

TECH-2-TECH

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An exploratory interview study of researchers' and technicians' perceptions of rat tickling

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Key points

This paper highlights the main themes which emerged from a study carried out with Animal Technicians and researchers to better understand:

- perceptions of rat tickling
- potential drivers and barriers to the uptake of tickling in a laboratory environment

The interviewees indicated they had positive attitudes towards rats and the idea of rat tickling with positive comments about rats' social behaviour, their intelligence

and their capacity to interact with Animal Technicians and researchers.

The participants indicated that barriers to wider uptake of rat tickling including time constraints, a lack of training in the specifics of rat tickling and how to interpret rat responses to tickling.

In addition, there was mention of concerns over tickling affecting experimental integrity and the need to maintain professional detachment from rats as experimental animals.

Introduction

Rat tickling was first developed by neuroscientists to mimic rat play behaviour using the human hand to play with the rat¹ (Figure 1).

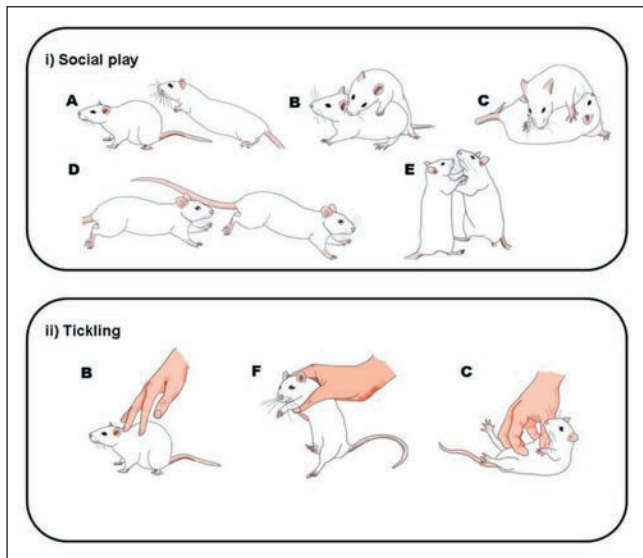


Figure 1.

These drawings illustrate the behaviours seen in rats during:

- social play²
- during the standard version of tickling³

Letters indicate rat behaviours that share similar or the same physical characteristics:

- pouncing
- nape contact
- pinning
- chasing
- boxing
- flipping

During social play behaviours can occur in any order and do not always occur in each play bout. During tickling the sequence is always B, F, C. Re-drawn from⁴ Original drawings by Tayla Hammond.

These motions were similar to human tickling, hence the term rat tickling. Rat tickling subsequently became of interest in Animal Welfare as a practical approach to provide social enrichment to and reduce handling stress for laboratory rats.^{3,5} Rat tickling is also relevant with increased interest in positive Animal Welfare in domesticated animals (<https://www.positiveanimalwelfare.net/>). Finally, rat tickling has even become known in the popular press (e.g <https://www.youtube.com/watch?v=d-84UjYFRM>); one reason for this wider interest may be that rats emit ultrasonic vocalisations (USVs) which have been interpreted as rats laughing when being tickled⁶ (<https://www.positiveanimalwelfare.net/research/rat-tickling/>).



Figure 2.

There has been previous social science research on rat tickling led by Megan LaFollette (figure 2) <https://www.linkedin.com/in/megan-lafollette/>) including: a cross-sectional survey of laboratory animal personnel in the United States of America (USA) and Canada including their implementation of and perceptions towards rat tickling⁷ as well as a longitudinal study of the effects of training laboratory animal personnel in rat tickling (US based).⁸

The work reported here was an addition to a National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs) funded project on refining rat tickling (figures 3 and 4) (<https://www.nc3rs.org.uk/our-portfolio/refinement-tickling-protocols-improve-positive-animal-welfare-laboratory-rats>). Our aim was to extend the previous social science research on rat tickling by interviewing United Kingdom (UK) based Animal Technicians and researchers who use rats in their studies. The questions also allowed expansion into more general attitudes to the animals and human-animal interactions in the research environment.

Approach

In these exploratory investigations into perceptions of rat tickling, we conducted twelve interviews with a mixture of researchers and Animal Technicians (6 of each) working with rats in a laboratory environment. Interviews took place virtually and for consistency followed an outline topic guide (Appendix A). Fieldwork took place either virtually or face-to-face between October 2022 and January 2023. Participants were identified through university veterinary services and invited via an introductory email to participate in the study. All the interviews were carried out by the same

interviewer and varied between 20 minutes and 30 minutes duration. Interviews started with a recap of the study's aims and sought informed consent (Appendix B) to proceed with the interview and to record the discussion. Recordings were subsequently transcribed and given the technical nature of some content, draft transcripts were reviewed for accuracy by the interviewer. A simple deductive thematic analysis^{9,10} was followed whereby scripts were analysed according to the issues being investigated, that is:

- participants' general experience of rats
- their understanding of rat tickling
- perceived benefits and disbenefits of rat tickling (for the animal, its handler, and wider research activities)
- barriers to uptake of rat tickling

A summary of emerging themes was shared with participants for their feedback and their responses were incorporated in a final draft.

Findings

Working environment

In a reflection of their different roles and responsibilities, contact between researchers and the rats in their studies tended to be more intermittent whereas Animal Technicians were in day to day contact with the rats in their care.

Researchers were variously investigating rats as models for behavioural neuroscience or aging with variation in whether they were working with pups, juveniles or adult rats. In some cases, rats were housed individually. In this case efforts were made to ensure contact with rats



Figure 3.



Figure 4.

in neighbouring cages to reduce isolation. Otherwise the rats tended to be kept in small groups. Among researchers the levels of interaction with the rats in their studies varied. For example one respondent described daily handling over the last 2 years whilst another researcher was interacting with the rats in their study twice per week for purposes of checking, weighing and handling. Interactions between the other researchers and the rats in their studies were more intermittent or cyclical with daily handling during their experiments but zero handling at other times as their focus turned to analysis and reporting.

Animal Technicians were responsible for the day to day care and general husbandry of the rats including, routine feeding, watering, cleaning and marking as well as having some recording responsibilities. Their roles involved considerable handling and interaction with the rats, checking for wellbeing and signs of ill health and liaising as necessary with the veterinarian. There were also mentions of supervising the mating/breeding programmes, administering injections and maintaining cages of handling rats to help familiarise new Animal Technicians and researchers.

Themes

Similar and yet different perspectives from researchers and Animal Technicians

Overall there was a sense of responsibility to the rats with words reflecting respect, some affection and a sense of pride in the scientific work being conducted.

Four of the researchers mentioned they had previously worked with mice and for two, working with rats was felt to open up new and exciting opportunities given the rich social repertoire of rats and the opportunity to establish relationships with them based on their friendly and inquisitive nature. One researcher mentioned they were often surprised by the intelligent behaviours demonstrated by rats that left them wondering “...wow, how is it possible that you learn how to do that?”.

Another researcher spoke of forming a particular bond with some of their rats, noting that “...there are always three or four that are my favourites ...they are more friendly, enjoy human contact and seek out interactions”.

Among Animal Technicians, some worked only with rats and some worked with rats and mice. Levels of experience varied from those that had started relatively recently to those with medium (4-5 years) and longer term (12-20 years) experience. One Animal Technician commented on the challenge of recruiting younger staff to work with rats observing that “...the workload, the size of the rats, the size of the cages puts them off ... and a fear of being bitten given the size of the teeth”.

There was a shared concern to enrich the laboratory environment. For example, one Animal Technician spoke of the play tunnels and chew sticks they saw as important for example to avoid development of “...stereotypical behaviours that can be detrimental”.

Two Animal Technicians mentioned rats' well-developed sense of smell, speaking of being ‘welcomed’ when they come into the room (by the same token, noting that rats may be apprehensive of newcomers). In common with participating researchers, Animal Technicians spoke of rats' intelligence that makes working with them potentially highly rewarding.

Knowledge and experience of rat tickling

Among participants, existing levels of knowledge and personal experience of rat tickling were varied. Some respondents were less confident of their knowledge while others felt better informed. Both researchers and Animal Technicians acknowledged that even if colleagues in the same facility were applying tickling practices the nature of their work meant it would not always be visible to others “...it's such a solitary life doing behavioural experiments, we're just each in our own rooms. I don't see my lab-mates do their experiments...” (researcher).

Tickling was described by some as ‘an enrichment’ with interest expressed in the vocalisations that accompany tickling by way of developing a better understanding of its impact. Among Animal Technicians, one mentioned how tickling was embedded as a core function in a previous role and the challenge they faced in making time to incorporate tickling in their current post. Another three participants described implementing their own interpretation of tickling as a way of interacting with the rats, taking their cue from the rats as to how much or how little was appropriate.

On being asked how they might describe rat tickling to a lay person, responses varied. Researchers tended to mention aspects of the interaction and enjoyment of the rat. One likened the approach to “...finding the rat's sweet-spot in the same way that you might with a pet to encourage positive behaviours”.

Another referred to the process of “...turning the rats over to tickle their tummies”.

A third spoke of familiarising the rat with the hand through a process of touching and interaction with a view to “...forging a relationship”.

A fourth researcher described tickling as:

- An interaction that is pleasurable for the rat as it mimics natural play.
- From a scientific point of view, an intervention that can be controlled and better controlled than other enrichments such as free play that is also of value in measuring neural responses.

Among technicians, one spoke of tickling as *"...an enrichment that is beneficial for the rats and helps to give them a better life"*.

Another reflected on tickling as a kind of *"...replication of social behaviour"* by recreating the passive aggressive turning over of one rat by another. Other interpretations emphasised the interaction between the handler and their rats. One suggested that it was perhaps more about *"...play-fighting rather than tickling, per se"* and making time to handle the rats more than usual. Another Animal Technician described the motion of the hands and movement of the fingers but emphasised also the importance of ensuring that the *"...rat understands it's not threatening"* (demonstrated by the rat coming back for more and not showing signs of avoidance e.g. stiffening-up or cowering).

A third framed tickling as a behavioural approach to *"finding out more about the animal"* (and they likened it to interactions between mother and offspring) and by getting to know rats better and *"...improving its well-being within the confines of the lab"*.

There was also mention of tickling as a 'two way street' speaking of the benefits for the rat and the handler akin to the pet owner relationship.

Perceived benefits/disbenefits of tickling for the rat

Tickling was broadly perceived as a positive interaction for most but not all rats. There was an emphasis on taking time to introduce the practice ideally to young rats and being sensitive to the level of interaction being sought by the rat. One researcher recalled having read that *"...five minutes of tickling is better than, say, half an hour of interacting with no clear purpose"* and felt this was borne-out by their own experience of pups seeking to engage by *"running to my hand ... it's subjective but it's telling me something"*.

In the context of the laboratory environment, researchers identified several potential benefits for rats that may be housed individually, in helping them become accustomed to the blue gloves that have to be worn, by reassuring them that fingers *'...are not trying to hurt them'* and thereby helping to reduce levels of stress, keeping animals *'happy and friendly'* and through this interaction, helping handlers be alert to any changing *'mood or condition'*. Together, this was seen as increasing the likelihood of obtaining good results from the laboratory work itself.

Animal Technicians reflected on the differences between handling and tickling, reasoning that the latter may help to habituate rats more quickly and in a more enjoyable way, encouraging them to seek out interaction and reducing associated stress. Animal Technicians sought guidance on tickling and were concerned about getting

it right and to comply with the requirements of different experiments so as not to risk compromising the results. Reflecting on their own workloads and day to day pressures on their time, they were also concerned about the consequences of habituating rats to tickling if resources were not there to support ongoing interaction over a rat's lifetime.

Perceived benefits/disbenefits for researchers and Animal Technicians

Researchers and Animal Technicians saw potential benefits from tickling. However there were concerns about experimental integrity and accommodating tickling in day to day routines given the competing demands on their time. Most agreed that more information about tickling would be of value:

- In helping them to understand how it could impact on experiments.
- In how it might be applied consistently to permit an informed choice to be made.

Among researchers, some expressed concerns about the potential for tickling to interfere with or confound the integrity of experimental studies. Others felt that given the number of existing variables, tickling was unlikely to have a significant impact. Among those that were concerned, some wondered if it might best be introduced into breeding stock rather than the rats used in experiments. One spoke of the behaviour trials they were conducting and the importance of avoiding the introduction of anything that might influence the outcomes they were observing. They wondered if some form of self administered approach that avoids human interaction, e.g. back-scratchers, may have an application. As regards the need for consistency, there were queries over whether the varying amount or dose of tickling between rats might affect experimental outcomes. One researcher reflected on the Animal Technicians' relationship with their rats and a tendency to have favourites, wondering how this might impact on the results of the wider study. Two of the researchers challenged the assumption that tickling was always positive and queried how to allow for rats that do not enjoy the experience. One of the participating researchers highlighted the significant levels of investment required to allow their experiments to go ahead and the associated risk that comes with compromising the integrity of this work. Among other researchers, tickling was associated with reducing stress. In one case (working with older rats) it was felt that *"...allowing the rats to become inactive/obese represents a greater risk to the integrity of a study"*.

In the second case it was argued that as much as researchers try to control variables, the experience of each rat varies and in this context *"...anything that helps the rats to feel comfortable and display natural behaviours has to be positive"*.

In the third case, the researcher saw tickling, along with efforts to improve the housing and the habitat of rats as areas of continually evolving improvement. Crucially, believing that *"I think it has to be better if the animals are less stressed"*.

One researcher spoke of the potential benefits of tickling for their experiments with rats that they recovered more quickly from surgery and were able to proceed sooner to the next stage. They were less apprehensive when confronted by new tasks and able to move more quickly into performing these tasks. Another commented on their perception that tickled rats were habituating more quickly to them, with less variability between animals, noting that *"...on the first day there's some that don't seem that keen, on the second day none of them seem to mind any more judging by how floppy and relaxed they seem"*.

A third researcher expressed their wish for rats to have a good quality of life, with benefits for rats and Animal Technicians in having a good relationship and making the routine tasks, such as taking weights and monitoring blood pressure, less unpleasant for all concerned. Nevertheless, there was recognition that tickling is not risk free with the possibility of receiving a *'really nasty bite'* from any interaction with a rat.

From the Animal Technicians' perspective, more *'tame'*, more *'approachable'*, more *'amenable'* and more *'interactive'* rats were perceived as a good thing for those handling them. Procedures involving tickled rats were described as going more smoothly with reduced risk of being scratched or bitten by rats that are more easily handled. Some concerns were expressed that rats will start seeking interaction, for example by pressing their noses up against the cage door, and although *"...attention seeking is not necessarily a bad thing, it could become an issue"*.

Overall, applying tickling in practice, comes down to a *'question of time'*. One Animal Technician acknowledged the privilege of working in a specialist unit with fewer animals that allowed them sufficient time to *"...say 'hello' to each of them, every day"*.

Others however, described competing demands on their time. One Technician noted *"...there's not time to do that [tickling] in some of the other units where I provide weekend cover but that's just how it is"*.

Another Animal Technician spoke of the ad-hoc approach they had developed when time permits. They were spending 5 to 10 minutes tickling cages at weaning in the belief that the rats seemed to be more interactive thereafter. This sense of prioritising was echoed elsewhere with two Animal Technicians recognising that some strains seem to be more aggressive than

others, prompting them to wonder if these rats should be the more immediate priority. Another mentioned cage-changing or single-housed animals as the prompts for tickling so that eventually you would work your way around the entire house. There was also consideration about who should do the tickling and this prompted one Animal Technician to suggest for the researchers to be more involved as *"...even with some animals that are very relaxed with me, there can be something of a tense atmosphere between them and the researchers"*.

Animal Technicians were pragmatic about the need to balance interactions with individual animals with the day-to-day challenges of caring for the wider group.

The majority of participating Animal Technicians were positively disposed, time permitting, to the idea of doing more tickling in the future and it was broadly seen as a positive thing. That said, they would welcome guidelines as to its application. One respondent summed it up by saying *"I'm always up for change. That's what science is all about, I suppose, isn't it?"*.

If it improves Animal Welfare then it should be encouraged" with another observing "I think it's a good thing and I think improving the interactions with the rats will help to encourage staff to work with rats e.g. the rats coming to you instead of running to the back of the cage and I would love to see that happen".

Discussion

Knowledge of tickling

Knowledge of tickling was in some cases related to use of tickling, but this was not always the case. Across all levels of knowledge about tickling there seemed to be some uncertainty about how to specifically carry out tickling and whether the hand movements that interviewees were currently using in practice could be termed tickling. There was recognition from some that tickling should not be forced on rats and that it may not be appropriate in all circumstances e.g. post-surgery; with some genetic strains. There were also variable levels of confidence about how to interpret rats' response to tickling: rats engaging in the activity and actively seeking out the hand and coming back for more were mentioned as potential indicators of positive responses of rats to tickling. Another aspect that was mentioned on several occasions was the use of rats' vocalisations to assess rat welfare. Both researchers and Animal Technicians expressed interest in these vocalisations which are mainly in the ultrasound and require specialised equipment to monitor them (<https://www.positiveanimalwelfare.net/research/rat-tickling/>).

Training in tickling

Linked to knowledge of tickling, these interviews also suggest the development of training to impart knowledge and confidence in how to tickle. Training materials on rat tickling do exist, for example on the NC3Rs and the 3RsC websites (<https://nc3rs.org.uk/3rs-resources/rat-tickling>; <https://www.na3rsc.org/rat-tickling-faq/>). There is also evidence that training can improve key outcomes for rat tickling such as increased self-reported knowledge and self efficacy.¹¹ This raises the question of how best to incorporate training on rat tickling in the UK (this could be seen as a broader issue in how to create 'behavioural change' with respect to rodent welfare (e.g. stress free handling)). Possibilities include raising more awareness of rat tickling and other pro welfare approaches into Personal Licence (PIL) accreditation with more direction towards available training materials. Rat tickling (and other pro welfare approaches) could also be highlighted in Guidelines such as PREPARE.¹²

Barriers to uptake of tickling

These interviews reinforce existing understanding of the barriers that prevent further uptake of rat tickling.⁷ The main constraint mentioned here was the time availability for tickling and the practical considerations of how to fit rat tickling into the busy day to day routine of both Animal Technicians and researchers. Several interviewees asked for guidance on how much and how often tickling needs to be administered to create a positive response in the rats. This links again to the need for more knowledge and training on rat tickling. Previously¹¹ investigated the question of time and determined only 15 seconds of tickling for 3 days was enough to be effective. In addition there were also concerns about the effects of tickling on the repeatability of the research and that the act of interacting with rats through tickling may be at odds with a perceived need for professional detachment from experimental animals. This last point was referred to, for example, at the end of the experiment when the animals which had been interacted with would need to be culled. There was also reference to potential divergence of views on this point between researchers and their supervisors suggesting the need for more discussion and mentorship on the development of bonds between researchers and their rats.

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Appendix A

The question schedule used to organise the interviews (potential follow up questions indicated*):

General questions

- Are you a regular handler of rats?
- * How would you describe your role (e.g., technician, user of rats).
- How familiar are you with rat tickling?
- If you were asked to describe rat tickling to a friend how would you describe it?
- Have you used rat tickling previously?
- * (Answer will determine how the next questions are framed – see under Yes or No below).
- * if Yes can you describe how you have previously tickled rats.
- * if Yes can you tell me for what reason you tickled rats.

Positives

- If Yes to previous question: Could you tell me about the positives you have experienced from rat tickling?
- * What do you think might be other positives e.g. to the rat or to the researcher?
- If No: Could you tell me what positives you think could come from rat tickling?
- * What do you think might be other positives e.g. to the rat or to the researcher?

Negatives

- If Yes: Could you tell me about the negatives you have experienced from rat tickling?
- * What do you think might be other positives e.g. to the rat or to the researcher?
- If No: Could you tell me what negatives you think could come from rat tickling?
- * What do you think might be other positives e.g. to the rat or to the researcher?

Facilitating use of tickling

- If Yes: Reflecting on your current use of rat tickling, what do you think would increase/ decrease your use of tickling?
- If No: Reflecting on what you know about rat tickling what do you think would increase/ decrease your use of tickling?

Balance of positives and negatives

- Do you think you will be more likely or less likely to use rat tickling in the next 6 months?
- * Do you think others should be encouraged to use rat tickling?

Appendix B

Information and Consent Sheet:

You are being asked to participate in a short interview and/or participant in a focus group discussion to examine your thoughts on **Rat Tickling protocols to improve positive Animal Welfare in laboratory rats** being carried out by SRUC and the University of Edinburgh and funded by NC3Rs.

Background to project

This is part of a larger experimental study funded by NC3Rs <https://www.nc3rs.org.uk/our-portfolio/refinement-tickling-protocols-improve-positive-animal-welfare-laboratory-rats>. The aim of the project is to improve the way that rats are tickled to enhance their welfare. As a part of this, we would like to understand more about how people who use rats in their research perceive rat tickling. We hope that this understanding could help in improving the uptake of rat tickling in practice.

Aim of this study

To explore and better understand how Animal Technicians and individuals who use rats in their research perceive rat tickling and what may constrain or encourage the uptake of rat tickling in laboratory contexts.

Participation

Your participation in this research is voluntary. You can refuse to take part and you can change your mind and withdraw from this study at any time without having to give an explanation.

Ensuring your anonymity

- All information about you will be treated in strict confidence.
- No potentially identifiable information will be used.
- When project progress is discussed with others and when findings are reported and published, only anonymised information and quotations will be used.

The privacy policy that will cover this work can be found here: [https://www.sruc.ac.uk/connect/about-sruc/policies-compliance/compliance/privacy-policy-gdpr-cookies/#:~:text=Information%20we%20collect%20and%20use&text=Special%20category%20data%20\(or%20sensitive.in%20your%20relationship%20with%20SRUC](https://www.sruc.ac.uk/connect/about-sruc/policies-compliance/compliance/privacy-policy-gdpr-cookies/#:~:text=Information%20we%20collect%20and%20use&text=Special%20category%20data%20(or%20sensitive.in%20your%20relationship%20with%20SRUC)

What taking part will involve

You will be asked to take part in short one-to-one research interviews online (on MS Teams) with Prof. Alistair Lawrence. This is a longitudinal study so we would potentially like to talk to you at more than one point in time i.e. we would aim to interview you at the start, middle and end of this study. This is expected to take about 30 minutes but not last more than 45

minutes. In these interviews you will be asked several questions relating to what you think about the use of rat tickling and what you think may constrain or encourage it's use. We may also conduct a group focus group session with other participants, which you may also be asked to attend and share your views and experiences of rat tickling. This is expected to take no more than one hour.

Data collection, analysis and findings

This project will use Teams as the secure environment to collect and store data.

With your consent, an audio recording using Teams will be made of your answers which will be given an anonymous identifier. These recordings will be stored on Teams and from there downloaded to Otter.ai which will be used to transcribe the recordings into a text file. These text files will be corrected on Otter.ai before being uploaded back to Teams for secure storing prior to analysis at which point the files on Otter.ai will be deleted. The audio recording will be deleted at the end of the project. If you decide to withdraw any of your data (whether from individual interviews or focus groups) will be deleted immediately.

The overall findings of this study will be reported to NC3Rs. Insights and perspectives you provide may be included in publications (e.g. academic papers, media articles, and policy reports).

Contact

If you have questions at any time about the study or the procedures, you may contact Alistair Lawrence at alistair.lawrence@sruc.ac.uk

By signing the below you agree that

- You have read the above information
- You voluntarily agree to participate
- You understand that participation will involve a recorded interview (of about an hour).
- You agree that your responses will be used for the purposes of the research outlined above and reported in publications (e.g. media reports, policy briefs and academic papers), which may include your anonymised information and quotations (No information which could identify me you will be shared).
- You are 18 years of age or older

I freely give my consent to participate in this research study and have been given a copy of this form for my own information.

Signature: _____

Date: _____