Andrea Farnham, PhD
The Traveler in the Digital World
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I have no conflicts of interest to report.

Travel medicine research offers great challenges

Constantly changing exposures
Far from home environment
Time lag for data collection

...but also great opportunities

How does health behavior change in new environments?
How do risk attitudes influence health behavior?
How do acute environmental exposures like air pollution and traffic affect health?

mHealth has the potential to transform travel medicine research

Real-time quantification of traveler health behavior and outcomes
mHealth Technology

Multiple Data Sources:

Smartphone data collection:
1. Streaming Data (GPS-tracking, weather, location data, social media data)
2. Electronic questionnaires from travelers on risky behaviors (i.e. drinking local tap water) and health events (i.e. fever, accidents).

Traditional pre-travel paper questionnaires and medical records

The use of mobile phones in travel medicine research is already growing

Data collection via smartphone application

«Risky» health behaviors are common during travel

How can mobile phone applications be used to create a more complete picture of health during travel?

How can we better estimate incidence of health events during travel?
Spatial patterns of lesser known health events

Domain-Specific Risk-Taking Scale (DOSPERT)

Measures self-rated willingness to take risks and perceived «riskiness» in five domains:

- Financial decisions
- Health/safety
- Recreational
- Ethical
- Social decisions

DOSPERT scores predict behaviors during travel

<table>
<thead>
<tr>
<th>Prediction of Drug and Alcohol Risk Behaviours</th>
<th>Beta coefficient (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Safety Domain Score</td>
<td>0.03 (0.007, 0.06)</td>
<td>0.01</td>
</tr>
<tr>
<td>Social Domain Score</td>
<td>-0.02 (-0.007, 0.008)</td>
<td>0.17</td>
</tr>
<tr>
<td>Recreational Domain Score</td>
<td>0.01 (-0.015, 0.02)</td>
<td>0.41</td>
</tr>
<tr>
<td>Age</td>
<td>0.01 (-0.012, 0.03)</td>
<td>0.07</td>
</tr>
<tr>
<td>Sex (male)</td>
<td>0.03 (-0.03, 0.09)</td>
<td>0.53</td>
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</tbody>
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Findings are so far mixed

- Rodriguez-Valero et al. developed an mHealth application that tracked incidence of disease among travellers in real time and provided telemedicine care to ill travellers.
- Rozenberg et al. found in a randomized controlled trial, however, that recall was lower in a shortened consultation paired with smartphone support, and satisfaction was the same as with a traditional travel medicine consultation.

Inherent limitations of mobile data collection

- Reliability of self-reported health information?
- Need to have internet connection
- Biased selection of smartphone savvy participants (although decreasing over time . . .)
- Measurement of external exposures like pollution and traffic still limited outside of major cities
Inherent limitations of mobile data collection

Privacy and ethical concerns
- If you are collecting data in real time, what are your responsibilities towards your participants?
- Secure servers and encryption to ensure data safety
- In my view, no real possible way to de-identify data
- Don’t rely on ethics boards to think about this for you!

What comes next for mHealth and travel medicine?

Every traveler will have an e-doctor in their pocket!

Travel Medicine Consult ➔ Specialized Advice based on Itinerary and traveler profile ➔ Better Preparation for Trip ➔ Database of Traveler Health Outcomes ➔ Follow-Up After Travel ➔ Monitoring Emergent Health Situations During Travel

Traditional travel medicine model

Travel Medicine Consult ➔ Advice/Vaccines Based on Travel Destination

Consult Doctor after Trip about Health Problems ➔ Unknown Health Outcomes during Trip

Thank you!

Contact Information
Andrea Farnham, PhD
Swiss Tropical and Public Health Institute
University of Basel
Sozienstrasse 57
CH-4051 Basel
Phone: +41 79 486 62 77
andrea.farnham@swisstph.ch