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# **University of Cincinnati Undergraduate Scholarly Showcase 2022**

College of Allied Health Sciences  
Speech Language and Hearing Sciences

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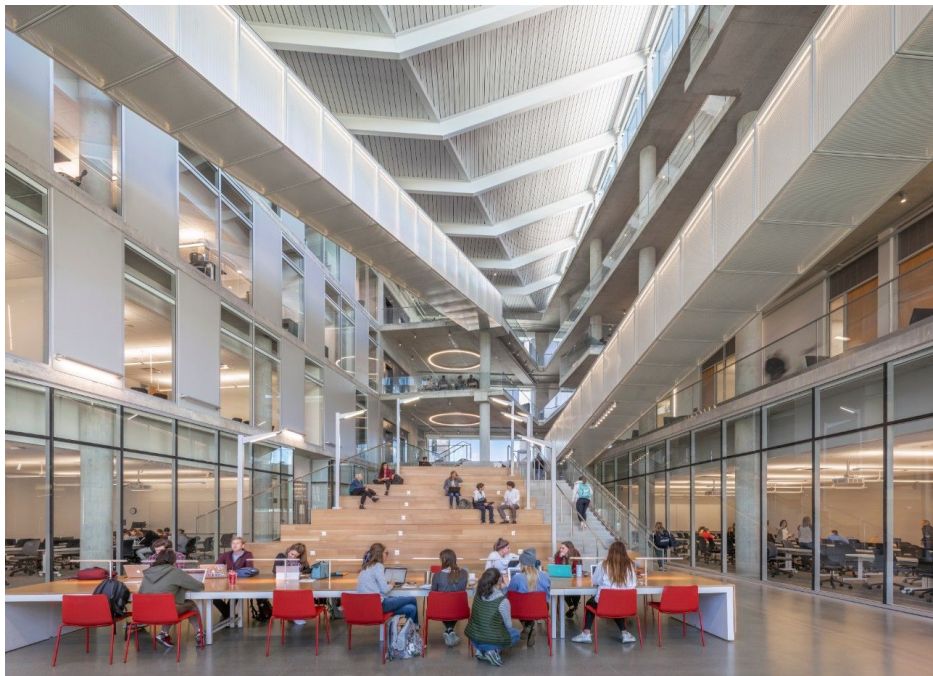
## **Monitoring chronic cough in patients at night: A pilot study on smartphone app usability**

# INTRODUCTIONS

Paige Dixon



# ACKNOWLEDGEMENTS



Thank you to the Voice & Swallow Mechanics Lab members and collaborators

Special thank you to Dr. Victoria McKenna, Lauren Humpert, Andres Llico, Brittany Fletcher, Kelly Carraro, and Haley Doerr

UC Health Collaborators:  
Dr. Aaron Friedman and Dr. Sudip Vhaduri

# Chronic Cough

- Daily cough that lasts more than eight weeks
- Affects approximately 5% of the United States
- Currently only a few objective ways to assess the frequency and severity of someone's cough or to help track treatment progress

**The long-term goal of our work is to develop a phone app that will monitor a person's cough at home.**

**Study Aims:**

- 1)** Gather audio data to assist in future acoustic cough detection algorithm development
- 2)** Assess the participants perceptions of using an app at home.

# Recruitment

## Do you have chronic cough that keeps you up at night?

People with chronic cough needed for a research study

**Study Title:** *Nocturnal Cough Monitoring: Developing an app to monitor health outcomes*

The Voice and Swallow Mechanics Lab at the University of Cincinnati (UC) is looking for adults to participate in a study that uses an app to record cough during sleep. Participants will be asked to complete two visits on UC's campus, each about a half hour long, and to monitor their cough and sleep at home.

You may be eligible to participate if:

- English speaker
- Aged 18 years and older
- Have chronic cough for at least 8 weeks that impacts your sleep
- Have a smartphone/device that can download an app



Receive up to \$54 for your participation in the study.

For more information, please contact:

Victoria McKenna at [VSMechLab@ucmail.uc.edu](mailto:VSMechLab@ucmail.uc.edu) or (978)-761-6574

IRB Protocol Number: 2020-0730

Principal Investigator: Victoria McKenna, Ph.D., CCC-SLP

# Study Protocols - Session 1

- Demographic Information collected
- Questionnaire related to their cough and sleep
- Leicester Cough Questionnaire

Participant ID: \_\_\_\_\_

Date: \_\_\_\_\_

Researcher: \_\_\_\_\_

## Leicester Cough Questionnaire

This questionnaire is designed to assess the impact of cough on various aspects of your life. Read each question carefully and answer by circling the response that best applies to you. Please answer all questions, as honestly as you can.

1. In the last 2 weeks, have you had chest or stomach pains as a result of your cough?

1	2	3	4	5	6	7
All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	Hardly any of the time	None of the time

# Study Procedures: At-home Task

Participant will record their sleep at home at least 3 nights

## Nocturnal Cough Log

Please fill out this log each morning following a recording.

Example of filled log:

Night	Day	Date	# of Hours Slept	Cough Events that Woke You Up	Rate your sleep quality (circle answer)
1	Monday	July 26, 2020	7 hours	2 events	<div>1. My sleep was better than usual</div> <div><input checked="" type="radio"/> 2. My sleep was typical</div> <div>3. My sleep was worse than usual</div>

Please record and rate up-to 3 nights of sleep:

Night	Day	Date	# of Hours Slept	Cough Events that Woke You Up	Rate your sleep quality (circle answer)
1					<div>1. My sleep was better than usual</div> <div><input type="radio"/> 2. My sleep was typical</div> <div><input type="radio"/> 3. My sleep was worse than usual</div>
2					<div>1. My sleep was better than usual</div> <div><input type="radio"/> 2. My sleep was typical</div> <div><input type="radio"/> 3. My sleep was worse than usual</div>
3					<div>1. My sleep was better than usual</div> <div><input type="radio"/> 2. My sleep was typical</div> <div><input type="radio"/> 3. My sleep was worse than usual</div>
4					<div>1. My sleep was better than usual</div> <div><input type="radio"/> 2. My sleep was typical</div> <div><input type="radio"/> 3. My sleep was worse than usual</div>
5					<div>1. My sleep was better than usual</div> <div><input type="radio"/> 2. My sleep was typical</div> <div><input type="radio"/> 3. My sleep was worse than usual</div>
Please use this space for additional comments:					



# Study Procedures: Session 2

Participant ID: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_  
Researcher: \_\_\_\_\_

## Nocturnal Cough Monitoring (IRB#: 2020-0730)

### Information Sheet

#### Session 2

#### Information about Recordings

How many nights (6 hours or more) did you record throughout the week? \_\_\_\_\_

Are there any recordings you wish to delete or edit prior to providing us the recordings? \_\_\_\_\_

Please answer these questions regarding your comfort using the recording app on your phone:

	Not Comfortable		Neutral		Very Comfortable
Downloading the app	1	2	3	4	5
Turning the app on and off	1	2	3	4	5
Determining how to use different app features	1	2	3	4	5
Using the app to record my sleep/cough at home	1	2	3	4	5
Sharing my recordings with the research team	1	2	3	4	5

- 1) What are the features in the app that you interacted with during the study?
- 2) Is there any feature that you feel could be a useful addition to this existing app?
- 3) What issues or challenges did you face (if any), while participating in our study?
- 4) What issues or challenges do you think you may face if you are invited to a similar study set up for 24-hour monitoring? This study would include recordings throughout the day.

## Session 2:

- Collect information on usability/comfort of app
- Upload recorded data to the server

# Our Participants

- One Male
  - 71 years old
- Two Female
  - 47 years old
  - 75 years old

\*goal is 10 participants\*

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# Participant Results

Sleep and Cough:

- Average of 6.06 hours of sleep
- Reported 0-3 cough events per night
- Leicester Cough

Questionnaire score of 12.04 (negative impact)

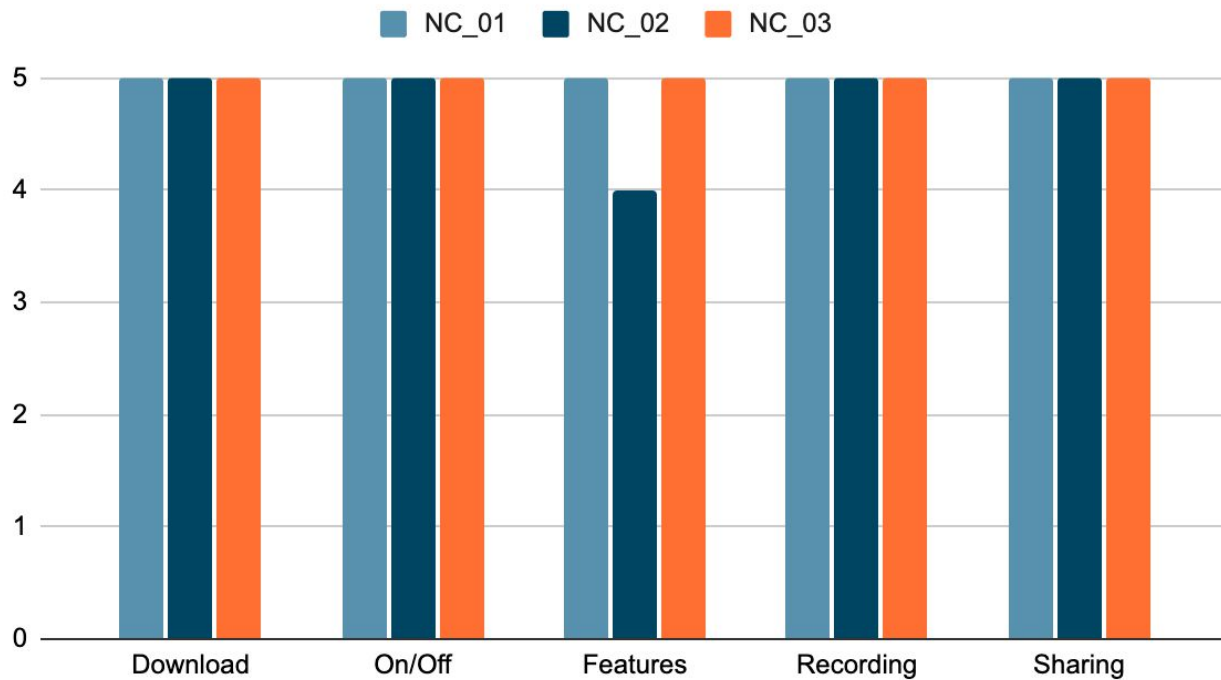
## Leicester Cough Questionnaire

- Total Score range is 3-21
- Higher score = better quality of life
- Lower score = lower quality of life

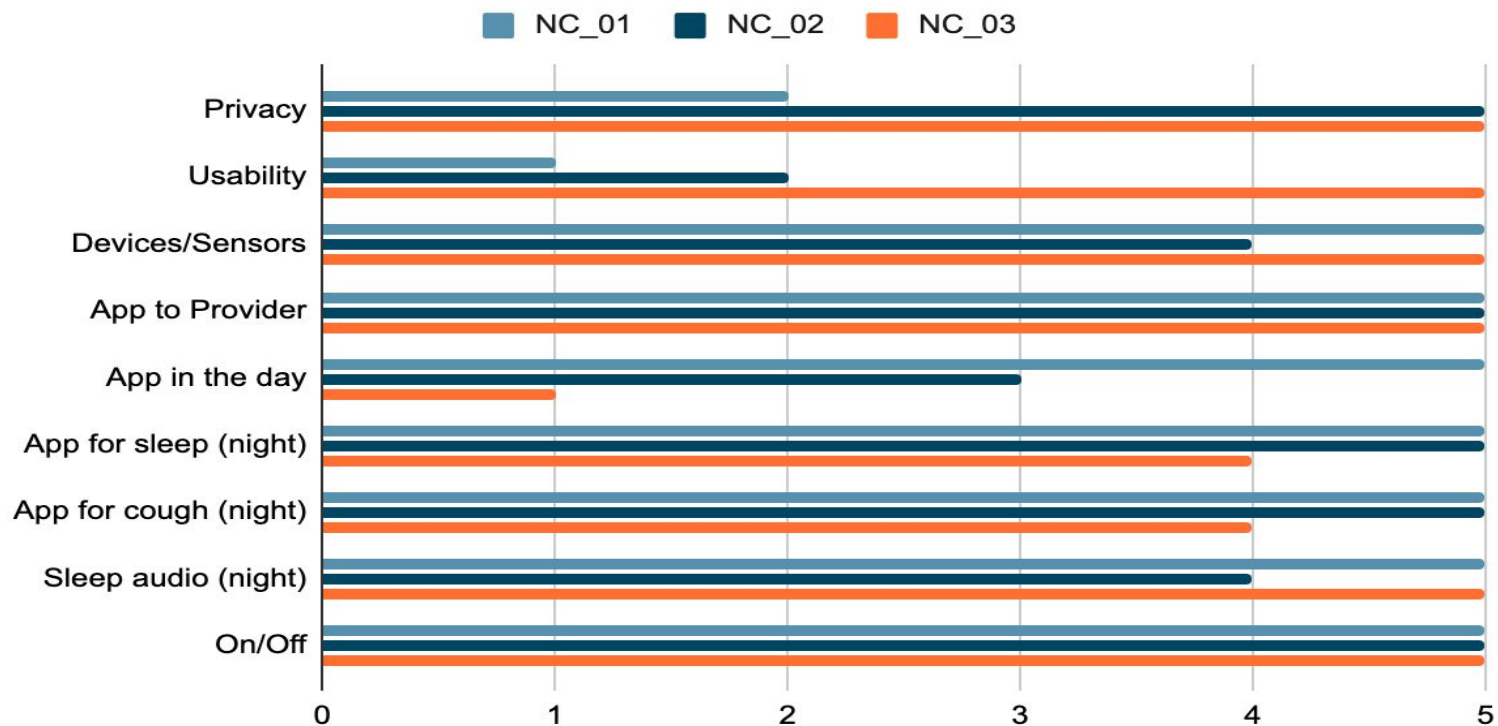
19. In the last 2 weeks, I feel that my cough has annoyed my partner, family, or friends.

1	2	3	4	5	6	7
All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	Hardly any of the time	None of the time

# App Comfortability



# App Usability



# Important Takeaways

- Chronic cough disturbs people's quality of life.
- There are very few objective ways to assess the frequency and severity of the cough or to help track treatment progress of someone who struggles with chronic cough.
- In conclusion, apps on a smartphone device are a feasible way for patients to provide quantifiable data on their chronic cough while asleep but more information is needed on how to protect privacy when using apps during the day.



**THANK YOU!**

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