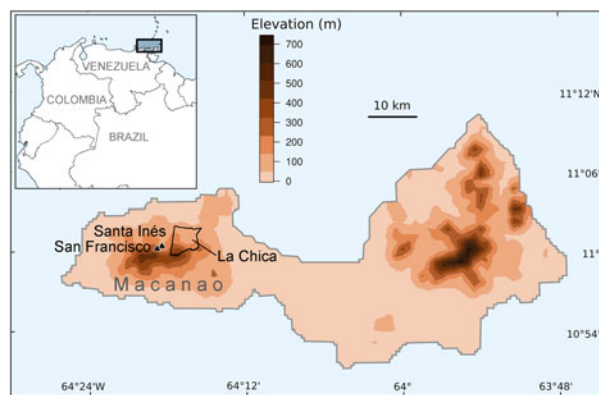

FIG. 1 The Macanao Peninsula, Margarita Island, Venezuela, showing elevation, the towns where we carried out the interview surveys, and the conservation area of La Chica where Provita monitors nests of the yellow-shouldered Amazon *Amazona barbadensis*.

We used the theory of planned behaviour framework and data for the yellow-shouldered Amazon *Amazona barbadensis* to evaluate hypotheses on the role of behavioural and contextual factors in explaining the intention to keep wild parrots as pets. The yellow-shouldered Amazon is endemic to Venezuela and Bonaire (The Netherlands) and the largest population (c. 1,600 individuals) inhabits Macanao Peninsula on Margarita Island, Venezuela (Rojas-Suárez & Rodríguez, 2015; Fig. 1). *Amazona barbadensis* is categorized as Vulnerable on the IUCN Red list (BirdLife International, 2018) and as Endangered nationally (Rojas-Suárez & Rodríguez, 2015). The total estimated population is 1,700–5,600 (BirdLife International, 2018). As it is a regional conservation symbol, the yellow-shouldered Amazon is a top priority for the conservation of threatened Venezuelan birds (Rodríguez et al., 2004). The primary threats are the extraction of nestlings for the pet trade (both domestic and international; Sánchez-Mercado et al., 2020a), and destruction of nesting and feeding grounds (Sanz & Rodríguez-Ferraro, 2006).

As part of the efforts to understand and mitigate the unsustainable global demand for wild parrots, and to protect the yellow-shouldered Amazon in particular, the Venezuelan NGO Provita has developed a long-term conservation plan in Macanao. It was launched in 1989 and includes an environmental education programme for schoolchildren and full-time surveillance of the main nesting site (Briceño-Linares et al., 2011). However, despite 32 years of implementation, these interventions have not been sufficient to reduce parrot keeping behaviour: in 2019 30% of people in Macanao kept at least one parrot (Sánchez-Mercado et al., 2020b), and nestling extraction was 100% at sites without surveillance (Briceño-Linares et al., 2011). A better understanding of the behavioural drivers of parrot keeping, and the relationship of these drivers to socio-economic factors, could facilitate cultural-based solutions to reduce the unsustainable use of parrots.

Study area

Macanao is a peninsula in the west of Margarita Island; it is economically less developed than the eastern part of the island and its ecosystems are relatively undisturbed ([Fig. 1](#); Rojas-Suárez & Rodríguez, [2015](#)). In 2011 there were 24,419 inhabitants in Macanao (10% of Margarita Island's population; Instituto Nacional de Estadística, [2010](#)). Employment opportunities are scarce, with fishing being the primary economic activity. The communities of San Francisco (c. 20,000 inhabitants) and Santa Inés (c. 5,000 inhabitants) are adjacent to the main yellow-shouldered Amazon nesting site, La Chica, where Provita has been monitoring and protecting breeding yellow-shouldered Amazons since 1989.

Methods

Interview instrument and survey process

During 2–15 June 2017, we implemented a survey using semi-structured interviews with 150 adults (> 18 years) in the communities of San Francisco and Santa Inés. In all cases, we obtained verbal informed consent from each participant after explaining our research objectives and assuring participants that information would be used only for research and would be presented only in aggregate analyses, protecting each participant's identity (Buppert & McKeehan, [2013](#)). Participants were selected using a stratified sampling design based on the sectors of each town, selecting every fifth house. The sample size represented 10–21% of households in each community.

The survey included two sections, the first with questions regarding the participant's age, gender, level of education and employment status, and the second comprised statements about intentions, attitudes, social norms and perceived control for the behaviour of keeping wild yellow-shouldered Amazons as pets. Intentions, attitudes, social norms and perceived control were assessed on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), in response to a series of statements ([Table 1](#)). We used two statements to measure intention to keep yellow-shouldered Amazons as pets. We used eight statements to measure attitudes (high scores reflect attitudes supporting parrot keeping behaviour) as behavioural beliefs and evaluative outcomes about keeping parrots as pets. We used five statements to assess social norms (high scores reflect greater social pressure to perform the target behaviour), measured as beliefs of what other people important to the participant think about keeping yellow-shouldered Amazons as pets (i.e. normative social norms) and the particpants' motivations to comply with them. We used four statements to measure perceived control (with high scores reflecting a greater level of control over the target behaviour), expressed as the level of confidence to acquire and care for yellow-shouldered Amazons, taking into account parrot availability and the respondent's resources.

We evaluated self-reported behaviour by asking participants how many yellow-shouldered Amazons, and which other types of pets, they kept at home. We evaluated participants' past experience of pet keeping by asking if they had ever kept yellow-shouldered Amazons as pets (1, never; 2, sometimes; 3, always). The first question provides a measure of current ownership, and the second is a qualitative measure of prevalence of ownership over time. We asked the same questions of all participants, although we later divided the data into owner and non-owner groups, to describe whether they kept yellow-shouldered Amazons (1) or, alternatively, other types of pets or none (0).

Data analysis

We examined possible collinearity among the 19 statements, using the variance inflation factor (Tabachnick & Fidell, [2007](#)). This was, however, low for all statements (five-point score mean $1.972 \pm SE\ 0.359$) and thus reducing the number of variables was not necessary.

The intention index was the sum of the two statements evaluating intentions to keep yellow-shouldered Amazons as pets. We built indices for each component of the theory of planned behaviour. For the attitude index, we multiplied the resulted five-point score of each behavioural belief statement by the score of the relevant evaluation statement ([Table 1](#)), and the resulting products were added. Similarly, for the subjective norm index we added the products of the belief statements score to the motivation statement score ([Table 1](#)). The perceived behavioural control index was the product of the four statements of each person's perceived level of confidence in acquiring and caring for yellow-shouldered Amazons.

We tested the internal consistency of the four theory of planned behaviour indices by using Cronbach's alpha (Piedmont, [2014](#)). We inspected the distributions of the indices using histograms, and calculated Pearson correlation coefficients to examine any interrelatedness between indices.

To develop a predictive model of intention to keep yellow-shouldered Amazons, we developed two linear regression models. Model 1 captured the response of the dependent variable (intention) as a function of three continuous independent variables:

$$Intention \sim attitude + norm + control \qquad 1$$

where *attitude*, *norm* and *control* are the theory of planned behaviour indices. Model 2 added contextual variables:

$$Intention \sim attitude + norm + control + age + job + education + years\_macanao \qquad 2$$

where *age* is the interviewee's age in years, *job* a binomial

TABLE 1 Statements used to measure the four components of the theory of planned behaviour to evaluate the intention to kept yellow-shouldered Amazons *Amazona barbadensis* as pets on Macanao, Margarita Island, Venezuela (Fig. 1). The table shows the mean ± SE of the five-point score answers and sample size for each statement (as interviewees did not answers all statements), and the per cent of owners and non-owners interviewed who agreed (≥ 4 on the five-point score) with each statement.

Statements (by component)	Mean ± SE	N	Agreement (%)	
			Owners	Non-owners
Intention				
I wish to have a yellow-shouldered Amazon at home	2.600 ± 0.166	115	40	36
I wish to give a yellow-shouldered Amazon to one of my relatives	2.633 ± 0.159	147	36	35
Attitude				
Behavioural belief statements				
Yellow-shouldered Amazons are affectionate & fun pets	1.561 ± 0.110	148	6	8
Yellow-shouldered Amazons are part of my family	1.460 ± 0.116	150	98	6
Yellow-shouldered Amazons have a lot of trouble in the wild	3.000 ± 0.154	146	34	56
Yellow-shouldered Amazons become fond of their caregivers	1.573 ± 0.075	150	2	3
Evaluation statements				
If I bring home a yellow-shouldered Amazon, it will bring happiness to my family	1.517 ± 0.093	149	2	5
If I have a yellow-shouldered Amazon at home, my mother/grandmother will feel less lonely	1.810 ± 0.114	147	8	10
Yellow-shouldered Amazons are happier in captivity than in the wild	3.333 ± 0.151	147	61	72
Yellow-shouldered Amazons are used to being in captivity	1.573 ± 0.134	149	21	19
Subjective norm				
Belief statements				
In Macanao, keeping yellow-shouldered Amazons as pets is a tradition	1.521 ± 0.072	146	6	1
Keeping yellow-shouldered Amazons as pets is legal	4.176 ± 0.123	148	79	87
Motivation statements				
My family thinks I should keep yellow-shouldered Amazons as pets	2.158 ± 0.132	120	4	36
To me, it is important to behave as my family expects me to	1.507 ± 0.062	146	0	1
To me, it is important to be recognized as Macanaguense	1.405 ± 0.094	148	6	4
Perceived control				
It is easy to find someone who will sell you a yellow-shouldered Amazon	2.302 ± 0.153	149	34	26
Yellow-shouldered Amazons are inexpensive	3.929 ± 0.115	141	94	96
Taking care of a yellow-shouldered Amazon is easy	2.311 ± 0.118	148	19	31
Taking care of a yellow-shouldered Amazon is inexpensive	2.547 ± 0.139	150	32	39

variable describing whether the interviewee has a job (1) or not (0), *education* a binomial variable describing whether the interviewee has studied at tertiary level (1) or not (0), and *years_macanao* the number of years the interviewee has been living in Macanao.

Given that people who currently own a parrot may have a low intention to acquire another one in the short-term, we fitted models 1 and 2 separately for both current owners and non-owners. Models were fitted using the *lm* function in the *spp* package in R 3.6.3 (R Development Core Team, 2019).

Results

Our sample predominantly comprised women (81% female). Fifty-eight per cent of interviewees were unemployed, 17% had a university degree and 78% had finished high school only. Interviewees had lived for a mean of 37 ± SE 18 years in Macanao.

Thirty-three percent of the 150 interviewees reported they currently kept at least one yellow-shouldered amazon as a pet. With regard to their past experience 29% had never kept a yellow-shouldered Amazon as a pet, 23% had sometimes, and 43% had always kept them. With respect to predicting the intention to keep yellow-shouldered Amazons as pets, internal consistency coefficients were 0.60–0.71 (Table 2). Considering that Cronbach's alpha is sensitive to a low number of statements, these values suggest a reasonable internal consistency (Piedmont, 2014). In general, Pearson correlations between behaviour variables were low (< 0.4). Correlation of *intention* with *attitude* was low but significant (Table 2).

For non-owners, Model 1, with only behaviour variables, explained 32% of the variance of intention to keep yellow-shouldered Amazons as pets (Table 3). Attitudes and subjective norms were the most important and significant variables, both with positive effect: intention to keep parrots was higher amongst interviewees with strong attitudinal beliefs towards human–animal relations, and with higher expectations about social norms ($R^2 = 0.318$, $F = 8.69$, df = 3,56, $P < 0.001$). The inclusion of contextual variables (Model 2)

TABLE 2 Descriptive statistics for the variables used to predict intention to keep the yellow-shouldered Amazon, with the mean ± SE of each index (for details of calculations, see text). Internal consistencies are provided by Cronbach's alpha and inter-correlations. Significant correlations (P < 0.01) are marked with *.

	Mean ± SE	Cronbach's alpha	Correlations		
			Norm	Control	Intention
Attitude	19.55 ± 1.24	0.61 (0.06)	0.48*	0.06	0.34*
Norm	5.36 ± 0.34	0.60 (0.07)		0.15	0.25
Control	15.41 ± 0.90	0.71 (0.03)			0.12
Intention	5.30 ± 0.30	0.69 (0.07)			

TABLE 3 Regression model of the intention to keep the yellow-shouldered Amazon as a pet amongst the 100 people interviewed who currently did not own one (for the model of the 50 current owners interviewed, see text for details), with estimate ± SE, t for the standardized coefficient regression, and the probability for each predictor variable. Significant predictor variables are marked with *.

	Estimate ± SE	t	P
Model 1			
Intercept	2.367 ± 0.941*	2.515	0.015
Attitude	0.080 ± 0.028*	2.862	0.006
Norm	0.260 ± 0.120*	2.172	0.034
Control	−0.030 ± 0.036	−0.836	0.407
Model 2			
Intercept	2.373 ± 1.481	1.603	0.115
Attitude	0.076 ± 0.029*	2.605	0.012
Norm	0.266 ± 0.117*	2.275	0.027
Control	−0.038 ± 0.038	−0.989	0.328
Job	−0.333 ± 0.533	−0.625	0.535
Education	1.485 ± 0.682*	2.178	0.034
Age	0.003 ± 0.020	0.136	0.893

increased the explained variance to 41%, and added level of education as a significant variable: intention was higher amongst interviewees with a high level of education (Table 3; $R^2 = 0.407$, F = 5.83, df = 6,51, P < 0.001). For owners, no behavioural or contextual variables were significant in explaining intentions to keep yellow-shouldered Amazons (Model 1 $R^2 = 0.159$, F = 0.69, df = 3,11, P = 0.575; Model 2 $R^2 = 0.246$; F = 0.52, df = 5,8, P = 0.754).

Discussion

Explaining yellow-shouldered Amazon keeping behaviour

We found evidence supporting both the affection and contextual hypotheses: individuals who had strong beliefs about positive outcomes for human–parrot relationships were more likely to show a favourable intention to keep yellow-shouldered Amazons. The significant role of affective attitudes supports the notion that strong empathy and compassion for wild animals are important motivations for keeping them as pets (Drews, 2002). Misguided empathy with the animal's needs generates an erroneous interpretation of animal behaviour, fostering the belief that previously wild pets are content, happy and not lonely (Licariao et al., 2013).

High empathy for animals is associated with greater knowledge about their biology (Drews, 2002), and past environmental education efforts in Macanao have probably increased people's knowledge of parrot biology and generated concern for their conservation (Sánchez-Mercado et al., 2020b). That people with higher educational levels had stronger intentions to keep yellow-shouldered Amazons as pets suggests that in this case education may be reinforcing misguided conservation behaviours. In the particular case of the yellow-shouldered Amazon, neither affective attitudes nor high educational level necessarily lead to good practice (Bjerke et al., 2003; Shuttlewood et al., 2016). People need to be better informed regarding how they can make a positive impact on the conservation of wild yellow-shouldered Amazons. Specifically, people need information about behavioural alternatives, such as buying captive-bred rather than wild-caught birds (Jepson & Ladle, 2005; Jepson et al., 2011), or about actively engaging in conservation actions as an alternative way of enjoying a parrot's companionship (DELWP, 2018) and the environmental impact of these options (Clayton & Myers, 2011).

Knowing that other people important to the interviewees, such as family, friends or neighbours, approve the keeping of yellow-shouldered Amazons as pets helps explain parrot keeping intentions in Macanao. This highlights the significant influence of perceived social norms on the formation of intentions to keep wildlife as pets, a factor that is frequently not considered in research on the illegal parrot trade (Sánchez-Mercado et al., 2021). The perception of social approval of parrot keeping was justified mostly on the grounds of the legality of keeping wildlife (Table 1). Venezuelan environmental legislation allows wildlife use via special licenses, including scientific sampling, pest control, sport and commercial hunting. Taking wildlife from nature without a permit is punishable by fines and up to 2 years in prison, but having wildlife at home is penalized only with confiscation (Congreso de la República de Venezuela, 1970; de la Venezuela, 2012). The belief that extraction and trade of parrots is illegal, but keeping them at home is not, is

deeply rooted in the people of Macanao (Sánchez-Mercado et al., 2020b). This belief is not based on poor knowledge or misunderstanding of environmental legislation: interviewees noted that they feared the authorities would confiscate their parrots.

Moral norms in Macanao seem to be adapted to support and encourage this illicit behaviour. Moral norms refer to a feeling of moral obligation that motivates individuals to engage in a specific behaviour, and are relevant when one's self-interest and the interest of others are at odds, a dilemma that relates to many environmental problems (Harland et al., 1999; Kaiser et al., 2005; Gkargkavouzi et al., 2019). Including measurement of moral norms in our theory of planned behaviour model could potentially have improved our understanding of the role of social norms. Finally, intention to keep yellow-shouldered Amazons amongst non-owners is probably also driven by injunctive norms (i.e. what others do). That is, if individuals think that other people approve of keeping parrots, and also believe that many people do it (30% of people keep a yellow-shouldered Amazon), this will encourage non-owners to intend to do the same. Thus, a clear separation of different types of social norms could help to better understand their role in parrot keeping behaviour.

Changing human–parrot relationships

Our findings provided us with useful insights for the design of a behaviour change campaign aiming to promote a more sustainable, coherent relationship between people and parrots (Veríssimo, 2019; Veríssimo et al., 2019). Educational and awareness campaigns are frequently applied as behaviour change strategies (Wallen & Daut, 2018). However, in the case of the yellow-shouldered Amazon in Macanao, further campaigns to increase awareness of the species' conservation status are unlikely to be effective. Among the various approaches to designing behaviour change campaigns (Wallen & Daut, 2018), conservation marketing has been the most frequently used in conservation projects, with promising results (Saypanya et al., 2013; Veríssimo et al., 2018). Conservation marketing entails several stages, including identifying and prioritizing factors influencing the behaviour, developing a practical model of those factors, and building a marketing and communication strategy (Zain, 2012). Here, we prioritize factors influencing the unsustainable keeping of wild yellow-shouldered Amazons in Macanao, which allows us to propose the behavioural shifts needed to achieve our conservation goals.

The behaviour having the most detrimental impact on yellow-shouldered Amazon conservation is a misguided perception of benefits for the animals from being kept in captivity. Therefore, the behavioural shift needed is for people to engage in actions that may really have a positive impact on both captive and wild parrot populations. Although environmental attitudes are difficult to change, especially through education, they can change if people have direct experiences (Strieder Philippsen et al., 2017). Providing opportunities for people to engage in conservation actions, such as participation in the census of the wild population, creation of community nurseries for native plants to be used in restoration programmes for parrot habitat, or collaboration in building and installing nest boxes for parrots (DELWP, 2018) are examples of direct experience that could potentially change attitudes. In this way, people could continue enjoying the companionship of parrots but without keeping them captive.

There have been a few campaigns aimed at reducing trade in Venezuelan psittacines. The programme 'Your house is not their house' was launched nationally as an awareness campaign to reduce demand for wild parrots. The messages were focused on describing how a parrot's needs cannot be fulfilled in captivity (Mujica et al., 2008). Such campaigns, based only on wildlife protection messages, are unlikely to succeed in Venezuela or other South American communities (Drews, 2002) because they do not take into account the emotional attachment in the people–bird relationship, and can decrease people's desire to conserve wildlife. In contrast, approaches such as 'Living with wildlife' (DELWP, 2018), or 'Share a place to live' (Saypanya et al., 2013) could be more suitable in contexts such as Macanao, where the yellow-shouldered Amazon is already part of the landscape and culture, and there are no conflicts with people.

Any behaviour change campaign should consider two important contextual factors in Macanao's communities: (1) widespread poverty, and (2) the higher than usual proportion of adult women, mostly single mothers. Women are important actors in the illegal yellow-shouldered Amazon trade chain. The frequent absence of fathers, sons and husbands on long fishing trips (the primary economic activity, dominated by men), results in loneliness amongst wives, mothers and daughters (Farooq & Javed, 2009). Parrots are used to manage these emotions: they are described as a part of the family, and are presented as gifts from relatives, to alleviate loneliness (Sánchez-Mercado et al., 2020b). In Macanao, women's participation in social functions, including conservation programmes, is hampered by the mental stress created by loneliness and the increased responsibility of securing food, medicine and basic resources (España & Ponce, 2017). Jointly with the lack of employment opportunities, this situation makes women not only dependent upon male support and government social help, but poorer in terms of empowerment and participation.

Policies with a focus on generation of non-fishing wage employment for men and women across Macanao are required to improve livelihoods and reduce societal inequality (Khatiwada & Silva, 2014; Mashapa et al., 2020). With respect to conservation action, any behaviour change campaign to reduce the demand for parrots would need to promote the engagement of women and youth in community-based

conservation activities (e.g. community nurseries) as a way to increase their representation and leadership in the community and to manage loneliness and stress.

Theory of planned behaviour model performance

Overall, the explained variance in intention to own yellow-shouldered Amazons for non-owners was 41% (Model 2), which is a reasonable performance for a theory of planned behaviour model (Miller, 2017), and similar to other studies applied to conservation, which have explained from 20% (Marchini & Macdonald, 2012) to 45% (Miller, 2017) of variance. In our study, the statements assessed were derived from an extensive qualitative evaluation of local beliefs, and although our sample size was small, we are confident it was representative of socio-economic reality and of behavioural variables in the focal communities. Given that our research is based on self-reporting, our findings could be affected by participants under-reporting their intention to own parrots. However, the social acceptability of parrot keeping suggests that the intention measures we used are probably reliable.

Our survey instrument was not adequate to evaluate the keeping behaviour of current owners. Even though the intention levels of owners and non-owners were similar (Table 1), the low predictive power of the regression models suggests that we failed to characterize the behaviour of current owners. A behaviour comprises four elements: the action performed, the target at which the action is directed, the context in which it is performed, and the time when it is performed (Fishbein & Ajzen, 2010). Thus for a non-owner, the behaviour is defined as 'have (action) a yellow-shouldered Amazon (target) at home (context) in the next 12 months (time).' In contrast, for an owner the behaviour should be defined as 'have (action) a yellow-shouldered Amazon (target) at home if my current parrot dies (context) in the future (time).' This change in the context and time elements constitutes a change in the behaviour itself (Fishbein & Ajzen, 2010). This means that two different behaviours are being performed as we move from one context to another, even if the other elements remain the same. Our evaluation of intention only explored the wish to keep a parrot as a pet or give one to a relative, but not the intention of replacing a parrot after it has died. As well as being a misleading definition of owners' behaviour, our model also failed to capture the psychological motivations that drive ownership intentions. Owners showed a higher agreement than non-owners with the statement that parrots are part of the family (Table 1), suggesting that emotional motivations could be playing a more important role than tradition or contextual motivations. Future research should explore the psychological context related to the emotional bond between people and their parrots (Anderson, 2015).

Our study contributes to research on the illegal parrot trade by incorporating theories of behaviour and the socio-economic context in a model with advanced predictive ability. The proposed model expands previous studies by taking into account behavioural measures beyond attitudes, highlighting the role of social norms, which is often ignored in such research. Our findings provide insights for the design and implementation of behaviour change campaigns focused on redirecting affective attitudes towards human–parrot relationships and promoting new social norms that support parrot conservation. Future research should consider an extended set of social norms (moral and injunctive norms) and a separate evaluation of the intentions of owners.

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Conflicts of interest None.

Ethical standards The survey and implementation protocol were approved by the Laboratory of Political Ecology of the Venezuelan Institute of Scientific Research, and this research otherwise abided by the *Oryx* guidelines on ethical standards.

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