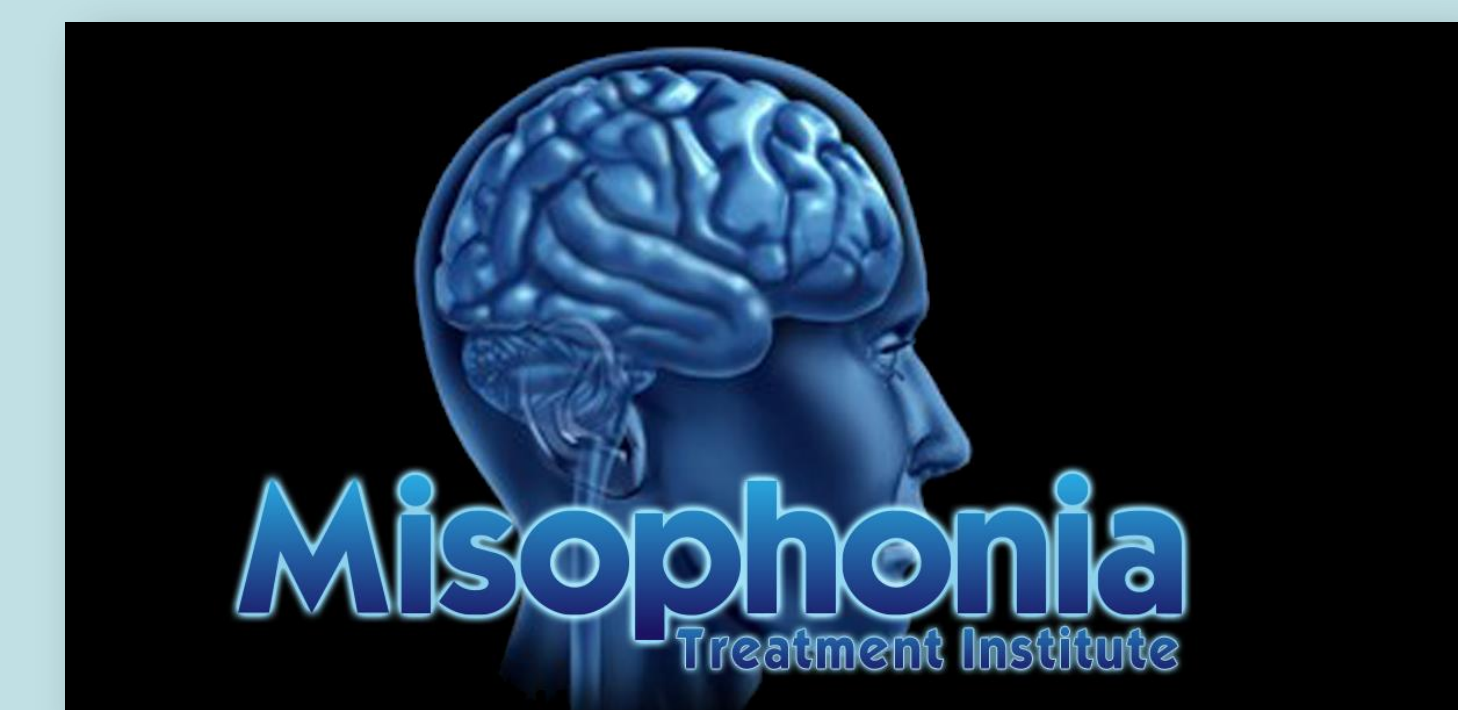


# Misophonia - An Aversive Conditioned Reflex to Soft Sounds

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## Introduction

**Misophonia** is condition where a person has a strong respondent behavior (physical and emotional) response to specific soft sounds. It is also known as Selective Sound Sensitivity Syndrome (4S). It also includes such reactions to visual stimuli associated with misophonic sounds.

Miso(hate)-phonia(sounds): Individuals with misophonia do not hate the sounds, but experience strong negative emotions directed at the person who made the sound.

**Treatment.** No published studies of treatment.

### Emotional Responses

- Reported as involuntary
- Methods of self-calming ineffective
- Hate, anger, rage, disgust, resentment, and other strong emotions are typical

### Physical Responses

- Skeletal muscle reflexes
  - Neck, shoulders, chest, jaw, face/eyes, hand open, hand close, abs, legs, butt, (and all sorts of combinations)
- Internal reflexes
  - Stomach constriction, nausea
  - Esophagus constriction
  - Sexual arousal

### Typical Misophonic Trigger Sounds

- Mouth sounds: Crunching, slurping, sipping, gum chewing/popping, lip smacking, and any other mouth sound.
- Nasal sounds: Sniffing, snorting, nasal breathing, nose whistling, snoring.
- Environmental sounds: typing, clicking pens, tapping, click of spoon on bowl, hair dryers, clock, and virtually any repeating sound.
- Voice sounds: Consonants such as P, T, S, and K.
- Visual triggers: Jaw movement, shaking leg, twirling hair, pointing, hand movements
- Every other repeating sound

## Theoretical Conceptualization of Misophonia

### Conditioned Stimulus-Response

- No clear US for US-CS pairing
- Respondent extinction does not occur
- Donahoe & Vegas (2004): Used a delayed reflex in pigeons
  - Tested NS-US vs. NS-UR pairing
  - NS-UR pairing is critical, not NS-US
- Trigger sounds develop when there is a physical action (UR, i.e. tense shoulder muscle) and a repeating sound (NS).
- Emotional reaction to trigger extends duration of CR, preventing respondent extinction.

### Involuntary Emotional Response

- Misophonia reaction: sound-reflex-emotion
- Sound causes the reflex
- Reflex is aversive
- Emotion is in response to aversive (physical) stimuli

## Research on Counterconditioning

### Supporting Research Studies

Pavonic (2002, 2003, 2011) found that a counterconditioning procedure that paired visualization of positive life experiences and PTSD events has consistent and positive reduction in PTSD.

## Method - Prevalence and Onset of Misophonia

### Participants (random sample)

- Adults 18-75
- 50% male, 50% female
- 310 survey responses

### Participants (control group)

- 194 individuals with misophonia
- 25% male, 75% female

### Procedure

- Survey Monkey requested individuals to take a survey who had previously agreed to take surveys.
- The control group were solicited with a posted link to the survey on misophonia websites.

## Results

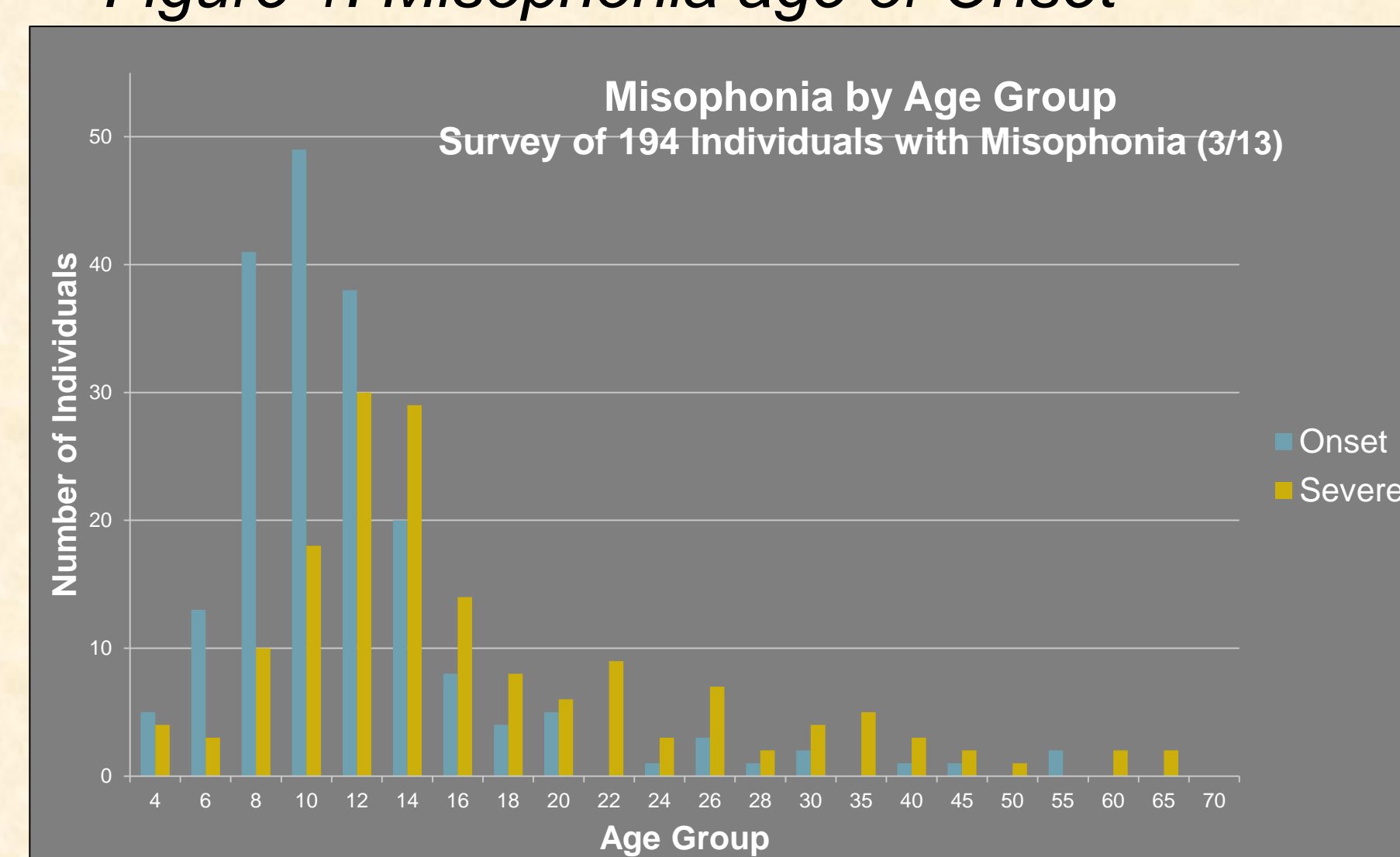
Table 1. Prevalence of Misophonia-Like Responses

Response	Responses	Percent
(11) Anger/rage only	17	5%
(10) Severe physical pain and overpowering emotions	3	1%
(9) Physical pain and extreme emotions	0	0%
(8) Emotional pain and very strong emotions	4	1%
(7) Elevated physical sensation and strong emotions	6	2%
(6) Elevated physical sensation and negative emotions	17	5%
Total	47	15%

Table 2. Physical/Emotional Responses of Individuals with Misophonia

Response	Maximum
(11) Anger/rage only	30%
(10) Severe physical pain and overpowering emotions	4%
(9) Physical pain and extreme emotions	18%
(8) Emotional pain and very strong emotions	16%
(7) Elevated physical sensation and strong emotions	12%
(6) Elevated physical sensation and negative emotions	14%
Total	94%

Figure 1. Misophonia age of Onset



## Counterconditioning Treatment Method

### Participant

50-ish woman, no physical or mental diagnoses. Worst trigger stimuli were crunching of bread, crunching Italian ice, scratching beard, and hand to face, all by husband.

### Procedure

Treatment sessions were weekly by Skype.

- Discussion of reflexes and misophonia
- Counterconditioning for 30 minutes
  - Recorded audio triggers 2/min
  - Trigger volume and duration set for minimal reaction
  - Discussion of positive events for counter conditioning stimulus
- Homework: 30 minute sessions with audio recording, 4 times per week

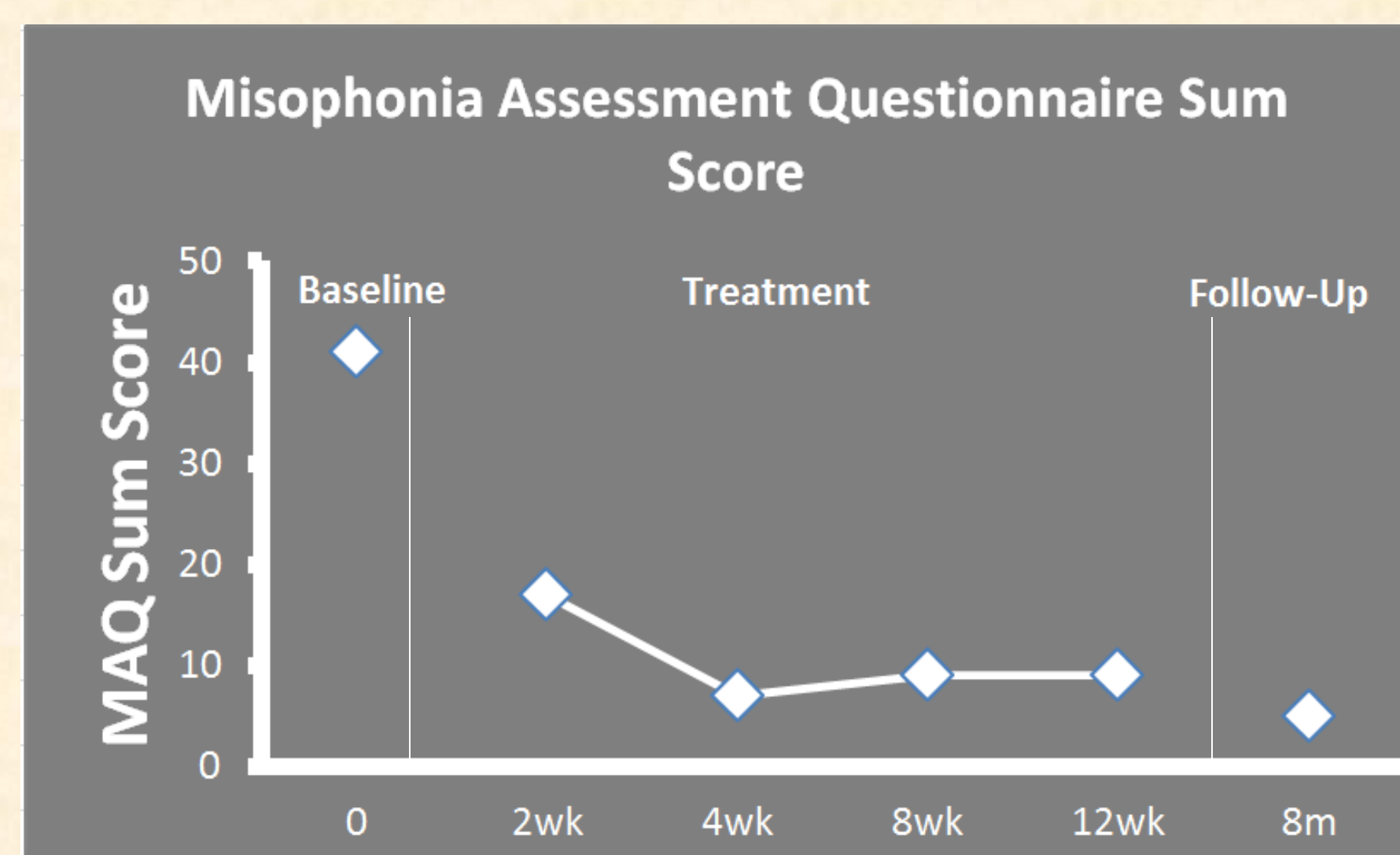
### Results

Severity of trigger reactions reduced

- Crunching bread, Italian ice, and scratching beard – 2 wks each
- Hand to face – 9 weeks
- All triggers became low-level or no response

Significant reduction in MAQ sum score

During treatment, the subject felt the physical response to the trigger stimulus, but did not have any aversive emotional reaction.



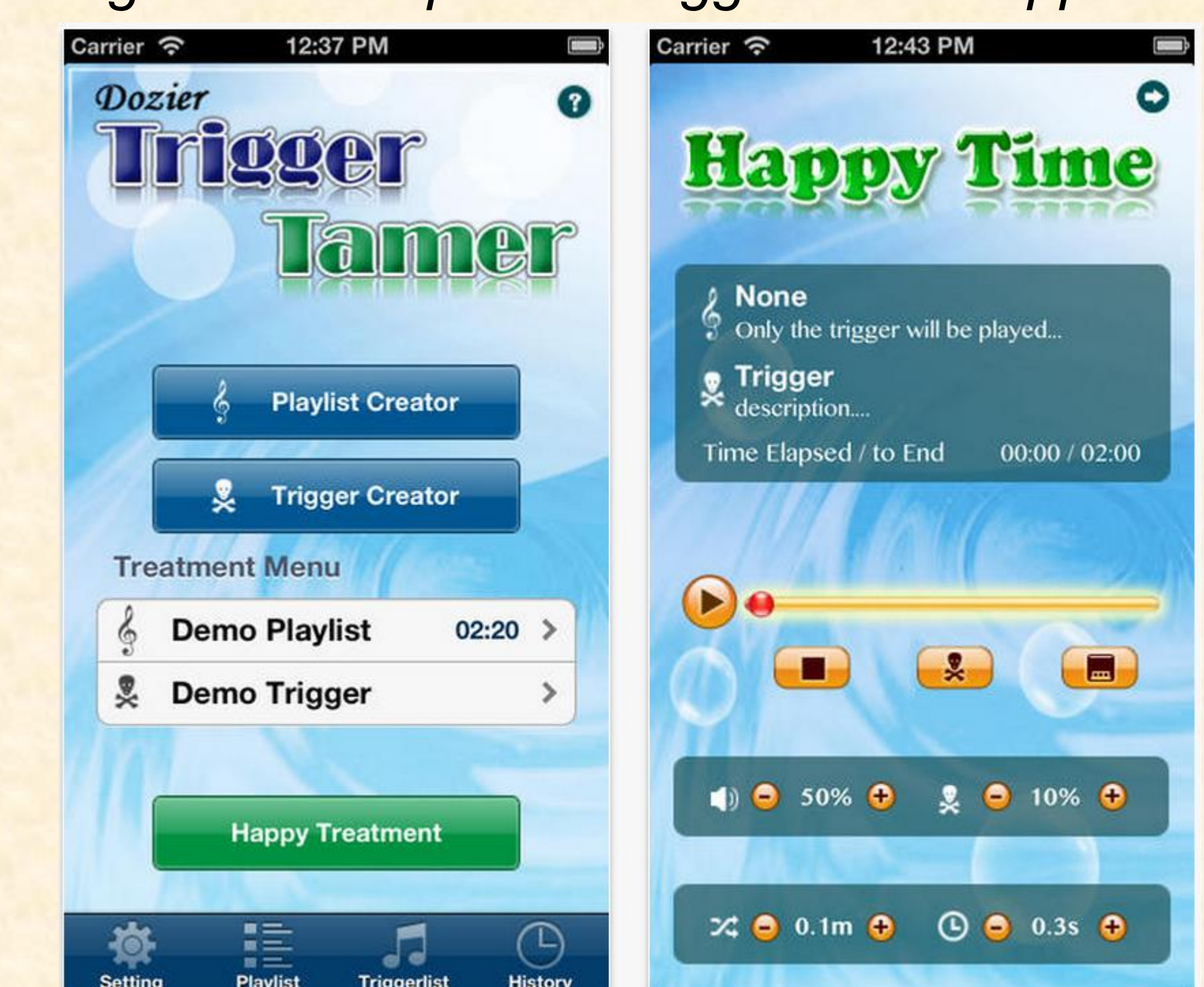
## Discussion

Misophonia is generally considered a rare, mysterious neurological condition where a person hears a soft sound and has an extreme emotional reaction. It appears that misophonia is a conditioned respondent muscle constriction to the trigger stimulus, and quite common. The extreme emotional response seems to be caused by the physical reflex. Essentially, the physical reflex is an aversive physical "assault." This would explain the universal report that a person with misophonia cannot stay calm and ignore the sound.

Counterconditioning treatment using a manual sound editor and manually generated audio files for the homework was tedious and problematic. It was difficult to guess the correct volume, duration, and rate of the triggers for the homework sessions.

To automate the treatment process, the Misophonia Trigger Tamer app was created. The app provides a user defined playlist and a user defined audio trigger.

Figure 3. Misophonia Trigger Tamer App



The Trigger Tamer has been used to treat other individuals. It eliminates the time to produce materials for the homework sessions. It also increases the productivity of the homework sessions by allowing the client to adjust the trigger volume, duration, and rate during the treatment session. This prevents the problem of a too-strong stimulus, and avoids wasted time from a too-weak stimulus.

### Discriminated Triggers

The subject in this case had very discriminated triggers. She responded to the specific sounds of her husband. With discriminated triggers, this technique has produced positive results.

### Generalized Triggers

Many individuals with misophonia have trigger sounds that are independent of context. For example, sniffing by anyone, anywhere will trigger them. In such cases, this counterconditioning procedure has failed to produce a meaningful reduction in the severity of the misophonic response in real-world settings, even after the person has no response to the stimulus in a treatment setting.

## References

- Paunović, N. (2011). Exposure inhibition therapy as a treatment for chronic posttraumatic stress disorder: A controlled pilot study. *Psychology*, 2(6), 605-614.
- Donahoe, J. W., & Vegas, R. (2004). Pavlovian Conditioning: The CS-UR Relation. *Journal Of Experimental Psychology: Animal Behavior Processes*, 30(1), 17-33.

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