ResearchGate

See discussions, stats, and author profiles for this publication at: https://www.researchgate.net/publication/348240401

Comment on Eisen and Eisen (2020) 'Benefits and Drawbacks of Citizen Science to Complement Traditional Data Gathering Approaches for Medically Important Hard Ticks (Acari: Ixodidae...

Article *in* Journal of Medical Entomology · January 2021

DOI: 10.1093/jme/tjaa288

CITATIONS
3

READS
149

6 authors, including:

Gebbiena Bron
Wageningen University & Research
42 PUBLICATIONS **170** CITATIONS
SEE PROFILE

María Del Pilar Fernández
Washington State University
66 PUBLICATIONS **606** CITATIONS
SEE PROFILE

Lyric Bartholomay
University of Wisconsin–Madison
165 PUBLICATIONS **5,068** CITATIONS
SEE PROFILE

Maria Diuk-Wasser
Columbia University
203 PUBLICATIONS **5,259** CITATIONS
SEE PROFILE

Some of the authors of this publication are also working on these related projects:

Midwest Center of Excellence for Vector-Borne Disease View project

Transmission dynamics of Borrelia and Babesia View project

All content following this page was uploaded by Maria Diuk-Wasser on 05 January 2021.

The user has requested enhancement of the downloaded file.

Journal of Medical Entomology, XX(X), 2021, 1–3
doi: 10.1093/jme/tjaa288
XXXX

Letter to the Editor

Comment on Eisen and Eisen (2020) 'Benefits and Drawbacks of Citizen Science to Complement Traditional Data Gathering Approaches for Medically Important Hard Ticks (Acari: Ixodidae) in the United States' Regarding the Tick App and Research-Based Citizen Science

Gebbiena M. Bron,[1,*] Maria del Pilar Fernandez,[2,3,*] Lyric C. Bartholomay,[4] Maria A. Diuk-Wasser,[2,6] Susan M. Paskewitz,[1] and Jean I. Tsao[5]

[1]Department of Entomology, University of Wisconsin-Madison, Madison, WI, [2]Department of Ecology, Evolution and Environmental Biology, Columbia University, Schemerhorn Ext Building, 11th Floor, Room 1013, New York, NY, [3]Earth Institute, Columbia University, New York, NY, [4]Department of Pathobiological Sciences, University of Wisconsin-Madison, Madison, WI, [5]Department of Fisheries and Wildlife, Michigan State University, East Lansing, MI, and [6]Corresponding author, e-mail: mad2256@columbia.edu

*These authors contributed equally.

Subject Editor: William Reisen

Received 27 October 2020; Editorial decision 30 November 2020

Dear Editor,

In their recent publication, Eisen and Eisen (2020) provide a solid overview of citizen science in the field of tick-transmitted illnesses. The authors give examples of citizen science and describe how it can and cannot serve public health goals toward reducing tick-borne diseases. They highlight that citizen science-collected data can reveal tick distribution and tick phenology, but that these observations come with certain drawbacks, specifically the quality of the data regarding species identification and the location of the tick encounter. In regard to '*Citizen science and tick collection records*' three different approaches were identified by the authors: 1) physical submission of ticks to professional scientists for tick identification and, in some cases, pathogen detection, 2) submission of digital tick images to professional scientists for tick identification, and 3) submission of tick information where species and life stage identification was done by the citizen scientist submitter with various aids, such as online guides showing images of different tick species and life stages. The Tick App is a smartphone application designed to conduct epidemiological surveys and to receive information on tick encounters to better understand human behavior and tick exposure (Fernandez et al. 2019, Bron et al. 2020; Fig. 1). Eisen and Eisen (2020) placed the Tick App in the third category of tick collection record approaches—identification by the citizen scientist; however, the current app fits better in the second category where professional scientists provide tick identification. In this letter, we aim to clarify the purpose and features of the Tick App, how this smartphone application evolved over time, and how research-focused projects have different oversight than non-research focused citizen science projects, possibly leading to differences in ensuring participants' confidentiality and privacy.

Not all tick exposures have the same risk of disease development for the individual who encountered the tick; therefore, additional information on tick encounters is needed to better understand the relationship between human behavior and tick exposure. The Tick App allows a user to report specific information about their tick encounters, and during the 3 yr the app has been in use, features and research questions have evolved. Eisen and Eisen (2020) categorize the Tick App's tick collection record approach based on a partial description of the app where 'Users were also asked to identify the tick from photographs that were provided in the app, including photos of female and male adult *Dermacentor variabilis* [Say, 1821], *Amblyomma americanum* [Linnaeus, 1758], and *I. scapularis* [Say, 1821] as well as an *I scapularis* nymph' (Fernandez et al. 2019). The intent of this identification challenge was to assess whether users were able to recognize different tick species based on images. Fernandez et al. (2019) continue on to describe how users then had the option to submit a tick image through an external University of Wisconsin–Madison hosted form (Qualtrics software, Provo, UT) as well as to send their tick to the UW-Madison. Professional scientists at the research institutions then made species determinations based on the image and/or submitted specimen; therefore, these verified tick collection records should be characterized as Approaches 1 and 2. Participant tick identifications, on the other hand, should not have been considered tick collection records, and we appreciate the opportunity to clarify this distinction. The participant responses were not used for making ecological or epidemiological inferences. Instead, responses for which a verified specimen identification was also available allowed researchers to evaluate the ability of participants to accurately match their tick with the photographs of different tick

© The Author(s) 2021. Published by Oxford University Press on behalf of Entomological Society of America.
All rights reserved. For permissions, please e-mail: journals.permissions@oup.com.

Downloaded from https://academic.oup.com/jme/advance-article/doi/10.1093/jme/tjaa288/6063463 by guest on 05 January 2021

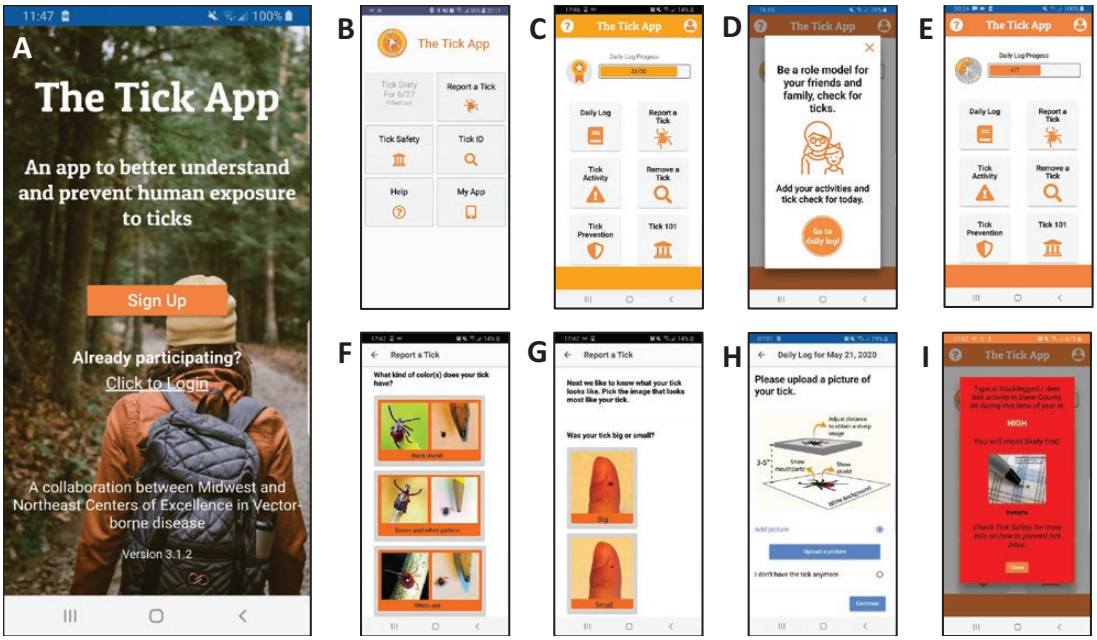

Fig. 1. Screenshots of The Tick App. Shown are the welcome screen after downloading the app from GooglePlay or the App Store (A, 2018 to current version) and the home screen in 2018 (B), 2019 (C), and 2020 (D and E). Since 2019, questions pertaining to the tick's color (F) and size (G, 2019 version) were included as well as the option to take or upload a picture of the tick (H, 2020 version). The option 'Tick Activity' (I) is informed by state and university records on blacklegged tick activity, not Tick App user submitted data.

species provided in the app. Beginning in April 2019 all versions of the Tick App have a tick image submission feature embedded in the app (Approach 2, Fig. 1H) and physical tick submissions are only requested when a tick cannot be identified based on the submitted image (Approach 1). Once again, tick images are identified by trained professionals and participants are informed by e-mail.

In addition to the tick image submission feature, the Tick App has evolved over the past 3 yr to improve application use, to optimize data collection, and to increase adoption of preventative behaviors to reduce tick bites (Fig. 1), balancing research needs and feedback from participants. Users frequently requested a 'tick report map' to make informed decisions on where to recreate and what to expect concerning ticks of any species based on real-time tick encounters by Tick App users. However, the accuracy of such a map would depend on the number of users reporting ticks, and given well-known issues regarding reporting bias towards larger ticks, the map could misrepresent the risk of tick and tick-borne disease exposure. In order to prevent Lyme disease and other common tick-borne diseases in the northeastern and midwestern United States, knowledge of the activity period of *Ixodes scapularis* Say (blacklegged tick) is most relevant. Specifically, nymphal blacklegged tick activity is most important, because this life stage is hard to detect and is responsible for transmitting the pathogen to most human Lyme disease cases. To help users in our study areas make informed decisions to mitigate tick-borne disease risk, we included the 'Tick activity' feature (Fig. 1I). This feature provides participants with a relative activity score (low, medium, high) for the most abundant blacklegged tick life stage (nymph or adult) in their county at that time of year. Data informing the relative activity-score are not real-time, but were sourced from historical records of collaborating partners of the Tick App project and the Northeast and Midwest Centers of Excellence for Vector-borne Diseases.

The main goal of the Tick App project is to understand better human behavior in relation to tick exposure, including both day-to-day activities and tick bite prevention strategies. Therefore, in contrast to non-profit and public health-based crowd-sourced data-gathering projects, The Tick App is considered human subject research (National Institute of Health 2020). Among other information, the app collects identifiable private information, including names, geographic subdivisions smaller than state, and e-mail addresses. Like most research-based citizen science projects, the Tick App project needs to comply with the Common Rule and the Health Insurance Portability and Accountability Act (HIPAA). To ensure compliance, the project's research protocol must be reviewed by the University's Institutional Review Board (IRB). Working within the rules, following the restrictions of the IRB process, and developing research protocols with an emphasis on protecting individual privacy and confidentiality are characteristics of research-based projects that can be overlooked when comparing crowd-sourced data gathering activities. Eisen and Eisen (2020) highlight how citizen science can be used to generate tick collection records, and, in turn, how this information can be incorporated into tick record databases and tick distribution and abundance maps. Although true, we want to highlight the need to balance citizen scientists' privacy (e.g., their location) with creating accurate maps of tick encounters. Often overlooked, we would like to make this discussion part of the citizen science conversation regarding the design of projects as well as data management and use.

We agree with Eisen and Eisen (2020) that citizen science can be a powerful tool for research and public health needs when the limitations are acknowledged. The vast geographical area covered and the frequency at which data can be collected by citizen scientists are not financially nor logistically feasible with active surveillance. We also agree that proper vetting of submitted information is needed to create reliable data, and that we should be careful when creating real-time interfaces to avoid inadvertently misleading the public and potentially causing a negative public health impact. To learn more about the Tick App project, we refer the reader to the blog on

Downloaded from https://academic.oup.com/jme/advance-article/doi/10.1093/jme/tjaa288/6063463 by guest on 05 January 2021

CitizenScience.gov (2019), visit www.thetickapp.org or contact the research team tickapp@wisc.edu.

Acknowledgments

The work and the Tick App was supported by the Centers for Disease Control and Prevention [Cooperative Agreements #U01 CK000505and#U01 CK000509]. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention or the Department of Health and Human Services.

References Cited

Bron, G. M., M. P. Fernandez, S. R. Larson, A. Maus, D. Gustafson Jr., J. I. Tsao, M. A. Diuk-Wasser, L. C. Bartholomay, and S. M. Paskewitz. 2020. Context matters: contrasting behavioral and residential risk factors for Lyme disease between high-incidence states in the Northeastern and Midwestern United States. Ticks Tick. Borne. Dis. 11: 101515.

CitizenScience.gov. 2019. United States Services Administration. Blog written by G.M. Bron, M.P. Fernandez, and P.A. Kache. https://www.citizenscience.gov/2019/06/04/the-tick-app/#

Eisen, L., and R. J. Eisen. 2020. Benefits and drawbacks of citizen science to complement traditional data gathering approaches for medically important hard ticks (Acari: Ixodidae) in the United States. J. Med Ent. doi:10.1093/jme/tjaa165.

Fernandez, M. P., G. M. Bron, P. A. Kache, S. R. Larson, A. Maus, D. Gustafson, Jr, J. I. Tsao, L. C. Bartholomay, S. M. Paskewitz, and M. A. Diuk-Wasser. 2019. Usability and feasibility of a smartphone app to assess human behavioral factors associated with tick exposure (The Tick App): quantitative and qualitative study. JMIR Mhealth Uhealth. 7: e14769.

National Institute of Health. 2020. United States Department of Health and Human Services, Policy and Compliance. https://grants.nih.gov/policy/humansubjects/research.htm]

Downloaded from https://academic.oup.com/jme/advance-article/doi/10.1093/jme/tjaa288/6063463 by guest on 05 January 2021

View publication stats