



## Introduction

- Social stigma is the discrediting of an individual with a devalued social identity
- Sexual minorities are a target population for this stigma (Meyer, Schwartz, & Frost, 2008).
- This makes them vulnerable to mental health problems, substance abuse and social isolation
- The literature is scarce in investigating the differing effects of stigma attached to gay men and gay male couples on gay men's body image and relationship quality

### Body Image

- Gay men have been found to show more bodily dissatisfaction than heterosexual men (e.g. Russell & Keel, 2010)
- This stems from the heightened focus on physical appearance where gay men socialise, images in the media, a smaller potential dating pool and an eagerness to prove masculinity
- Stress from stigma can have a worsening effect on this existing negative body image (Grogan, 2006)

### Relationship Quality

- External stressors are capable of negatively impacting romantic relationships. This is amplified for sexual minorities (Quinn & Chaudoir, 2009)
- These stressors are prevalent at every level of the socio-ecological system (see Figure 1)
- The romantic relationship becomes a core motivator of prejudice and discrimination (Doyle & Molix, 2014)

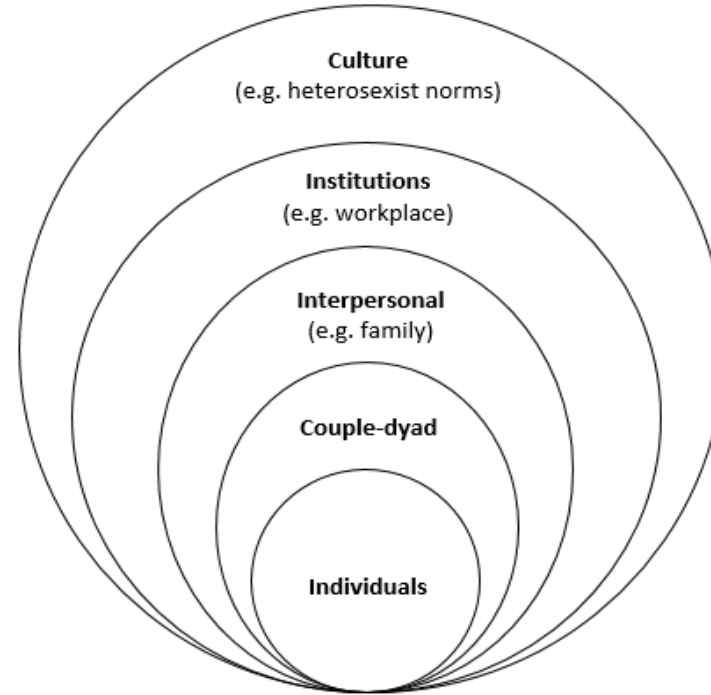


Figure 1. Socio-ecological system composed of nested levels whereby interactions at any level affect all other levels of the system. From Rostosky & Riggle (2017).

## Aim

To focus on gay men as a sexual minority and explore the effect of stigma attached to gay men or gay male couples on body image and relationship quality.

Our findings will be useful for intervention and treatment approaches to help gay men cope with stigma and prevent negative body image and romantic relationship problems.

### Hypotheses:

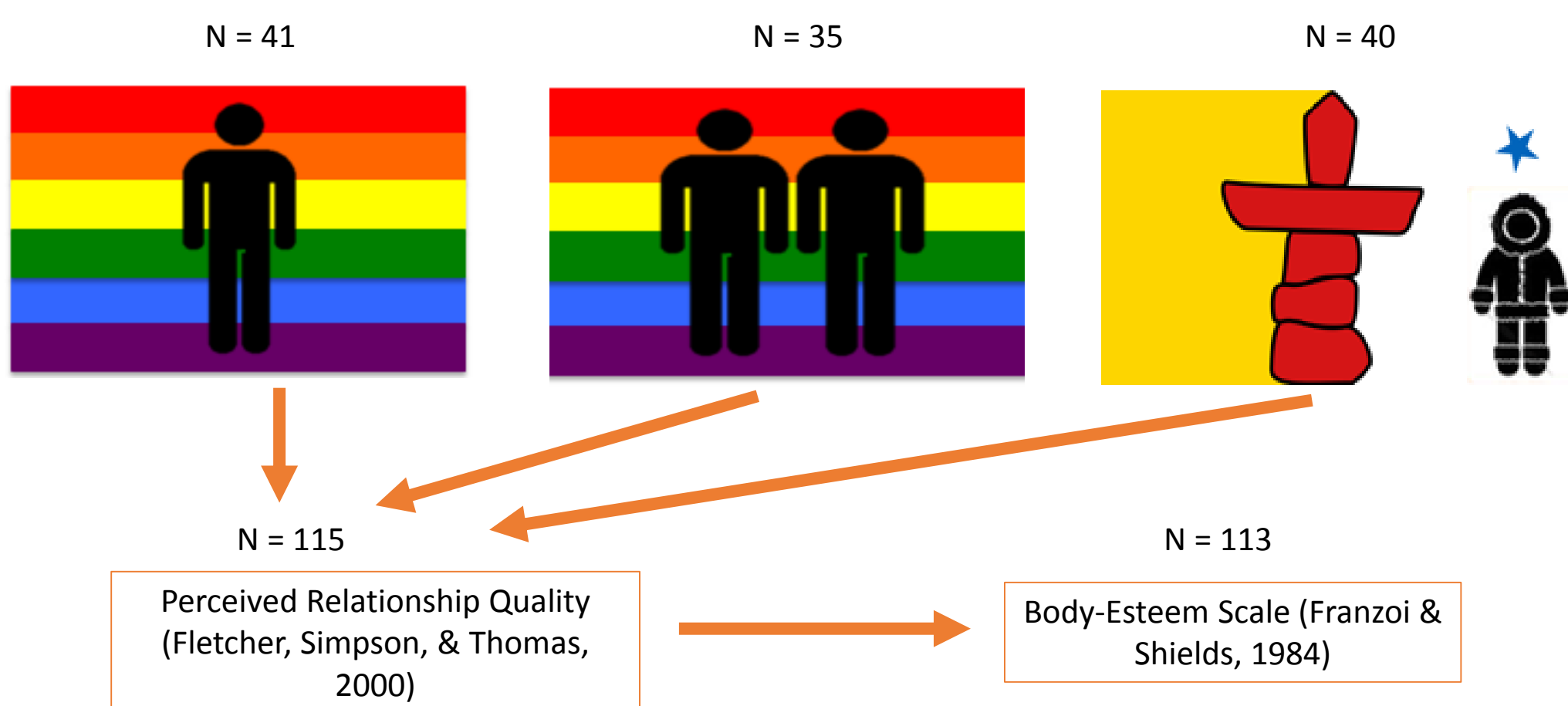
- H1** Participants who are primed with stigma attached to gay men or gay male couples will report a more negative body image than those in the control group
- H2** There will be a significant difference in the positivity of body image reported, depending on whether participants are primed with stigma attached to gay men or gay male couples
- H3** Participants who are primed with stigma attached to gay men or gay male couples will report lower romantic relationship quality than those in the control group
- H4** Participants who are primed with stigma attached to gay male couples will report lower relationship quality than participants primed with stigma attached to gay men

## Method

### Procedure

Participants were informed that the aim of the study was to explore identity and relationships. The study took place using an online survey platform.

Participants were randomly assigned to read one of three fabricated newspaper articles describing issues of discrimination towards gay men, gay male couples, or the Inuit Population (to be used as a control group). They were then asked to complete measures of relationship quality and body image:



## Results

### Body Image (see Figure 2)

- The stigma type primed did not have a significant effect on body image;  $F(2,110) = 1.26, p = .287$
- There was no significant difference between body image reported by those in the gay men or gay male couples condition;  $F(1,110) = 2.49, p = .118$

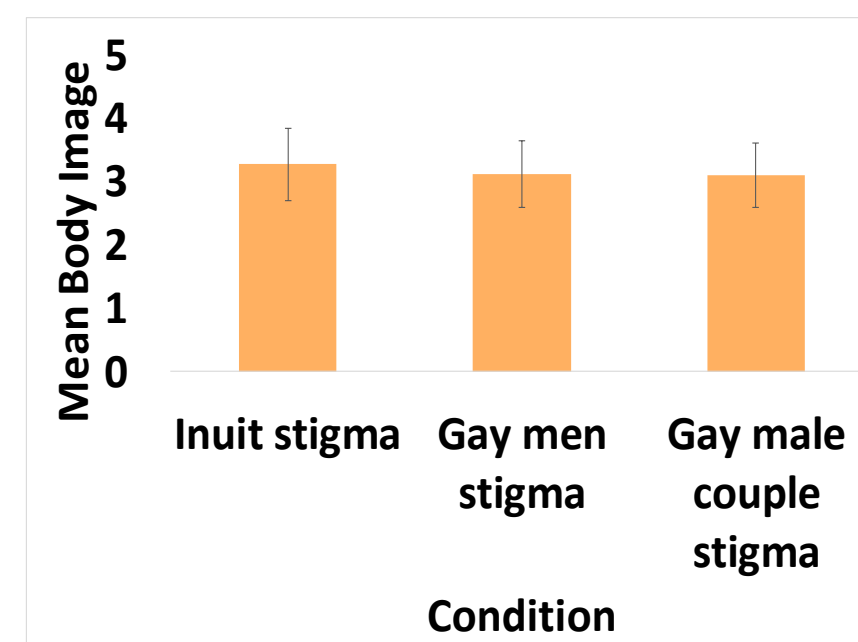


Figure 2. Mean body image as a function of condition with SD error bars. 1 = strong negative feelings, 5 = strong positive feelings.

### Relationship Quality (see Figure 3)

- The stigma type primed did not have a significant effect on relationship quality;  $F(2,112) = 0.69, p = .502$
- There was no significant difference between the relationship quality reported by those in the gay men or gay male couples condition;  $F(1,112) = 0.28, p = .596$

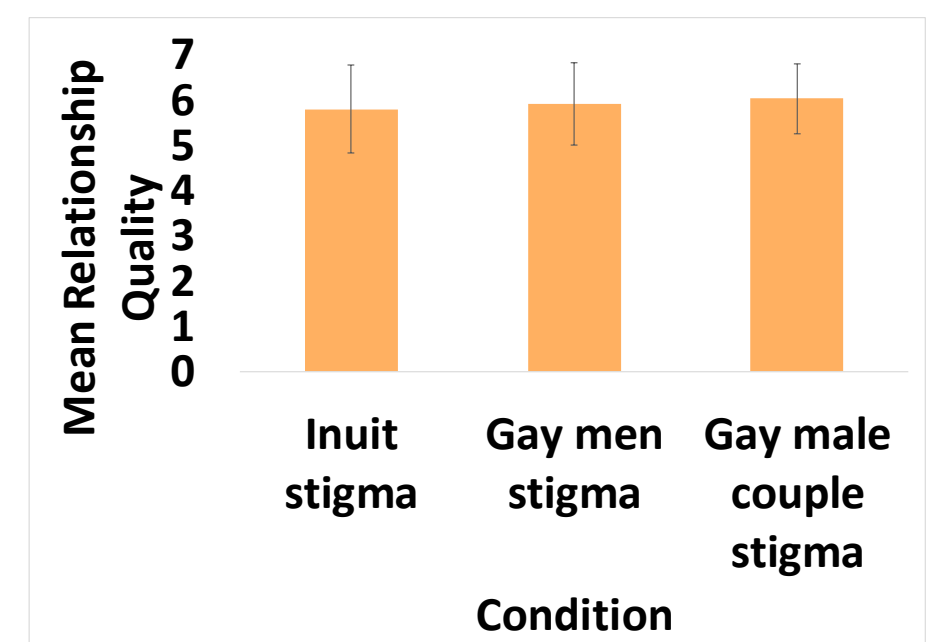
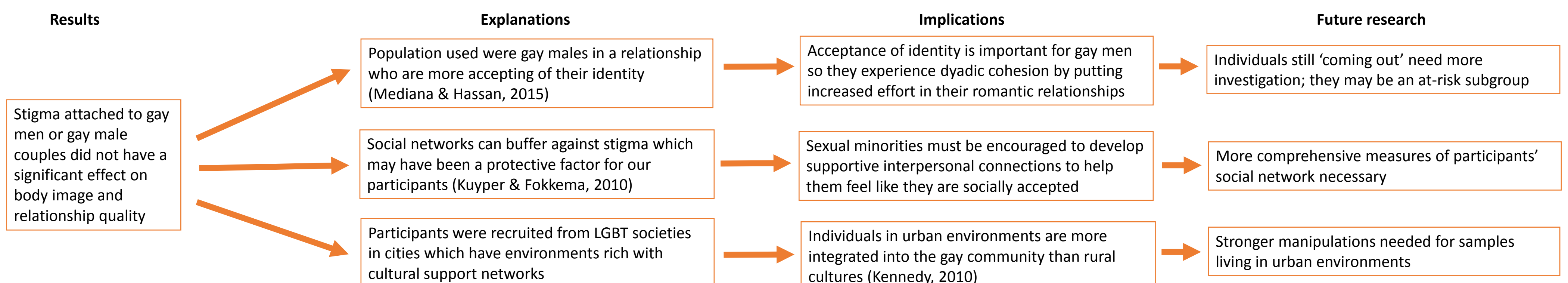


Figure 3. Mean relationship quality as a function of condition with SD error bars. 1 = low relationship quality, 5 = high relationship quality.

## Conclusions

- Despite our hypotheses not being supported, this study successfully addressed the gap in the literature investigating the effects of stigma attached to gay males and gay male couples on body image and relationship quality



Replications of this study with the above amendments will give us an appreciation of what protects and what makes a sexual minority vulnerable in the face of stigma. Future researchers are encouraged to consider the complexity of such a phenomenon as homophobia still remains a problem in the contemporary world.

## References

- Doyle, D. M., & Molix, L. (2014). How does stigma spoil relationships? Evidence that perceived discrimination harms romantic relationship quality through impaired self-image. *Journal of Applied Social Psychology, 44*, 600-610.
- Grogan, S. (2006). Body image and health: Contemporary perspectives. *Journal of Health Psychology, 11*, 523-530.
- Kennedy, M. (2010). Rural men, sexual identity and community. *Journal of Homosexuality, 57*, 1051-1091.
- Kuyper, L., & Fokkema, T. (2010). Loneliness among older lesbian, gay, and bisexual adults: The role of minority stress. *Archives of Sexual Behavior, 39*, 1171-1180.
- Mediana, P. A., & Hassan, S. A. (2015). A review on emotional intelligence among homosexual of LGBT community. *Asian Journal of Scientific Research, 8*, 14-21.
- Meyer, I. H., Schwartz, S., & Frost, D. M. (2008). Social patterning of stress and coping: does disadvantaged social statuses confer more stress and fewer coping resources? *Social Science & Medicine, 67*(3), 368-379.
- Quinn, D. M., & Chaudoir, S. R. (2009). Living with a concealable stigmatised identity: The impact of anticipated stigma, centrality, salience, and cultural stigma on psychological distress and health. *Journal of Personality and Social Psychology, 97*, 634-651.
- Rostosky, S., Riggle, E. D., Dudley, M. G., & Wright, C. M. L. (2006). Commitment in same-sex relationships: A qualitative analysis of couples' conversations. *Journal of Homosexuality, 51*(3), 199-223.
- Russell, C. J., & Keel, P. K. (2002). Homosexuality as a specific risk factor for eating disorders in men. *International Journal of Eating Disorders, 31*, 300-306.

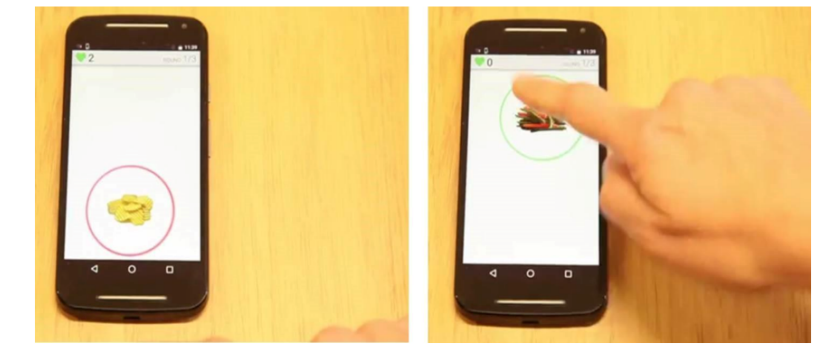
# Bin the Biscuits: Can Go/ no-go Training Encourage Children to Make Healthier Food Choices?



## Introduction

Children in the UK are eating up to **three times** the recommended **daily sugar** allowance (House of Commons Committee, 2015). **Automatic processes** have a role in eating behavior (e.g. Hofmann, Friese & Strack, 2009).

We can target automatic responses to food by using **Inhibitory control Training (ICT)** in the form of food specific **Go/ no-go paradigms** in which **healthy food** images (e.g. carrots, apples) are consistently paired with a “**go**” response (e.g. keyboard press or finger tap) and **unhealthy food** images (e.g. chocolate, sweets) are consistently paired with a “**no-go**” response (no response)(Houben & Jansen, 2015 ).



This type of training has encouraged **healthier food choices** and **weight loss** in adults when played at home ( e.g. Lawrence et al., 2015), and **healthier food choices** in **children**, but has only been done in a **laboratory** on a computer (e.g. Porter et al., 2017).

This raised the **question**: What would be the best way to give this training to **children at home**, and would doing so help them make **healthier food choices**?

## Aims

The aim of the research was to determine whether **children** would **engage** with two new formats of ICT, and whether they would still be **effective** in increasing **healthy food choices** .

**Study 1:** To determine whether **computerized, online ICT** would encourage **healthier food** choices when children engaged in it at **home**.

**Study 2:** To determine whether children would be able to play an **app version** of ICT (**FoodT**) and whether this would encourage them to make **healthier food choices**.

## Hypothesis

Children aged 4-12-years would be able to **engage** in both the **online ICT** in a **home** setting and the **FoodT app** and **both** would have an **effect on the healthy food choices**.

## Study One

### Method

Children were asked to play **computerised Go/no-go** game at **home**.

In the active group, **healthy food** images were paired with a smiley face (**go** signal) and sad faces (**no-go** signal) were paired with **energy dense food** images (Figure 1).

In the **control** group, the food images were randomly paired 50/50 to happy and sad faces.

Then, the children completed a hypothetical food choice tasks to assess their **healthy food choices**.

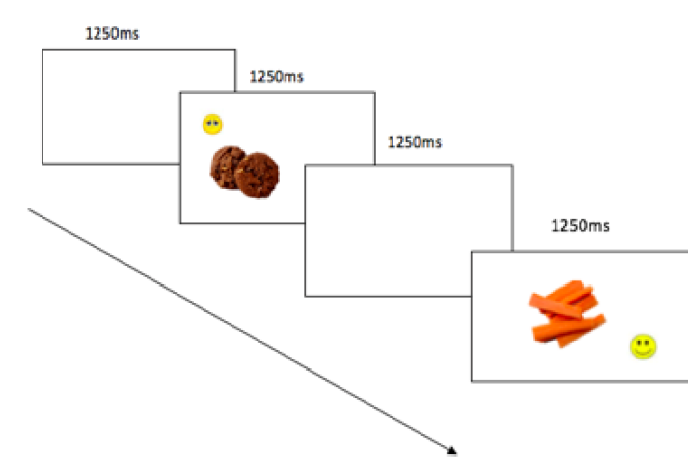


Figure 1: Frame-by-frame depiction of the active group computerised ICT trial with a smiley face indicating a “go” trial and a sad face indicating a “no-go” trial.

### Results

**High Drop-outs:** A total of **68** Participants signed up , but only **21** participants completed the study. We think this was because children now are **more familiar** with **tablets and smart phones** than stationary computers (Ofcom,2017;feedback from parents).

Despite this, **children** in the **active** condition chose a **greater number of healthy foods** in the Hypothetical food Choice Task ( $M=4.36$ ,  $SD=1.98$ ) than the children in the control group ( $F(1,19)=5.60$ ,  $p=.029$ ,  $\eta^2p=.228$ ) (Figure 2).

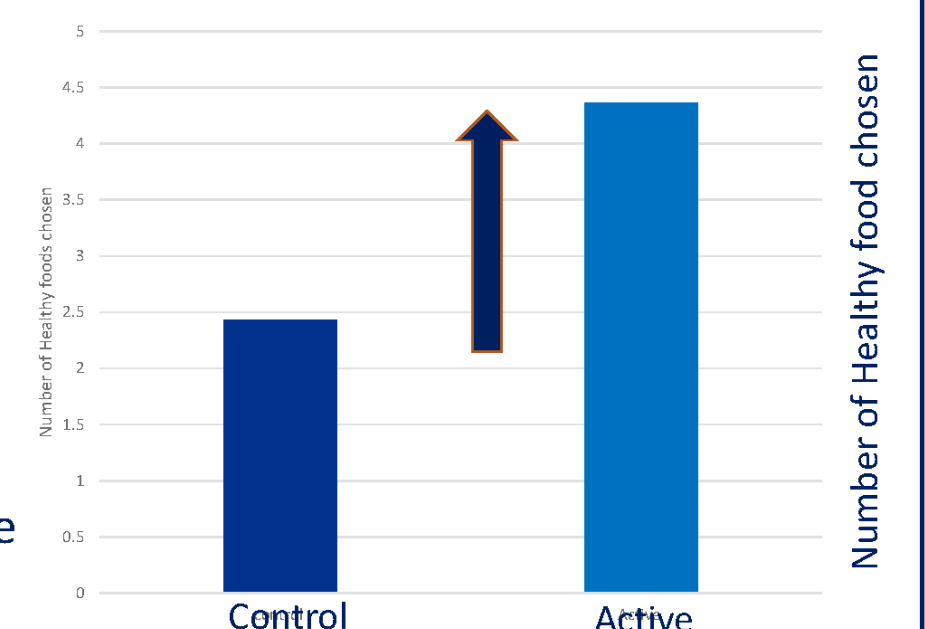


Figure 2: Healthy food choices made in the active and control condition

## Study Two

### Method

Children played the FoodT app on a smart phone.. **Healthy food** images are presented in a green circle (**go** signal; tap screen), and **energy dense** food images are presented in a red circle (**no-go** signal; inhibit response) (Figure 3).

The children completed a **food choice game** **before and after** playing the foodT app.

This required them to **choose** the foods they most wanted out of a **selection of healthy and energy dense** foods.

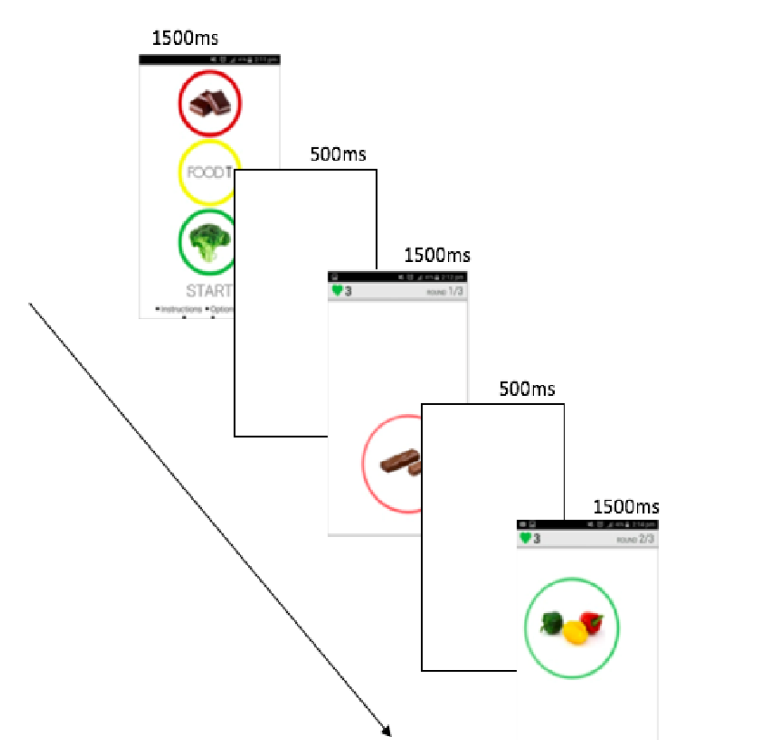


Figure 3: Frame-by-Frame depiction of the FoodT app. Red circle for “go-no” and green circle for “go”

### Results

After the engaging the the **FoodT app**, **children** chose an increased number of **healthy foods** compared to before playing ( $M= 0.49$ ,  $SD=1.30$ )  $F(1,65) = 8.12$ ,  $p=0.006$ ,  $\eta^2p=.111$ ).

Due to the limited number of food choice options, this resulted in a **subsequent decrease in unhealthy foods** (Figure 4).

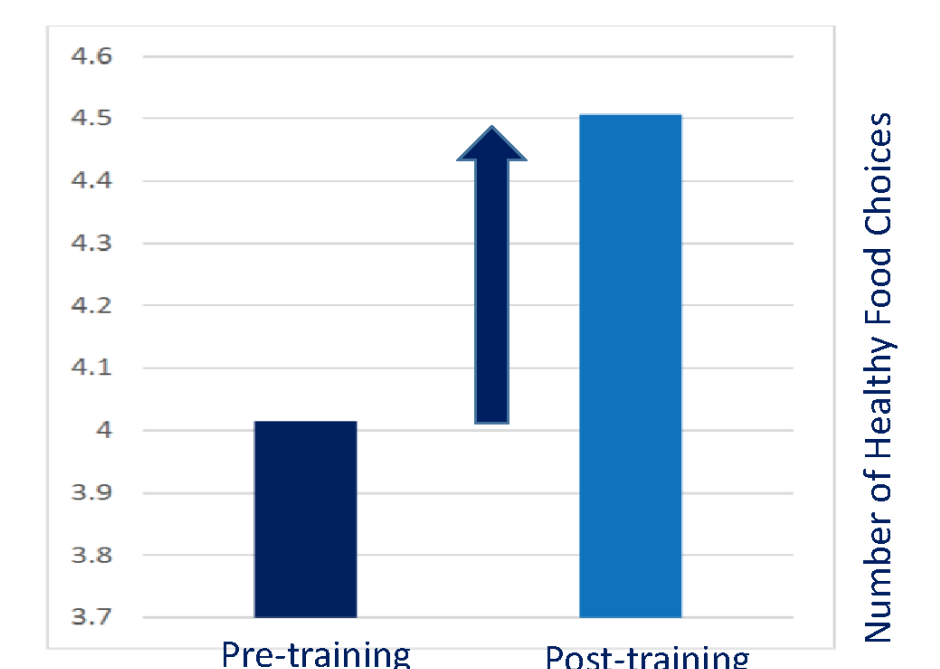


Figure 4: Pre and posty healthy and unhealthy choices out of a total of eight.

## Discussion

### What we found

**Children** aged 4-12 years old were able to complete food specific ICT both **at home** on a computer and on a **smart phone**.

Both resulted in a **significant increase** in the number of **healthy foods** chosen .

Due to the high drop out rates seen in study one, a **mobile phone app** format of the training may be more suitable for **children**.



### Future directions

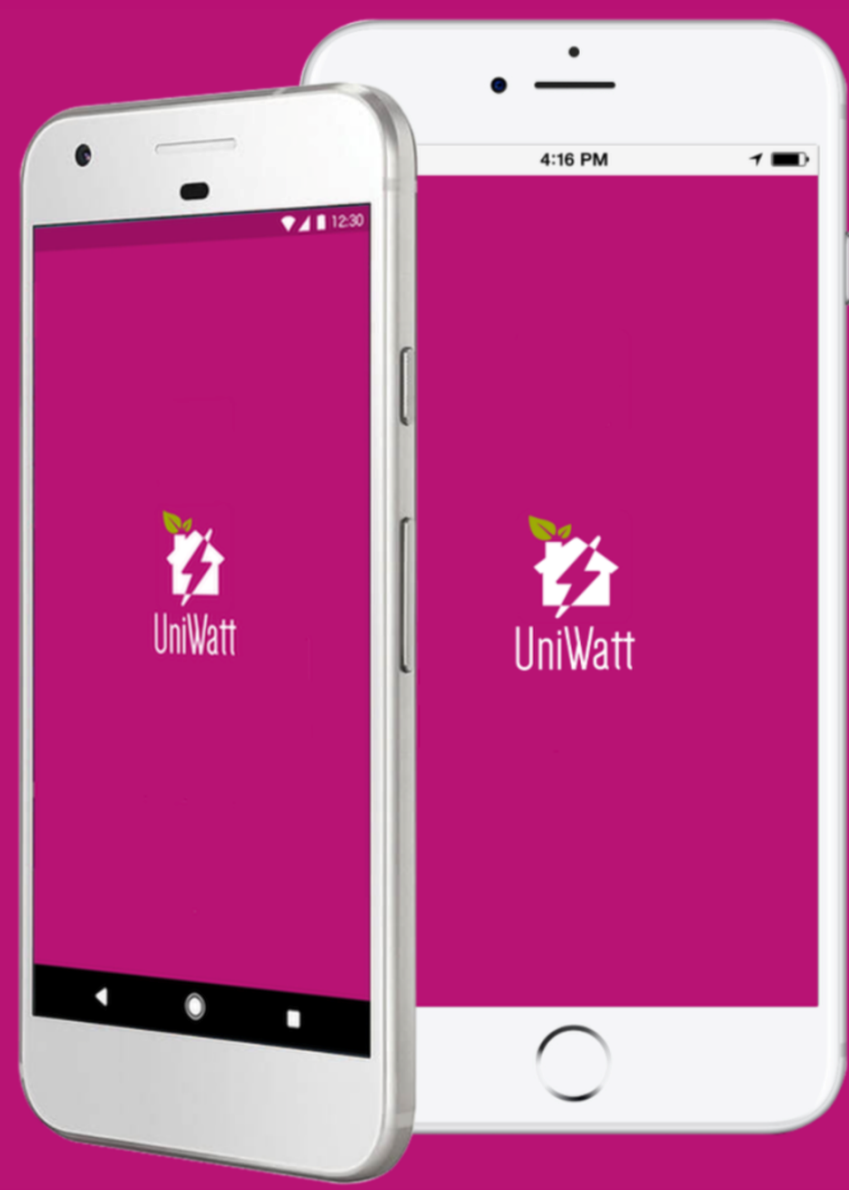
Due to the popularity of mobile phones in children and the feedback and drop outs from the computerized training, future research in **children** should focus on the **FoodT app** or a **gamified** version.

Future research should examine whether **healthier food** choices are encouraged when children play the **FoodT app** at **home**, and if they are willing to play the app at home.

The **FoodT app** should be examined for use in the **clinically overweight/ obese** population.

## References

Hofmann, W., Friese, M., & Strack, F. (2009). Impulse and self-control from a dual-systems perspective. *Perspect Psychol Sci* 4,162-176. House of Commons Health Committee. (2015, November, 17). *Childhood obesity – Brave and bold action*. Retrieved from: <https://www.publications.parliament.uk>; Houben, K., & Jansen, A. (2015). Chocolate equals stop. Chocolate-specific inhibition training reduces chocolate intake and go associations with chocolate. *Appetite*, 87,318-323; Lawrence, N.S., Hinton, E.C., Parkinson, J. A., & Lawrence, A.D. (2012). Nucleus accumbens response to food cues predicts subsequent snack consumption in women and increased body mass index in those with reduced self-control. *Neuroimage*, 63,415-422; Lawrence, N., O’Sullivan, J., Parslow, D., Javid, M., Adams, R.C., Chambers, C.D., Kos, K., & Verbruggen, F. (2015). Training response inhibition to food is associated with weight loss and reduced energy intake. *Appetite*, 17-28; Marrero, N.M., He, F.J., Whincup, P., & MacGregor, G.A. (2014). Salt intake of children and adolescents in south London consumption levels and dietary sources. *Hypertension*, 1026-1032; Moriguchi, Y., & Hiraki, K. (2013). Prefrontal cortex and executive function in young children: a review of NIRS studies. *Front Hum Neurosci*; 7,867; Porter, L., Bailey-Jones, C., Priudokaite, G., Allen, S., Wood, K., Stiles, K., Parvin, O., Javid, M. (submitted). From cookies to carrots: the effect of inhibitory control training on children’s snack selections; Silvers, J. A., Insel, C., Powers, A., Franz, P., Weber, J., Mischel, W., Casey, B.J., & Ochsner, K.N. (2014). Curbing craving: behavioural and brain evidence that children regulate craving when instructed to do so but have higher baseline cravings than adults. *Psychological Science*, 10,1932-1942.



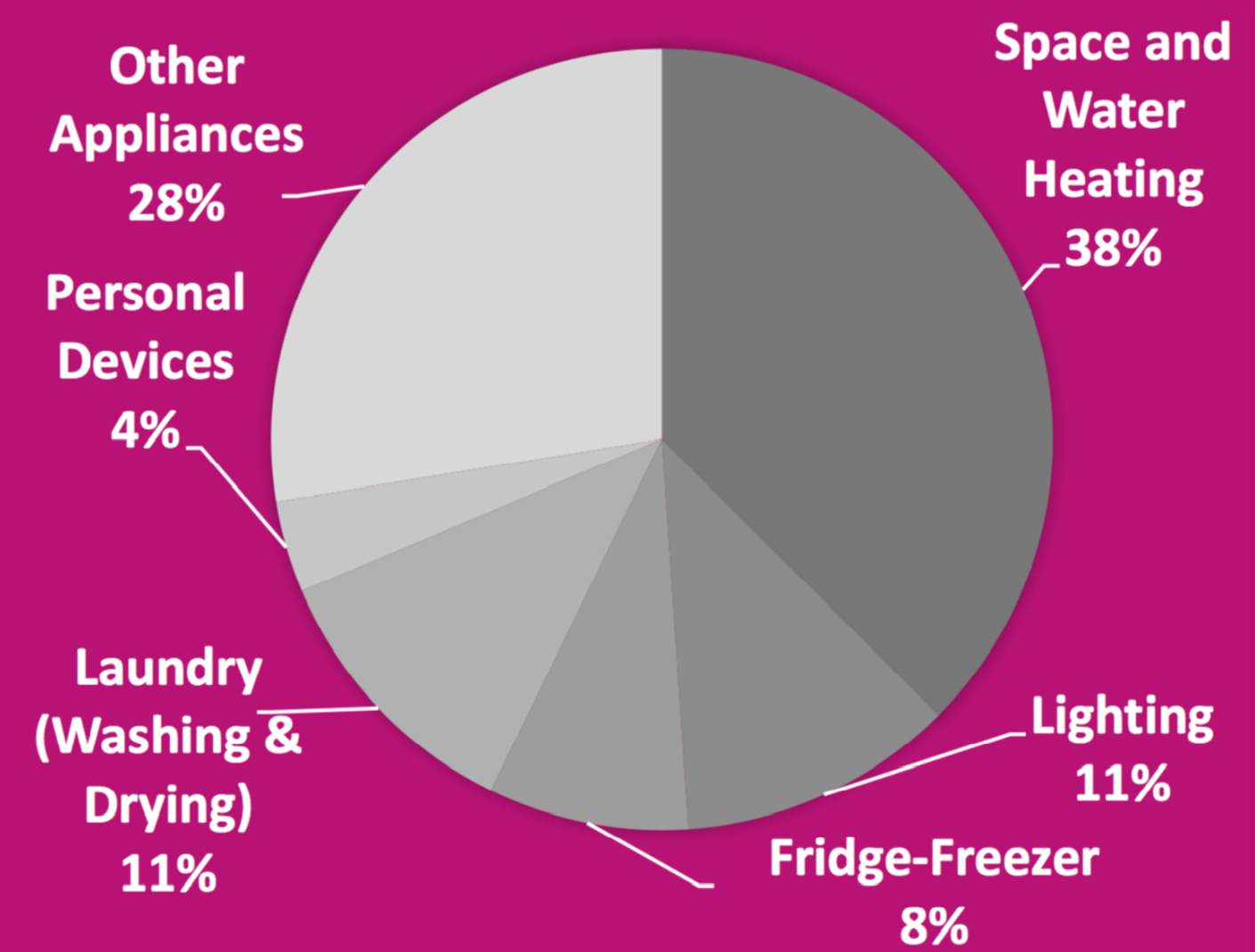
# UniWatt

An app to help students reduce energy consumption

Devon is recognized as having among the highest average household carbon footprints in the EU.<sup>1</sup> For Grand Challenges 2017, we were tasked with developing a platform to reduce household energy usage. With roughly one student for every two households in Exeter, we at UniWatt believe that students are an important demographic to target with a campaign to reduce domestic energy usage and eventually lead toward energy independence for Exeter.

From the "Energy Independence 2025 Report" by Exeter City Futures, we determined that approximately 97.5kWh is used per week by an average student household, the distribution of usage is shown in this pie chart.<sup>2</sup> The volume of energy used in Lighting, Personal Devices and Other Applications suggests that changes can be made in small individual lifestyle choices to improve the energy usage of a student household.

Due to the success of mobile apps such as JouleBug, we decided that an app allowing easy tracking of household energy use would both appeal to students and be an effective strategy.<sup>3</sup> In the Grand Challenges week we designed the concept, interface and layout; with the aim to work with Exeter University to promote and integrate this within the iExeter student app or develop it as a standalone product in the near future.



## WHAT WILL THE APP DO?

### TRACK YOUR USAGE

The students will see a total of their energy usage for the week and compare it to previous weeks.

### MONITOR YOUR PROGRESS

An interactive chart will enable students to monitor their energy usage over time.

### LOG USAGE WITH EASE

Students will simply tap the appliance they are using to allow easy and often input of data which leads to more accurate tracking of the students usage.

### HERE TO HELP

Notifications will appear to remind the student to input their appliance usage for the day and with tips on how to reduce the amount used in future.

## THE FUTURE

One of the ways UniWatt will be able to improve and adapt to the future is connection to the Internet of Things and devices such as smart meters. It is possible to develop algorithms which identify individual appliance usage by monitoring total household energy consumption. Providing accurate real time data not only benefits the users experience but also provides a platform to collect anonymised raw energy data and consumer feedback that can be provided to organisations such as the university and local council to inform decisions about useful change in the community.

<sup>1</sup> = Diana Ivanova *et al* 2017 *Environ. Res. Lett.* 12 054013.

<sup>2</sup> = <https://www.exetercityfutures.com/insights/energy-independence-2025/>

<sup>3</sup> = <https://joulebug.com>

# Atmospheric Modelling of Noachian Mars

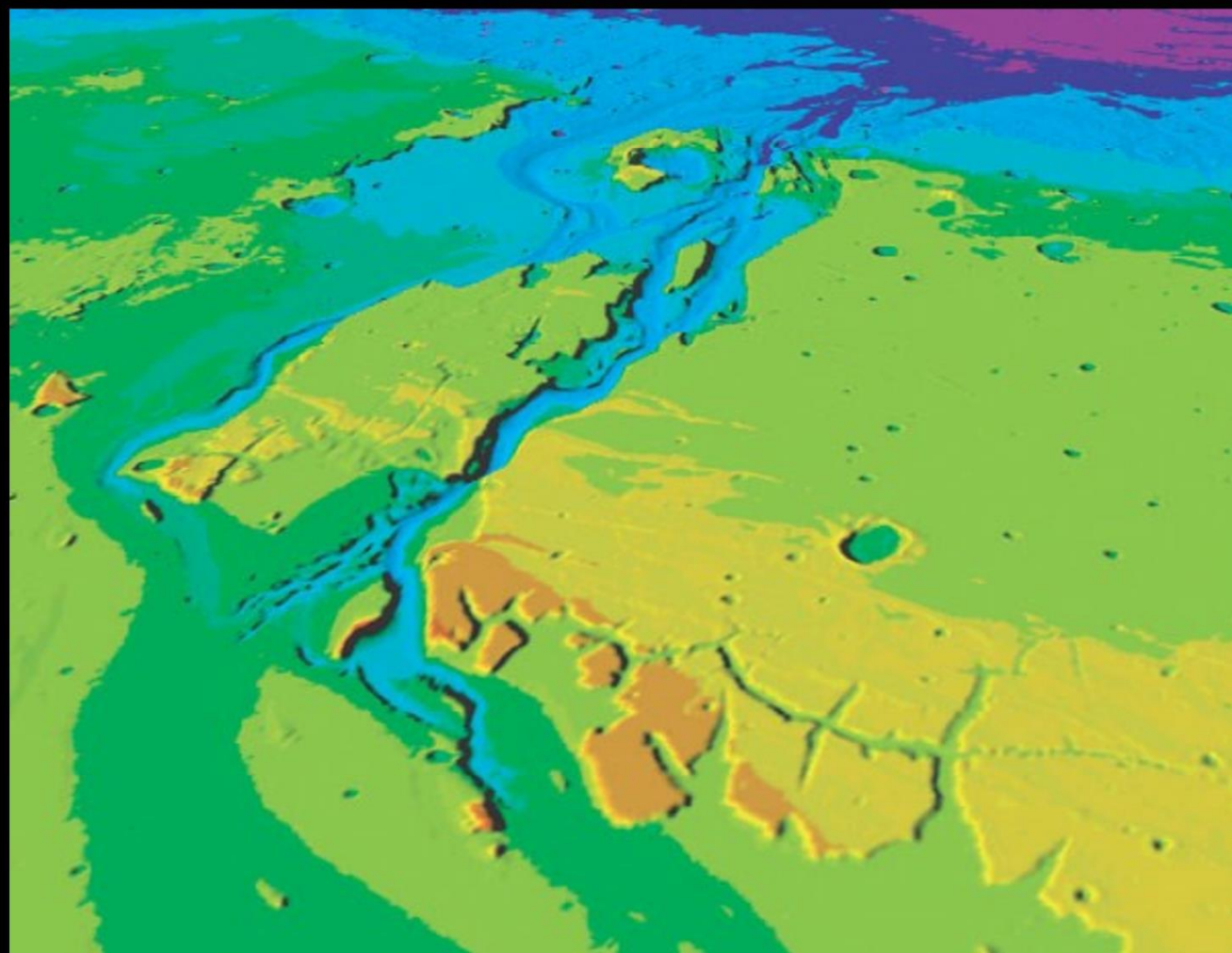
Supervisors: Nathan Mayne & Hugo Lambert  
 Model developers: James Manners & Ian Boutle

## Abstract

We use a 3D global climate model to investigate the atmospheric conditions required for an ancient Mars to harbor liquid water on its surface. The current model is a hydrologically active radiatively forced ancient Mars with an Earth-like atmosphere. This produces surface temperatures of 225K - 237K, too cold for liquid water to form.

## Introduction

Observations of the Red Planet indicate that the climate of Mars has changed significantly over time. Early in the planet's history (3.5 - 4.6 billion years ago) the climate was warm and wet with vast rivers and oceans covering the surface<sup>[1]</sup>. The evidence for this comes from the presence of fluvial features on ancient terrains, such as valley networks and open lake systems, which indicate precipitation and runoff<sup>[2]</sup>.



**Figure 1**  
 Oblique view of topographic data from the Mars Orbiter Laser Altimeter (MOLA) showing downstream portions of the outflow channel Kasei Vallis. Elevation is indicated by the colors, progressing from dark blue at 4000m, to dark green at about -1000 m, to dark orange at +2000 m.

(Image produced by T. M. Hare, US Geological Survey, Flagstaff, Arizona.)

### Why is the Martian surface so dry and cold today?

- Loss of water into space via atmospheric escape
- Freezing temperatures forced water to retreat towards the polar ice caps
- Decline of greenhouse gas concentrations in the atmosphere

## Aims

- Estimate the atmospheric gas concentrations required for liquid water
- Produce a simple model that can be manipulated for other planets
- Improve the understanding of atmospheric evolution

## Method

We use a 3D global climate model adapted from the Met Office Unified Model for planetary science to explore the atmospheric conditions of an ancient Mars. A simple temperature forced Earth model was developed to include radiative transfer, moisture and a hydrological cycle. The adjustment of the planet's orbital and body parameters allowed for the description of Mars with an Earth-like atmosphere. We simulate the young Sun's solar irradiance at  $952.7 \text{ W m}^{-2}$  (70% of today) and use the current Earth values for planet albedo and emissivity. The model was run for 10 Martian years (6870 Earth days).

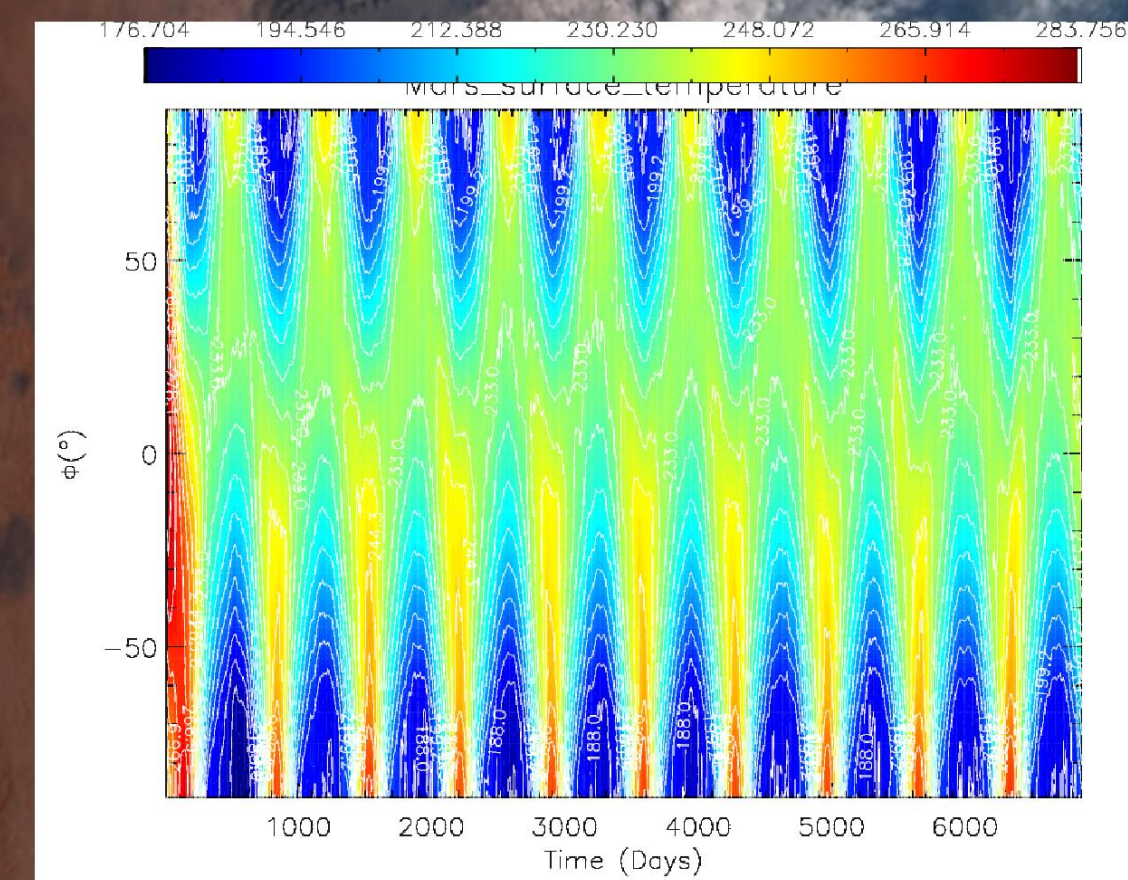
## Discussion & Conclusion

We developed a model of a dry temperature forced Earth into a hydrologically active radiatively forced ancient Mars. Present Earth-like atmospheric concentrations produce temperatures that are too low to for liquid water to form on the Martian surface (237K around the equator, 225K at the poles). This result is expected given the relatively low greenhouse gas concentrations in our current model. We believe this to be an appropriate model for an ancient Mars to be built upon.

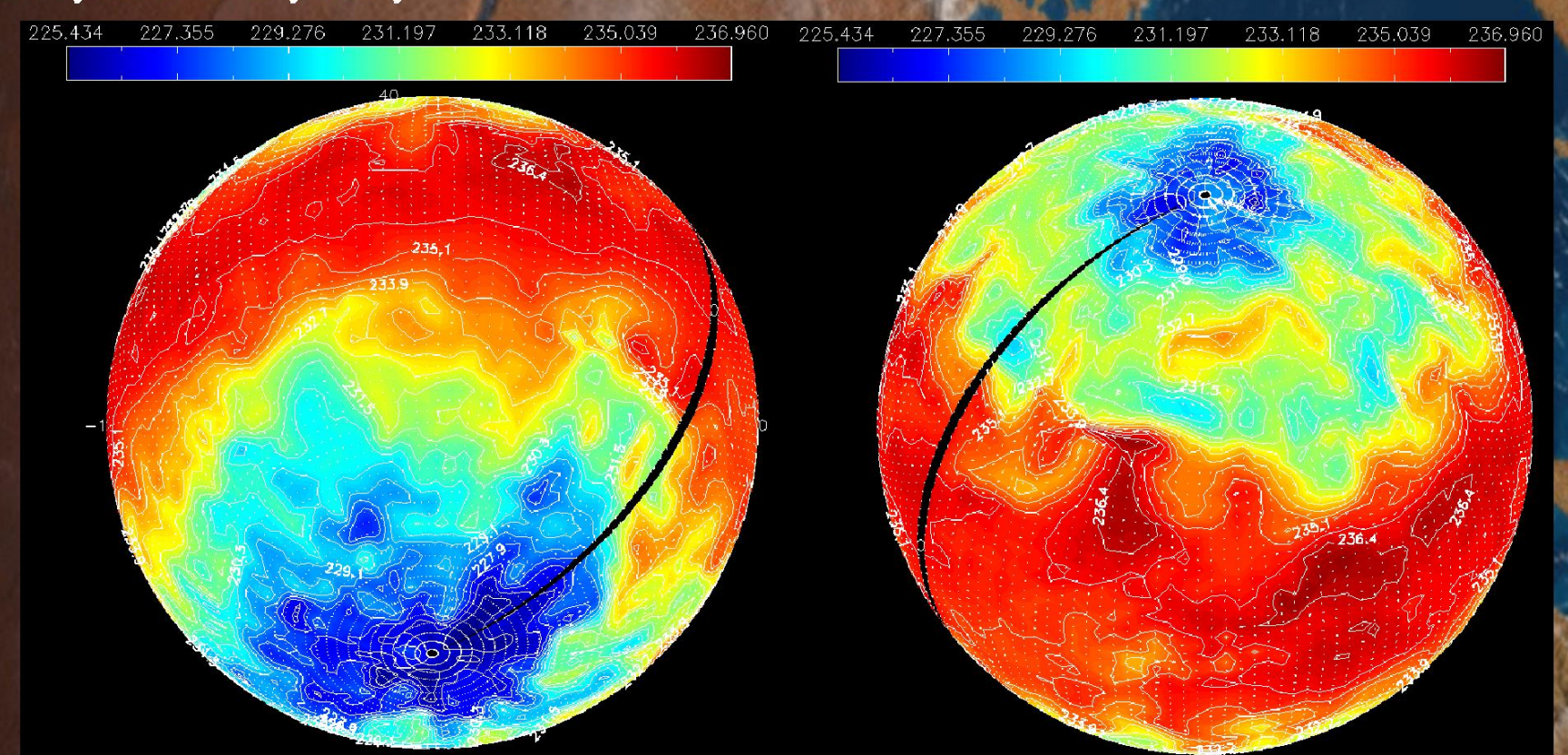
## References

- [1] Cabrol, N. A. & Grin, E. A. Distribution, classification, and ages of Martian impact crater lakes. *Icarus* 142, 160–172, 1999.  
 [2] Squires, S. W. Urey Prize Lecture: water on Mars. *Icarus* 79, 229–288, 1989.

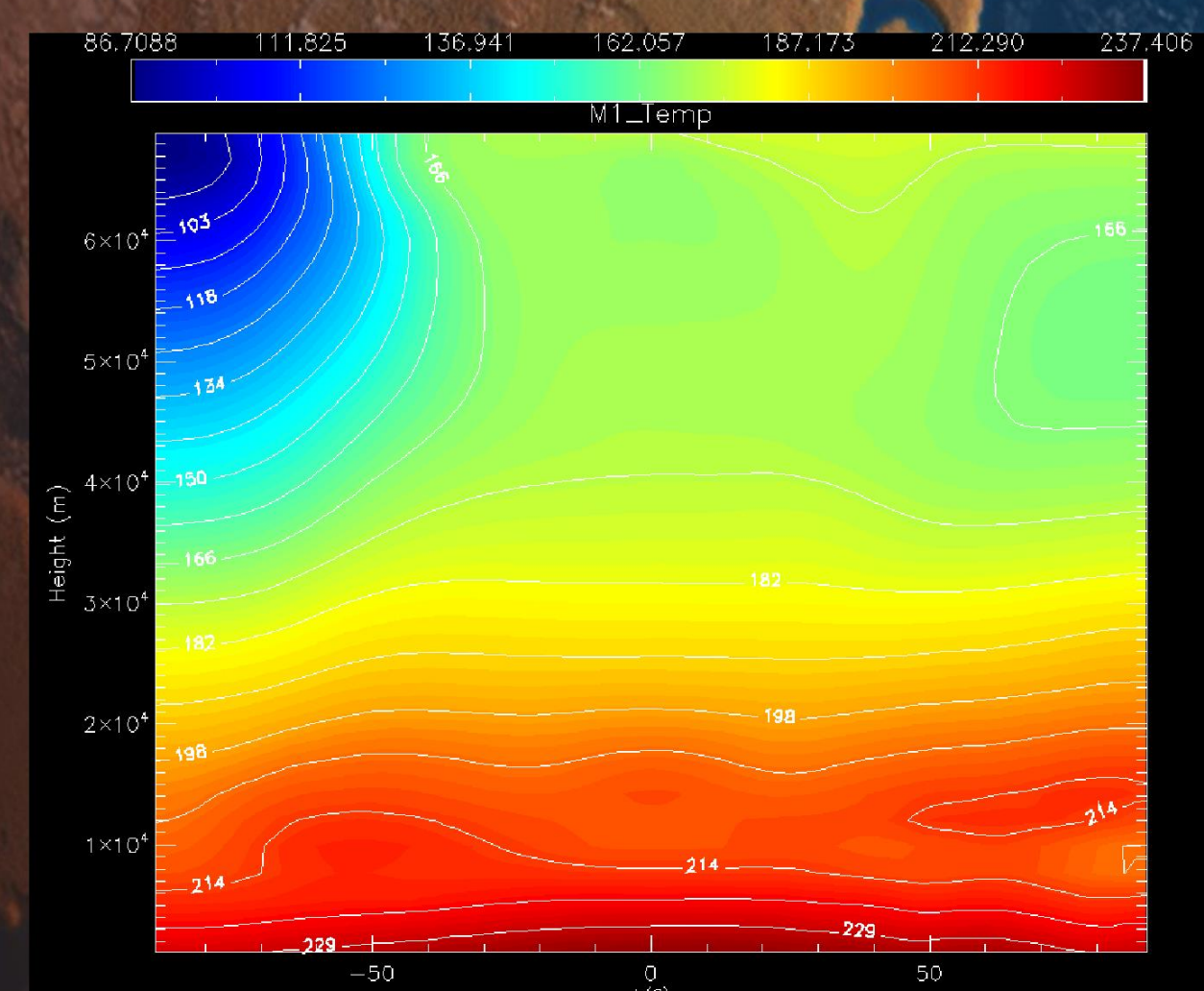
## Results



**Figure 2**  
 Variation of surface temperature over time at all latitudes. The model evolves from initial conditions until stabilization is reached at ~100 days. This figure shows a stable model with seasonal cycles and yearly variance.



**Figure 3**  
 3D renders of global atmospheric temperatures at low altitude. The temperature ranges around the planet from 225K (-48°C) at the poles to 237K (-36°C) along the equator.



**Figure 4**  
 Temperature variation with increasing altitude along all latitudes. The cold region on the left is due to the orientation of the planet, with the south pole facing away from the sun.

## Future Work

We will explore the planetary atmospheric conditions and energy balance required for an early Mars to achieve the necessary temperatures and pressures to permit liquid water on its surface. This will require adjustment of the atmospheric gas composition, surface albedo, planet emissivity and cloud molecule size within the global climate model. Increasing concentrations of greenhouse gases will hopefully reveal a realistic scenario of how Noachian Mars would have developed and sustained a complete hydrological cycle that can explain the geological and geochemical evidence for liquid water.

# An appointment with Dr. Google: what internet sources do patients use to find health-related information?

University of Exeter, Peninsula College of Medicine and Dentistry

## Introduction

The Internet is one of the world's most accessible sources of information; 43% of the global population have some form of access to the Internet.<sup>1</sup> There is an abundance of online health-related resources for patients to use. Such information may be seen as an asset, allowing patients to be more informed about their health; or as a burden, which may cause unnecessary anxiety. This study aimed to discover what online websites patients are using to find health-related information and whether this affected their knowledge or anxiety of their perceived problem.

## Aims

- To identify the online sources patients use for health-related information.
- To determine whether patients felt more or less informed regarding their own health after using the Internet.
- To determine whether patients were more or less worried after using the Internet to search for their symptoms.

## Method

- The study was conducted at The Clays Practice, Roche, Cornwall.
- 141 patients were asked to complete a questionnaire before they saw their GP. Patients were asked whether they had used the Internet to search for their symptoms, what online sources they had used, how informed they felt and whether they were more or less worried about their findings.
- Data was entered into Excel to allow for descriptive statistical analysis.

## Results

- 55 patients of 141 surveyed had used the Internet to search for their symptoms before their appointment.
- NHS Choices was the site most frequently used, accessed by 42 out of 55 patients (76.3%).
- 23 out of 55 patients (41.8%) stated that they were more informed after using the Internet. No patients were found to be less informed after they searched for their symptoms.
- 24 of the 55 patients (43.6%) experienced no changes to their worries, 8 were less worried (14.5%) and 4 patients were more worried (7.27%).

## Outcomes

NHS Choices was the website most frequently used (Fig. 1). The majority of patients felt more informed after using the Internet to search for their symptoms (Fig. 2). Most patients reported that searching online had no impact on their worries (Fig. 3).

## Discussion

This study was one of the first of its kind in UK general practice. However, due to the small sample size, collected from a single practice in Cornwall, our results may not be representative of the UK population.

Various reports in recent media suggest that using the Internet as a health tool spurs the development of so-called *cyberchondria*, the "unfounded escalation of concerns about normal symptomatology based on the review of search results and literature online", which interestingly does not appear to be reflected in our results.<sup>2,3,4</sup> A study of Microsoft workers in the USA found 38.5% of patients were more anxious about their medical condition, but 50.3% were less anxious.<sup>2</sup> Thus, the Internet may actually be beneficial in relieving patient health anxieties, rather than contributing to them.

There is a clear need for more research in this area to determine the impacts of the Internet on patient health anxieties. This particular study could be further developed by increasing the sample size and by collecting data from multiple practices, with the aim of having a more representative sample of the UK population.

FIGURE 1: SOURCES ACCESSED

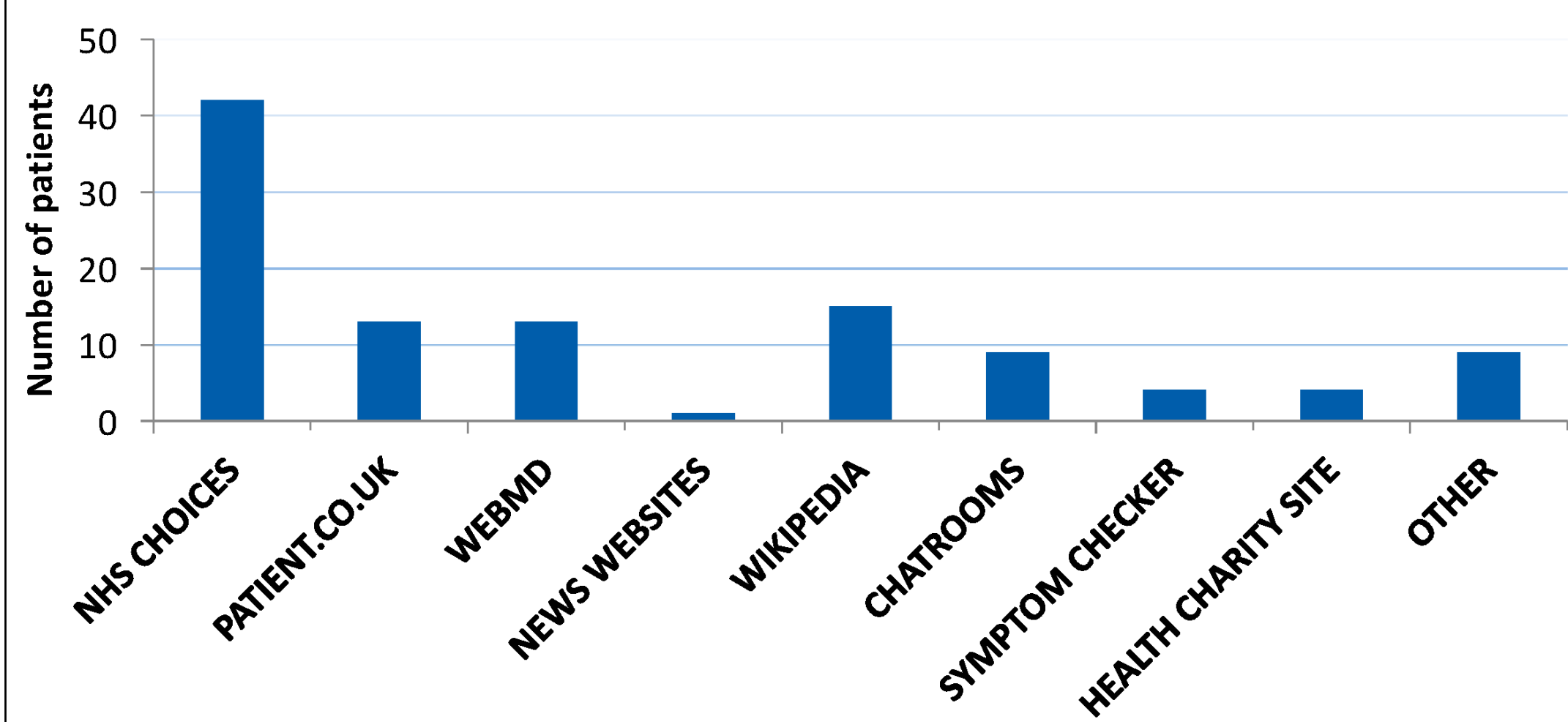


FIGURE 2: IMPACT ON PATIENT KNOWLEDGE

■ MORE INFORMED ■ NO CHANGE ■ N/A

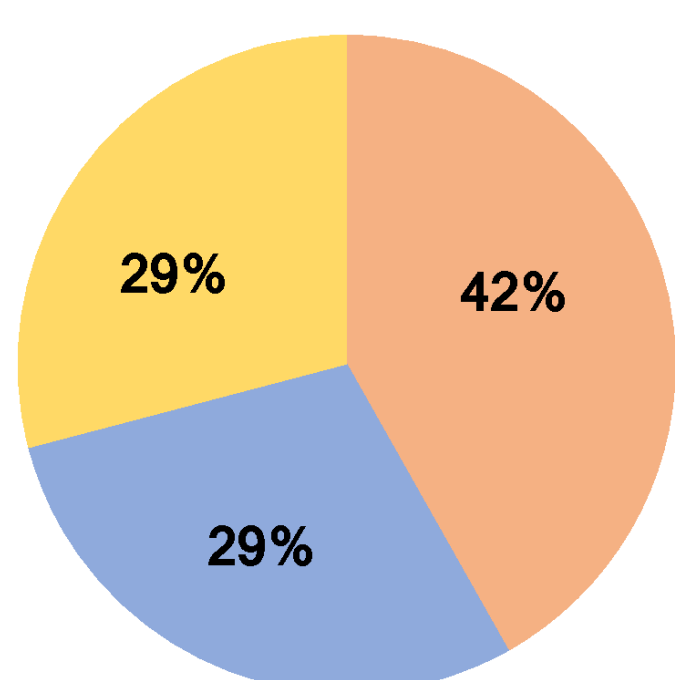
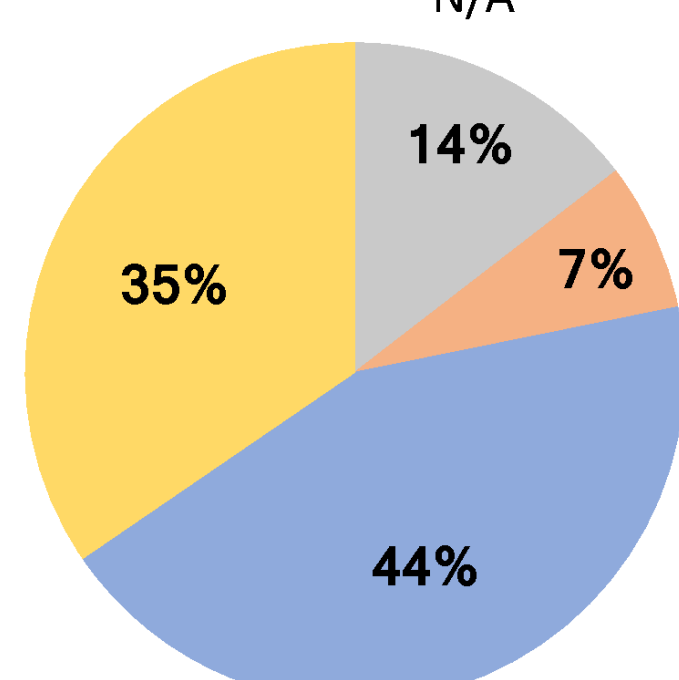


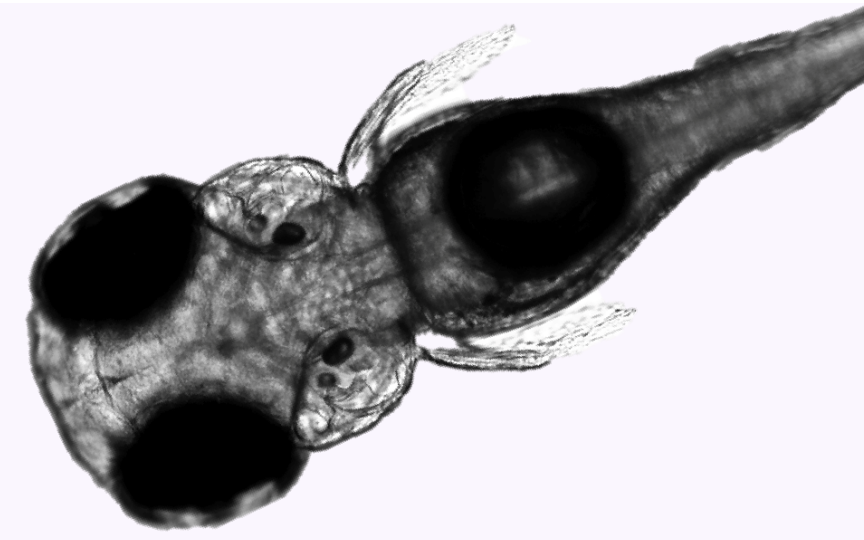
FIGURE 3: IMPACT ON PATIENT WORRIES

■ LESS WORRIED ■ MORE WORRIED  
■ NO CHANGE ■ N/A



## References

1. ITU. ITU released 2015 ICT figures. [http://www.itu.int/net/pressoffice/press\\_releases/2015/17.aspx](http://www.itu.int/net/pressoffice/press_releases/2015/17.aspx) (accessed Dec 2015)
2. White RW, Horvitz E. Experiences with web search on medical concerns and self diagnosis. *AMIA Annu Symp Proc* 2009;2009:696-700
3. Guardian. Is the internet making you (think you're) ill? You're a cyberchondriac. <https://www.theguardian.com/commentisfree/2013/oct/09/cyberchondriac-internet-ill-self-diagnose-symptoms> (accessed Dec 2015)
4. New Statesman. Health anxiety – the silent epidemic ignored by the NHS. <http://www.newstatesman.com/lifestyle/2015/05/health-anxiety-silent-epidemic-ignored-nhs> (accessed Dec 2015)



**Aim** – develop a method to screen a laboratory population of zebrafish for resistance to the pesticide PTX and begin the search for the mechanism that causes this resistance

## Background

Pesticides, are a cause for concern when present in the natural environment<sup>1</sup>. They have the capacity to be transferred into the aquatic ecosystem, having detrimental effects on marine and freshwater biota<sup>2</sup>. As these pesticides cascade through the food chain, humans consuming contaminated fish for example, could experience serious health problems<sup>3</sup>.

It is common place for organisms to develop resistance when exposed to harmful chemicals. E.g. Some populations of *Drosophila melanogaster* are resistant to a variety of pesticides including the gamma-aminobutyric acid (GABA) receptor antagonist Picrotoxin (PTX) and the mechanism conferring this resistance is a mutation on the GABA receptor<sup>4</sup>.

It has also been shown that aquatic vertebrates are too capable of developing resistance to pesticides but the mechanism causing this resistance is unknown<sup>5</sup>.

### Method

- Fertilised zebrafish embryos were exposed to PTX 3 hours post spawning and observations were made twice daily for 72 hours to determine toxicity levels, using seizure-like convulsions as a measure

1



### Results

- An MTC of 100µM PTX was established

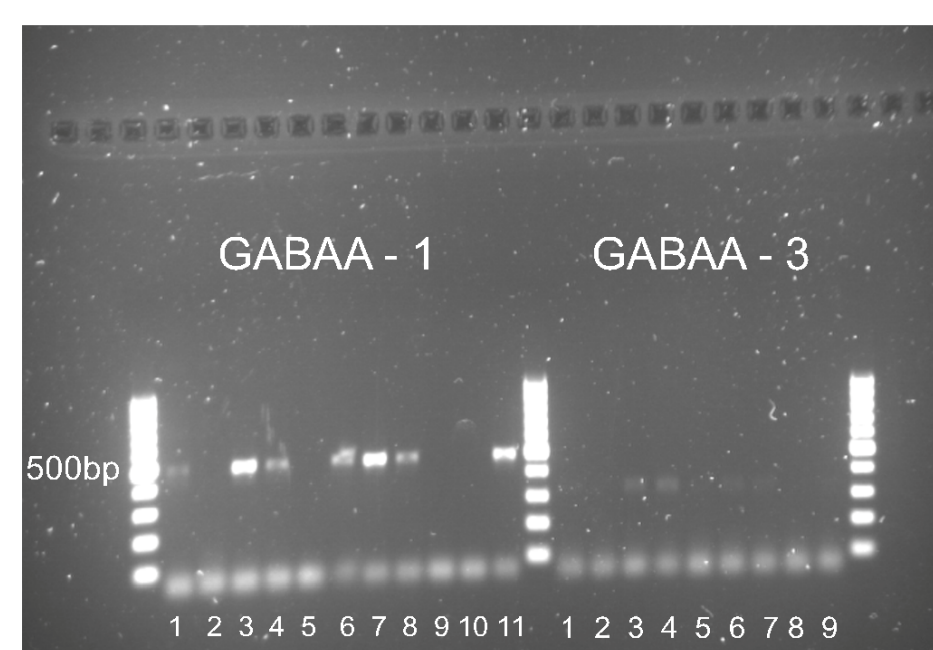
### Method

- RNA was extracted from individual larvae
- 5 subunits (1, 3, 5, 6a and 6b) of the GABA<sub>A</sub> receptor were amplified using polymerase chain reaction (PCR)
- Products were visualized using gel electrophoresis

3

### Results

- Each band represents an individual larvae; PTX (1-3), solvent control (4-6/10-11) and positive control (7-9)
- Regions corresponding to the GABA<sub>A</sub> receptor subunits are amplified correctly but there are no differences in GABA<sub>A</sub> expression between the treatments (brightness of bands)



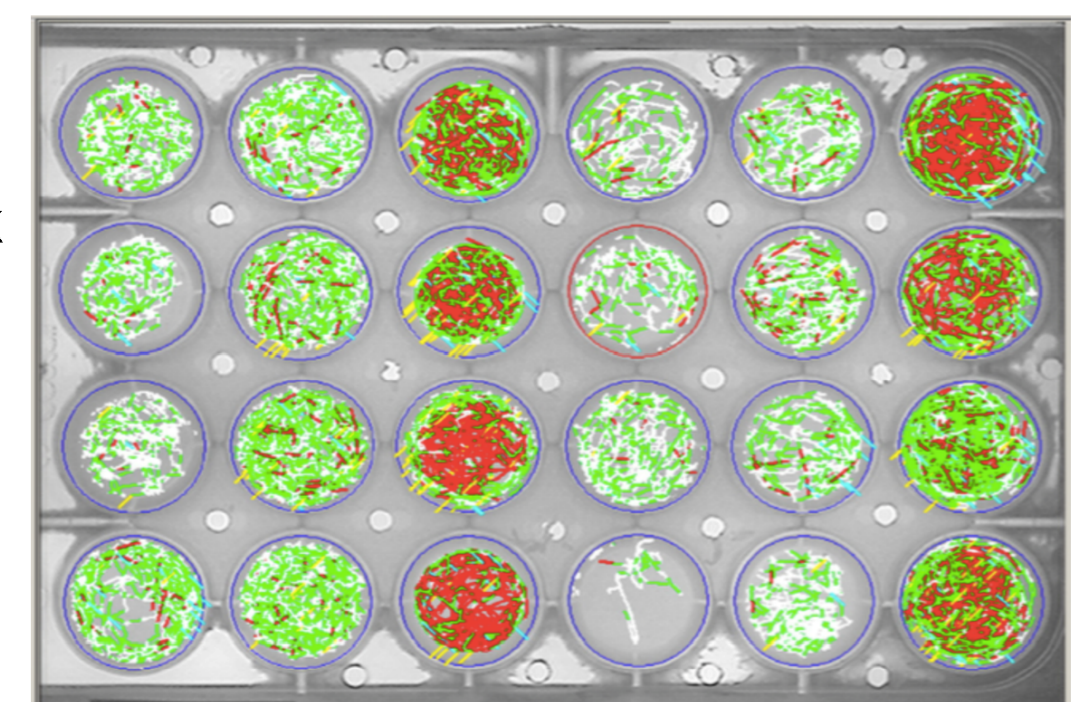
## Objectives

- Establish a Maximum Tolerated Concentration (MTC) for PTX in zebrafish (*Danio rerio*)
- Screen adult zebrafish for resistance using a larval convulsant determination assay
- Using molecular analysis, determine if resistance is caused by a mutation on the GABA<sub>A</sub> receptor

### Method

- 4-day post-fertilisation larvae were exposed to PTX, alongside a solvent (DMSO) and positive (PTZ) control
- The convulsant assay ran for 1 hour, and locomotor activity was assessed using VideoTrack for Zebrafish™ tracking system<sup>6</sup>
- Larvae with movement levels below 250mm/s, in alignment with that demonstrated by larvae in the solvent control, were categorized to have resistance to PTX

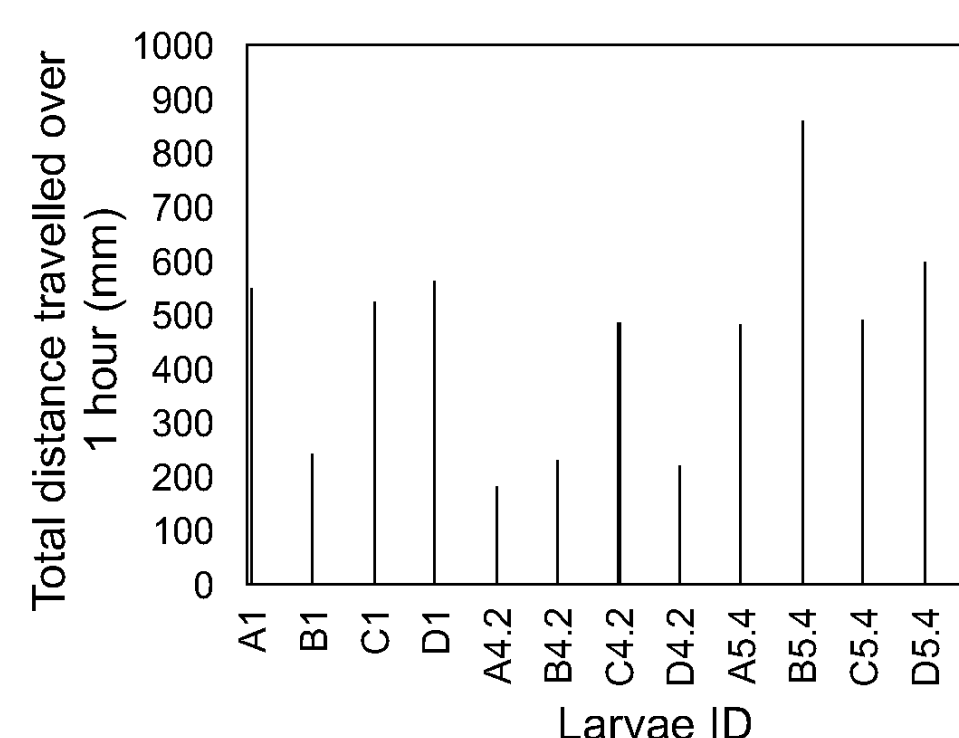
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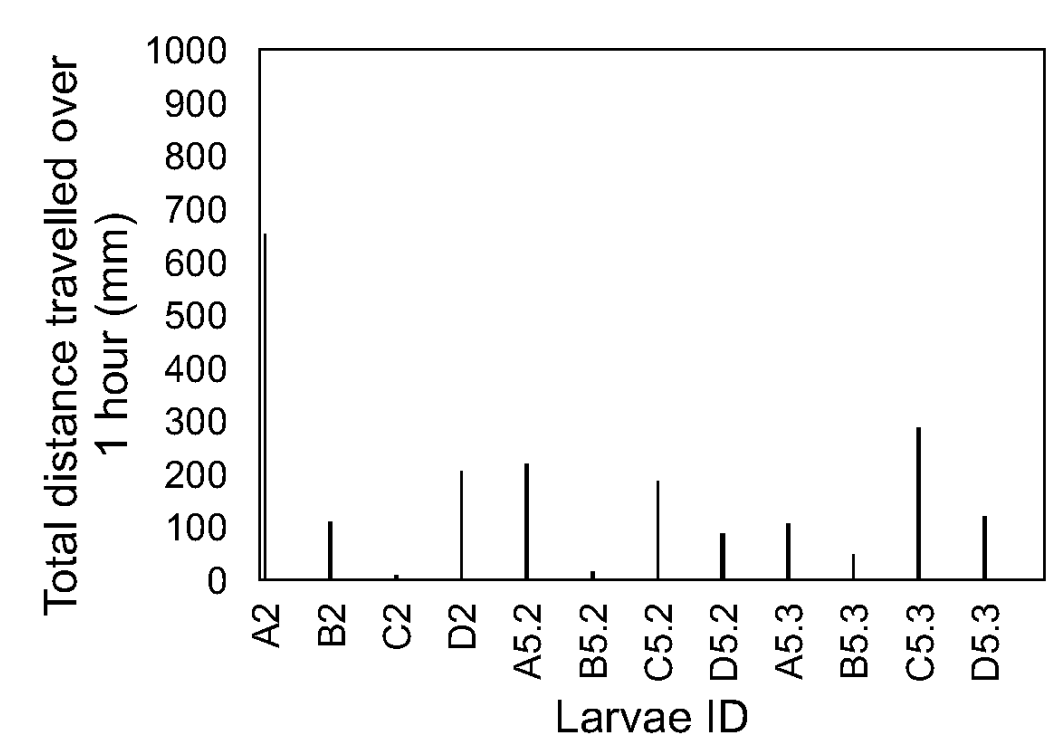
VideoTrack movement data after exposure to PTX. White signifies low speed, green medium and red high speed movements<sup>5</sup>

### Results

- The number of larvae displaying resistance varied depending on parent genotype and male-female mating pair combination
- 18.75% of larvae produced from this male-female mating pair were classified as resistant



Convulsant activity of larvae exposed to PTX



Convulsant activity of larvae in the solvent control

**Key finding** - resistance to the pesticide PTX does exist in populations of zebrafish and with appropriate screening methods, individuals carrying this resistance can be found

## Conclusion

- The convulsant determination assay is an effective method to identify resistant larvae and 100µM PTX is an appropriate MTC
- No differences were found in GABA<sub>A</sub> expression between resistant and control larvae so it is unclear if a mutation on this receptor confers PTX resistance - experimental repetition will therefore validate this result
- A breeding pair of zebrafish have been identified to carry PTX resistance and have subsequently been isolated for further research

## Further studies

- To determine the mechanism resulting in PTX resistance, the following studies will need to be undertaken:
- The adult breeding pair carrying resistance should be bred frequently and their offspring screened to collect more samples for PCR to determine if a mutation on the GABA<sub>A</sub> receptor causes resistance
  - Additional GABA receptors should be tested as the mutation causing resistance may be located on a different GABA receptor

### References

- (1) Li, W. 2014 *Environmental Pollution*. **187**; 193-201; (2) Edwards, C. 1977 Plenum Press, New York. **10**; 11-38; (3) Bro-Rasmussen, F. 1996 *Science of the Total Environment*. **188**; 45-60; (4) French-Constant, R. et al. 1993 *Nature*. **363**; 449-451; (5) Bonner, J. & Yarbrough, J. 1988 *Arch Toxicol*. **62**; 311-315; (6) Winter, M. et al. 2008 *Journal of Pharmacological and Toxicological Methods*. **57**; 176-187; <http://www.schoppiklab.com/aims/>; <https://www.smashwords.com/extreader/read/285005/2/meet-the-zebrafish-a-short-guide-to-keeping-breeding-and-und/>; <https://www.flickr.com/photos/dries-knapen/>

### Acknowledgements

I would like to thank the College of Life and Environmental Sciences at the University of Exeter for funding the project and the following individuals for their support and expertise throughout; Charles Tyler, Anke Lange, Matthew Winter, Anna Tochwin, Sulayman Mourabit, Jennifer Fitzgerald and Amy Foreman.

- Sources of renewable energy are vital to tackle global emissions and address dependency on fossil fuels. efficient and cost effective onshore wind power can be a part of solution.
  - The effective deployment of onshore wind power requires local public buy-in, community benefit packages are a way of achieving this.
- However, very few studies have investigated whether community benefit packages effectively foster acceptance, and no studies have investigated this at small onshore single turbine sites.
  - This study investigates the perception of a community benefit package paid to the community of Bere Regis from the developers of a nearby wind turbine.
- It finds that, in this instance, the provision of community benefits did somewhat alter perception of onshore wind power and foster acceptance, but general awareness of the benefits package and the work it does was limited.



Source: DistGen

## 1: Introduction

**The challenge:** A transition to clean, renewable energy is required if emission reduction targets are to be met (DECC, 2014). However, government policy is currently not supportive of onshore renewables, given recent reduction of fed in tariff rates. Despite this, a recent poll found that 73% of the British public support onshore wind turbines, the cheapest form of large-scale renewable energy. (Carrington, 2016). However, this figure is significantly lower in rural areas, where wind turbines are most likely to be erected (Toke et al, 2008). If more wind farms and turbines are to be built, public support in these places is vital.

**Contribution to science:** This study provides a much investigation to the public perception of community benefit packages, specifically in relation to smaller onshore wind turbines, something that has received little attention in academic literature. Previous studies have focused mainly on community led renewable energy schemes, this is despite the literature stating that this is rarely a feasible option for communities. Less attention has been paid to the study of community benefit packages.

## 2: What are community benefit packages?

Community benefit packages are payments made by wind turbine developers to the communities affected by and/or hosting wind farms/turbine. There is no singular definition of what a community benefit package is and no legal obligation for developers to provide benefits for turbines under a certain size. This study is mainly concerned with 'category 1' community benefits, whereby the developer delivers a lump sum or regular payment into a fund for the benefit of local residents (DTI, 2007)

## 3: Location

This study will explore the perception of community benefit packages through the case study of Rogershill wind turbine in Dorset, England (see figure 1). Dorset has a particularly low deployment of wind turbines (29 compared to Devon's 225 and Cornwall's 383). Planning applications have been made in the past, but have been met with opposition (figure 2).

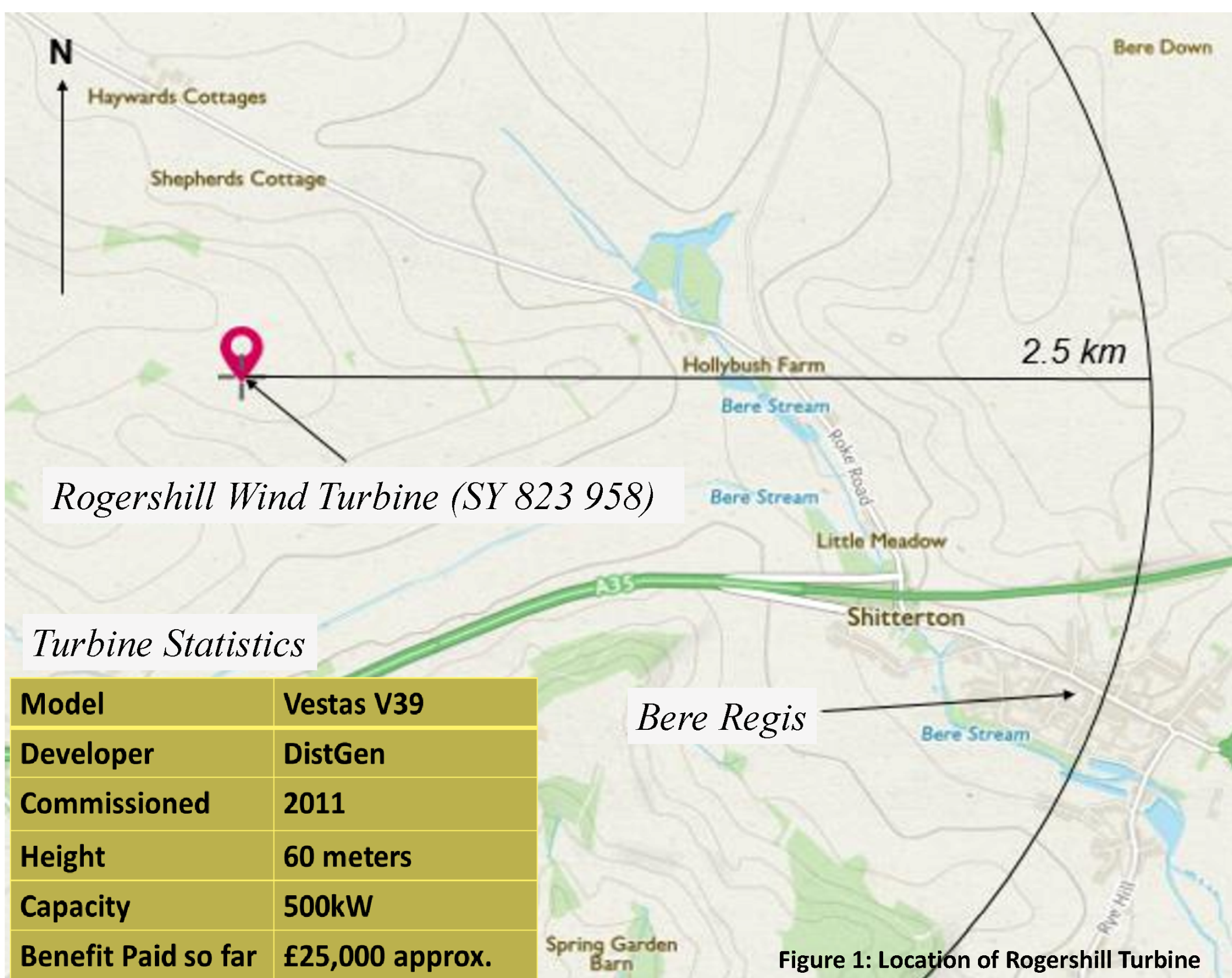


Figure 1: Location of Rogershill Turbine

'Dorset MPs take wind farm fight to David Cameron' – Daily Echo 2015	Dorchester wind farm plans at Slyer's Lane rejected by councillors – Dorset Echo 2016	Campaigners fighting proposed Dorchester wind farm heartened by PM's remarks – Echo 2016
Wind-farm wars: Dorset's rolling Hardy country the new battleground of 'nimbys' versus 'windies' – IBT 2016	Navitus Bay wind farm refused permission by government – BBC 2015	

Figure 2: A selection of newspaper headlines

## 4: Data Collection

Research Techniques	Kind of Data Provided
Interviews	Qualitative
Discussion Groups	Qualitative
Online Questionnaire	Quantitative/Qualitative
Postal Questionnaire	Quantitative/Qualitative

To address the research question this study used a combination of qualitative and quantitative methods of data collection. These complementary methods allow for the triangulation of data. This allows the validation of data through cross verification. 57 questionnaire responses were gathered, 3 interviews were conducted and 1 discussion group was undertaken. The vast majority of respondents lived in the village of Bere Regis itself. A possible extension of this study would be to investigate perception of residents from surrounding villages.

## References

Aitken, M., McDonald, S., and Strachan, P. (2008) Locating 'power' in wind power planning processes: the (not so) influential role of local objectors, *Journal of Environmental Policy and Planning*, 51(6): 777-799.

Carrington, D. (2016) Onshore windfarms more popular than thought, UK poll finds, *The Guardian*, 20<sup>th</sup> October, viewed 8<sup>th</sup> November 2016, < <https://www.theguardian.com/environment/2016/oct/20/onshore-windfarms-more-popular-than-thought-uk-poll-finds> >

DECC (2014) *Community Benefits from Onshore Wind Developments: Best Practice Guidance for England*, Crown Copyright, London.

DTI (2007b) *Delivering Community Benefits from Wind Energy Development: A Toolkit*, Centre for Sustainable Energy (CSE), available at <http://www.berr.gov.uk/files/file38710.pdf>.

Rogers, J.C., Simmons, E.A., Convery, I. and Weatherall, A. (2008) Public perceptions of opportunities for community-based renewable energy projects, *Energy Policy*, 36: 4217-4226.

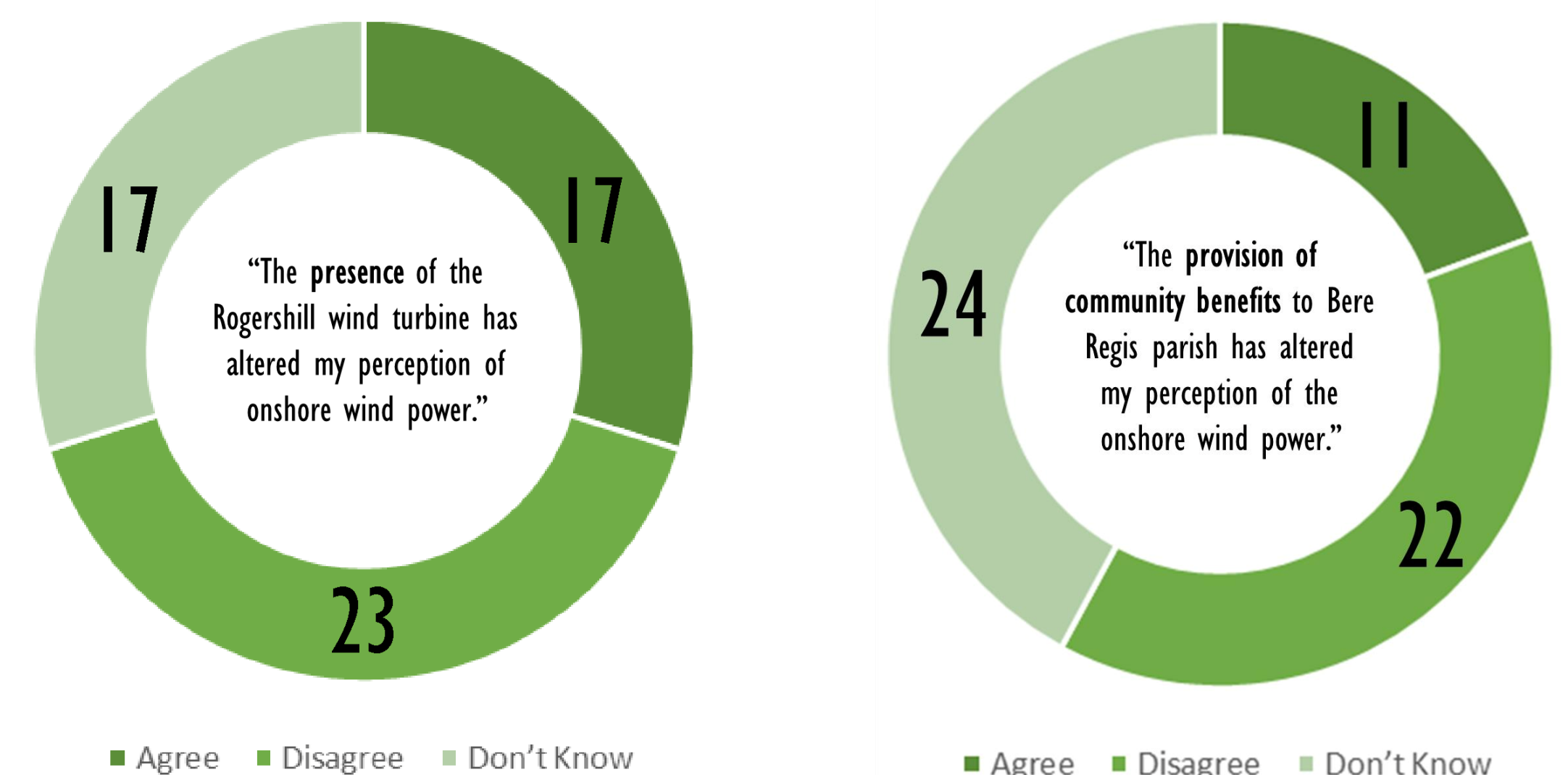
Toke, D., Breukers, S. and Wolsink, M. (2008) Wind power development outcomes: How can we account for the differences? *Renewable and Sustainable Energy Reviews*, 12(4): 1129-1147.

## 5: Research Question

How are community benefit packages perceived and do they alter people's perception of onshore wind turbines in rural locations?



Benefit packages can easily be interpreted as an attempt to 'buy permission' (Aitken, 2008). This study found respondents were of split opinion as to whether this was true. From speaking to councillors it was discovered that the benefits package was deliberately not taken into consideration during the planning stage. The plans were approved due to the minimal impact the turbine would have on the village.



## 6: Key Findings

- Some people felt their opinion on onshore wind turbines had changed. This was more likely to be as a result of the presence of the turbine rather than as a result of the benefits package, as the data shows. The vast majority were unsure how their opinion had changed or disagreed with the statement. This view was echoed across most interviews.
- For most questions, there were a large number of respondents who said they were unsure about how they felt about the turbine. This group of people were described by one interviewee as a 'floating iceberg' and can be considered 'disengaged'.
- For the significant number of respondents who felt their opinion on onshore wind power had not changed, the theory of confirmation bias, mentioned by one interviewee, could explain their situation. Confirmation bias refers to the way in which people hold strong opinions and prioritise information that agrees with their conclusion.

## 7: Conclusions

This study has shown, that in the case of the Rogershill turbine, there is potential for the provision of community benefit packages to change opinion of onshore wind power in rural locations. Residents have a good relationship with the Rogershill turbine despite often not knowing about the community benefits package. It is hoped this study contributes a growing body of literature outlining the merits of effective community engagement in renewable energy projects, and herald a new body of research looking in to the effectiveness of small size onshore wind turbines as a means to address our dependency on fossil fuels. However, to achieve this, proper guidance for developers and communities is required on the best ways to negotiate benefit packages. That said, the deeply held views of residents cannot be ignored. Developers should offer community benefit packages with caution, avoiding the risk of packages being perceived as bribes. As a result of this, this study also calls for more research to be conducted into how best to engage and include the disengaged majority.