Urban bird feeding: connecting people with nature

Short Title: Motivations behind garden bird feeding

Daniel T.C. Cox*, Kevin J. Gaston

Environment and Sustainability Institute, University of Exeter, Penryn, Cornwall TR10 9EZ, U.K.

*Corresponding author. Email dan.t.cox@googlemail.com (DTCC)

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Abstract

At a time of unprecedented biodiversity loss, researchers are increasingly recognizing the broad range of benefits provided to humankind by nature. However, as people live more urbanized lifestyles there is a progressive disengagement with the natural world that diminishes these benefits and discourages positive environmental behaviour. The provision of food for garden birds is an increasing global phenomenon, and provides a readily accessible way for people to counter this trend. Yet despite its popularity, quite why people feed birds remains poorly understood. We explore three loosely defined motivations behind bird feeding: that it provides psychological benefits, is due to a concern about bird welfare, and/or is due to a more general orientation towards nature. We quantitatively surveyed households from urban towns in southern England, to explore attitudes and actions towards garden bird feeding. Each household scored three Likert statements relating to each of the three motivations. We found that people who fed birds regularly felt more relaxed and connected to nature when they watched garden birds, and perceived that bird feeding is beneficial for bird welfare while investing time in minimising associated risks. Finally, feeding birds may be an expression of a wider orientation towards nature. Overall, we found that the feelings of being relaxed and connected to nature were the strongest drivers. As urban expansion continues both to threaten species conservation and to change peoples’ relationship with the natural world, feeding birds may provide an important tool for engaging people with nature to the benefit of both people and conservation.
Introduction

Globally, biodiversity and natural habitat continue on trends of apparently inexorable loss [1]. This is at a time when researchers are increasingly recognizing the broad range of physical, mental and social benefits that interacting with nature provides to people (e.g. [2-4]). As both a greater number and proportion of us live in cities there is growing concern that many people are becoming disengaged from the natural world (termed the ‘extinction of experience’; [5-6]). This is potentially serious, because it may lead, first, to a loss of people’s desire to interact with nature, so cutting them off from the associated benefits [6-8], and second, to a reduction in broad-based public support for biodiversity conservation [6,9-11], because people’s awareness of environmental issues is influenced crucially by their experiences of nature in everyday surroundings [12]. However, despite the oft-reduced opportunities, many people still seek out regular interactions with nature (e.g. [13,14]). Strengthening understanding of the motivations behind why they do so may be key both to maximising the benefits, and harnessing support for broader conservation issues.

For many people, particularly those living in urban areas, their interactions with wild birds may form the main wildlife interactions that they experience in daily life [15]. So, it is perhaps unsurprising that despite the widespread extinction of experience there is frequent provision of food by people for garden birds. This is often the most common form of wildlife gardening, with around a half of urban households in some western countries putting out food on a regular basis (estimated from [16-21]). The large scale provision of supplementary food for wild birds has significant ecological (reviewed by [22]) and economic [23] impacts. Increasingly it is also being recognised as being an important potential tool for stimulating a broader interest in the natural world [7,17,23-26].

However, despite the clear importance that feeding wild birds has for both birds and people there is still no clear understanding of people’s motivations for doing so. Here we distinguish three possible mechanisms, namely potential psychological benefits from watching wild birds; a concern about the welfare of wild birds; and/or as a more general orientation towards interacting with nature.
The psychological benefits that people receive from watching birds in their garden, such as feelings of pleasure, are the most obvious motivation for feeding them [21-27]. We explore two such benefits that might drive garden bird feeding. First, attention restoration theory proposes that the natural world promotes recovery from mental fatigue and offers opportunities for reflection [28], while stress reduction theory indicates that natural environments facilitate reductions in physiological arousal following stress [29]. Both of these theoretical frameworks promote relaxation thus leading to reduced stress and improved mental health (e.g. [30-31]). Watching birds and their behaviour as a visible component of nature may contribute significantly to these feelings. Second, watching garden birds may provide people with a feeling of being connected to nature, contributing towards an increased sense of belonging in the natural world (reviewed [32]). How a person relates to nature (i.e. how connected they are) has been shown to be a strong predictor of environmental attitudes (reviewed in [32]), and has been positively associated with subjective well-being [33-34] and reduced anxiety [35].

Traditionally, and currently, people in the northern hemisphere more often provide food for birds in winter when they are perceived to need more assistance with resources [23,27,36]. This is despite daylight hours being shorter, with people spending less time in their gardens and so arguably there being less likelihood of viewing the birds directly. This suggests that a concern about bird welfare may be an important motivation behind providing food. Indeed, many people feel passionately about their birds and are keen to learn best feeding practises. The aggregation of large numbers of birds around a food source has been associated with an increased risk of disease transmission [22], and best practice guidelines recommend that this risk can be reduced by the regular cleaning of feeders (e.g. [37]). However, this entails a time investment and because householders often cannot see the effects of disease transmission it may have little visible effect. Therefore people who clean feeders can be regarded as showing an increased concern for bird welfare.
Finally, there is increasing evidence that some people are more orientated towards interacting with the natural world than others [4,6,8], and are willing to invest more to obtain this interaction even when they have a reduced opportunity for doing so [38,39]. It can be relatively easy to attract birds to a feeder through the provision of food. We explore whether the mechanism behind people doing so is either a response to the opportunity of birds already present in the garden, or some people being orientated towards specifically attracting birds even when there are none. Indeed, a bird feeder plays a unique role in attracting birds to a focal location where they can be viewed more closely and for longer periods. People who invest in maintaining a bird feeder, so seeking the closer interaction provided, might be seen to be more orientated towards interacting with nature through bird feeding.

Here we ask survey respondents to rate three Likert statements as components of each motivation, to explore the degree to which they drive people's bird feeding activities: the psychological benefits they receive; their concern about bird welfare; and/or as a way to express their general orientation towards interacting with nature.

**Materials and methods**

**Ethical statement**

This research was conducted with approval from, and in accordance with, the University of Exeter Biosciences ethical review committee, project number 2013/320. Before completing the survey respondents were asked to provide written consent by checking a box stating their agreement to participate in the survey. Respondents were also asked to confirm that they were over 18 years of age. On the written consent form, participants were told that data would remain anonymous and would be protected and stored in a secured format. There is an electronic log of consent procedure to document the process.

**Survey methods**
We surveyed garden bird feeding activities and perceptions of common garden bird species using a questionnaire approach across three English towns located, in close proximity (~60 km to the north of London, UK): Milton Keynes (52°02’N, 0°45’W), Luton (51°53’N, 0°25’W) and Bedford (N52°58’N, 0°28’W). These each have sizeable human populations of, respectively, c. 230,000, c. 240,000, and c. 160,000 (2011 Census, UK). Two general survey methods were used. First, between November 2013 and February 2014, 20 households were selected at random in each of the three towns. A researcher knocked on the doors of the houses and asked one member of the household to complete the questionnaire. The survey participant in each household was also asked to enlist two other known households from within ~500m to participate in the survey. Potential participants were contacted by email or phone and the questionnaire was delivered by hand. Second, between March and July 2014 up to ten streets in each town were selected at random. A researcher then knocked on the doors of all houses with evidence that someone was home, e.g. from a car in the drive. The project was explained to the resident, who was then asked to complete a questionnaire in his or her own time. In order to minimize possible bias resulting from certain groups being more likely to be at home, different streets were targeted at different times of day either late morning (11:00 to 13:00), mid afternoon (14:30 to 16:00) or late afternoon (17:00 to 18:30). Surveys were conducted at both weekdays and at weekends. For both survey methods a first attempt to collect the questionnaire was made two days after delivery, and if unsuccessful a subsequent attempt was made two days after that. One hundred and forty responses were collected by the first survey method, and 191 by the second. The survey was conducted in a stratified random way because we were not interested in the proportion of the urban population who fed birds, but instead wanted to understand the reasons those that fed birds had for doing so, whilst having a sufficiently large sample of people who did not feed birds for comparison purposes.

**Questionnaire design**

We developed a questionnaire to explore people’s knowledge and experience of, and attitudes towards, garden bird feeding. The questionnaire took
approximately six minutes to complete and consisted of close-ended questions. Only those questions used in the analyses reported here are discussed (See Tables A-E in S1 File for a fuller description of the questionnaire). To explore respondents’ motivations behind garden bird feeding, we asked people to rate the extent to which they agreed with each of nine statements. Responses were given on a five-point Likert scale, from strongly disagree to strongly agree. Three statements related to the psychological benefits that people obtain from watching birds in their garden (Table B in S1 File). These stemmed from known psychological benefits of interacting with nature (e.g. [28,40]). A further three statements explored perceived welfare benefits and a respondents’ willingness to minimise potential risks associated with bird feeding (Table C and D in S1 File). Finally, three statements assessed respondents’ orientation towards bird feeding over their opportunity for doing so, and the role that a bird feeder plays in this (Table D in S1 File). Five of the above statements related to bird feeding generally and were completed by all respondents, while four related directly to bird feeding activities and so were not completed by people who did not feed birds. Item phrasing can influence outcomes, and statements were designed to be neither strongly positive nor negative, nor to lead respondents. We also collected data on the socio-demographic status of the respondents, along with information on their bird feeding activities and their general awareness of the birds around them (Table A in S1 File). To try and understand why some people don’t feed birds, we also asked people who did not do so to score the Likert statement ‘I am not interested in feeding birds’, and why those that engaged in some form of bird feeding activity don’t do so more regularly ‘I don’t always remember to put out food’. As a crude measure of the independence of surveying multiple people from each street we also asked people to score the five point Likert statement ‘I feed birds because my neighbours do’. See Table C and D in S1 File.

Prior to statistical analysis we created a three-level factor pertaining to how regularly a household provided food for birds: regularly (those that replied daily or weekly), irregularly (those that replied monthly or less than once a month) or never (those that didn’t feed birds). Second, as a measure of people’s awareness
of the birds around where they live and work, respondents were also asked to
select one or more periods during the day when they usually noticed birds (the
day was divided into four approximately equal periods; morning, lunchtime,
afternoon and evening). We then constructed a second factor on a scale of 0-4
according to what proportion of their average day people reported noticing birds
(e.g., someone who reported that they notice birds in the morning and afternoon
would be given a score of 2). Those that answered ‘I don’t notice birds’ were
given a score of zero. We created a third factor on gender (male/female).
Respondents were asked their age within a five-year window, we then developed
a fourth factor with ages pooled from 20 to 40 years, 40 to 60 years and >60
years. Finally we controlled for gross annual income by obtaining the ‘expected’
income categories for each postcode in which respondents resided (Office for
National Statistics, Small Area Income Estimates 2007/08, Gov UK). These were
then included as a four-level factor.

Statistical analyses

All analysis was conducted in R 3.1.2 [41]. We did not find a difference in
responses between the two methods of data collection (coefficient = 0.02 ± 0.04
(SE), p = 0.7), so we pooled responses from each (Appendix A in S1 File) and
from the three towns. For any completed questionnaire, if any of the questions
were incomplete, then that respondent’s question was removed from the
analysis. Generalized Variance Inflation Factors (GVIFs) were used to check for
multi-collinearity between factors, and found to be within acceptable norms,
with all GVIFs <1.3. To determine whether bird feeding activities, bird awareness,
age, gender and/or income were important predictors of answers to each of the
nine statements we used ordinal regression models using the ‘ordinal’ package
[42]. We then applied an Information Theoretic approach that simultaneously
evaluates hypotheses by balancing between model complexity and goodness of
fit [43]. We used the ‘MuMIn’ package [44] to produce all subsets of models
based on the global model and rank them based on AICc. Following [45], and to
be 95% sure that the most parsimonious models were maintained within the
best supported model set, we retained all models where ΔAICc < 6. We then used
model-averaging to produce the average parameter estimates of each parameter [43]. We used the 'HH' package to produce the Likert plots [46].

Based on the statements behind each motivation, we estimated which motivation was the strongest driver of bird feeding (i.e. which motivation had the strongest support). For each statement a score of 1 corresponded to strongly disagree, a score of five to strongly agree. Where necessary we then reversed the scores of statements so a high score always indicated support for bird feeding and/or welfare. Answers from all nine statements were then pooled, before building a mixed effects ordinal regression of the statement score (five level factor of one to five) against whether the statement represented a psychological benefit, welfare issue or orientation towards feeding birds (three-level factor). We controlled for the actual level of bird feeding activities because people who feed birds are likely to have stronger motivations for doing so. We included a unique ID for each respondent as a random effect.

**Results**

**Respondents**

A total of 331 questionnaires were completed and used in the analysis (140 and 191 completed from each survey method, respectively). For the first survey method we received a response rate of 94%. For the second survey method, 90% agreed to participate in the survey, of these 87% completed the survey giving an overall return rate of 78%. We found that 89% of respondents answered strongly disagree or disagree to the statement ‘I feed birds because my neighbours do’ (average score 1.4 ± 0.8 (SE)). Although this is not conclusive it does indicate that people believed that they were acting independently and so we deemed that surveying multiple households from the same street did not confound the study. There was an over representation of female respondents (56% compared to 51% in Buckinghamshire and Bedfordshire county’s, 2011 Census) and of respondents over 60 years (42% compared to 28% in Buckinghamshire and Bedfordshire county's, 2011 Census; Table Fa in S1 File). We found that 83% of households put out bird food, with 72% of those feeding
birds doing so regularly (Table Fb in S1 File). The proportion of respondents
who put out food did not vary by season ($\chi^2 = 4.2$, df = 3, p = 0.2). People most
customarily noticed birds in the morning and evening ($\chi^2 = 5.7$, df = 3, p <0.0001;
Fig 1a), while respondents tended to notice birds for different proportions of the
day ($\chi^2 = 86.9$, df = 4, p <0.0001; Fig 1b) with only 29% of respondents noticing
birds at all times of day (Fig 1b; acknowledging that individual respondents
could score more than one period of the day). A logistic regression of feeding
regularity against age, showed that people were more likely to feed birds
regularly as they got older (estimate = 1.7 ± 0.4 (SE), p <0.0001).

Fig 1. Summary statistics from 331 respondents, showing the proportion of:
a) respondents that noticed birds during different periods of the day and, b) the
proportion of the day that most people noticed birds.

Motivations behind bird feeding activities
Testing for assessed psychological benefits, we found that most people felt
relaxed and connected to nature when they watched birds in their garden (Table
1a-c, Fig 2). The feeling of being relaxed and connected to nature increased with
the level of bird feeding activities (Fig 2a), and in people who noticed birds for a
greater proportion of the day (Table 1a-c). The feeling of relaxation also
increased in respondents over 40 years old (Table 1a-c).

Table 1. Ordinal regression of responses to three Likert statements as
components of each of three motivations behind why people feed birds, a)
psychological benefits, b) welfare issues, or c) nature orientation. We show
model-averaged coefficients and standard errors in brackets. Given the ordinal
nature of the predictor variables the results show the outcome as compared to a
base factor level (shown in second row of table). The significance of factor levels
are shown as: *P <0.05; **P <0.01; ***P <0.001.