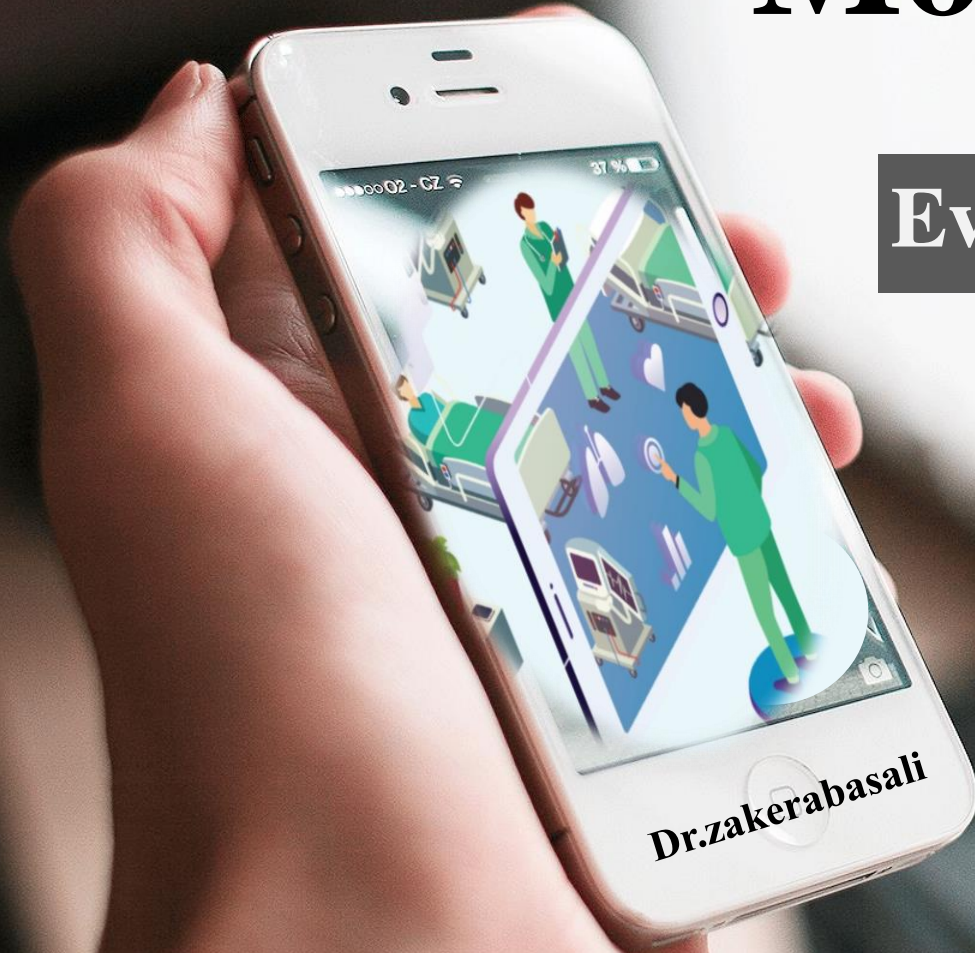
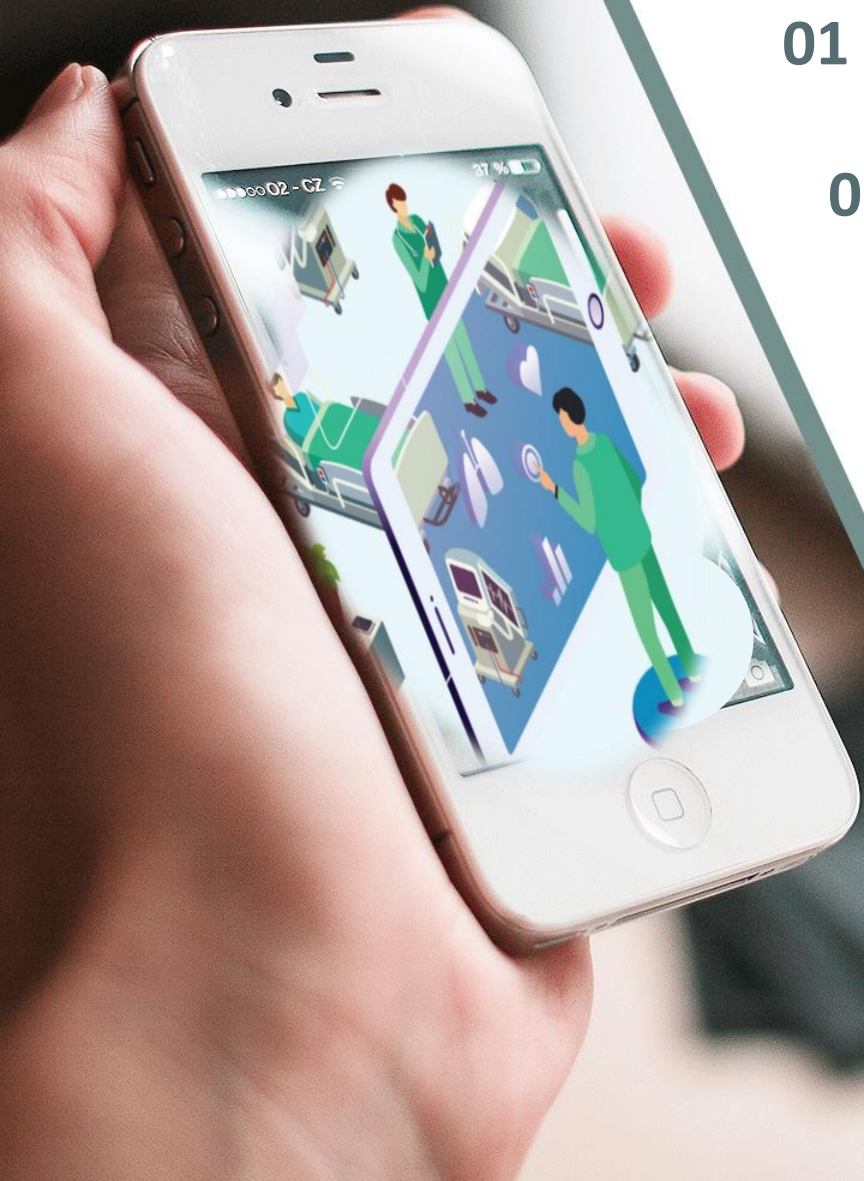


Mobile Health

Evaluation Methods



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01 Importance of Commercial apps

02 Importance of Evaluation

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Importance of Commercial apps

- *Mobile health (mHealth), or the use of mobile technology to improve health, is a rapidly expanding field . Although health apps have drawn great public interest and use, **little is known about the usability and efficacy of the majority of commercially available apps** Much mHealth research focuses on the development and testing of **new apps in academic settings**.*
- *However, the pace of traditional academic research is slow and **less nimble relative to commercial app development**, and this may result in **huge lags in dissemination into commercial markets** or settings where the general **public** has access to them, assuming the researcher takes steps to disseminate into commercial markets at all.*
- *Producing an app for public use requires **content, programming, design expertise**, the **ability to continually host and update the app**, and the resources to provide both customer service and technical support.*





Importance of Commercial apps

- *Health care providers also have great interest in determining the **evidentiary basis of commercial apps**. In fact, the American Psychiatric Association and others have developed **guidelines** for clinicians in selecting commercial apps to recommend to patients.*
- *A bedrock of these guidelines is that clinicians examine the **evidence to make these decisions**. With **little evidence available for commercial apps**, clinicians risk recommending a tool that does not work or worse one that causes harm.*
- *Although methods for systematically developing and establishing the effectiveness of apps in academic research laboratories have been described, **little guidance is available on ways to develop an evidence base for commercial apps**.*





Importance of Evaluation

- *The number of health-related applications available on iTunes® and Google® Play is overwhelming . This can create a sense of distress and frustration for health care providers who want to interact with accurate, reliable, timeless and up-to-date sources of information at the point of care.*
- *Professionals are cautious of downloading mobile applications for fear of liability issues in their practice, but are looking for user-friendly and current information. The question for this review is “Are there tools available that can allow clinicians to analyze effectively a new mobile application, provide a comprehensive evaluation of such and confirm which application to choose from amongst the many available?”.*
- *The sheer volume of applications available online has made it a necessity for clinicians to evaluate health information technology tools. It is therefore important to appraise their potential to improve health care professional critical judgment. This presentation discusses what are the evaluation tools available to evaluate mobile health applications.*



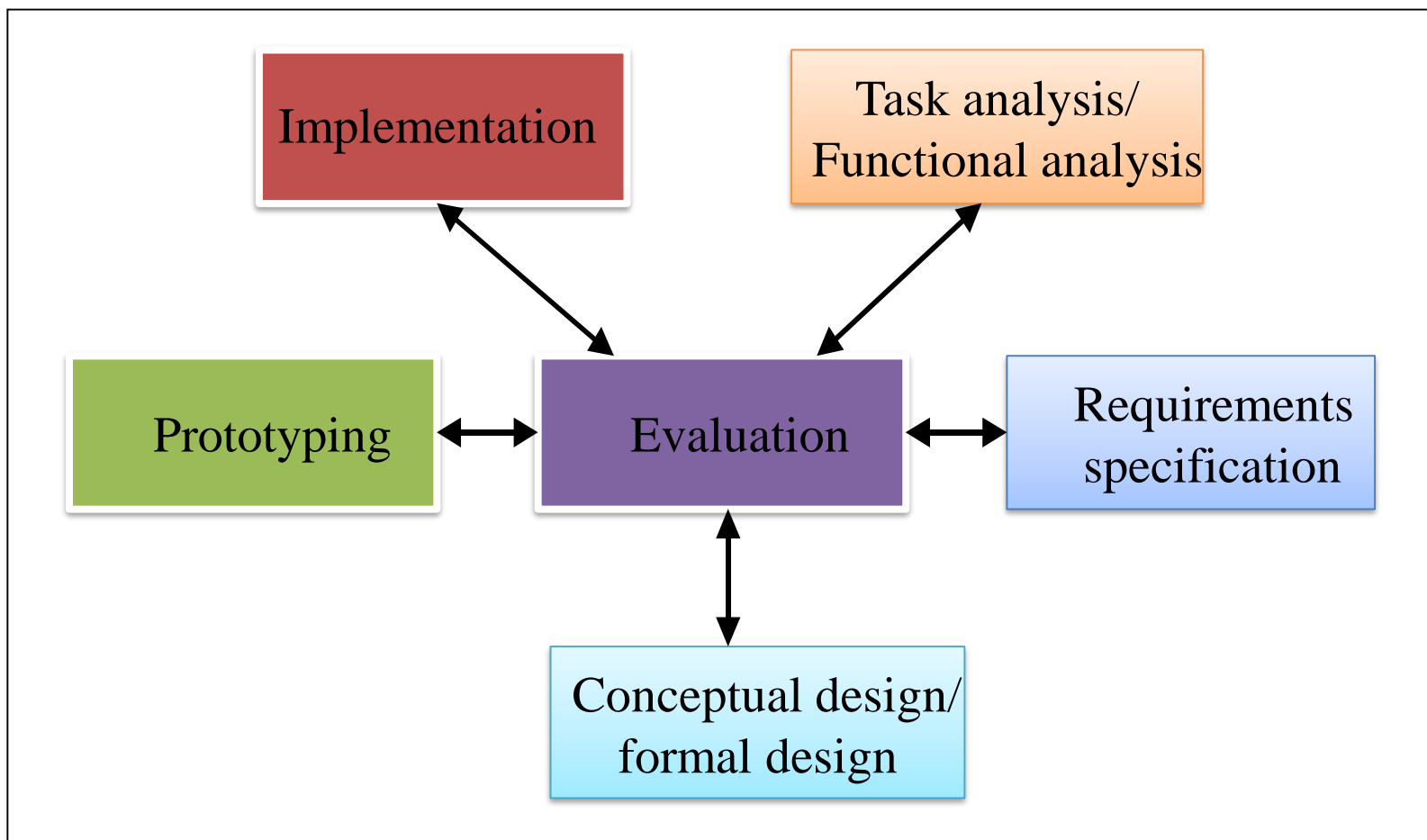
Why, What, Where, and When to Evaluate

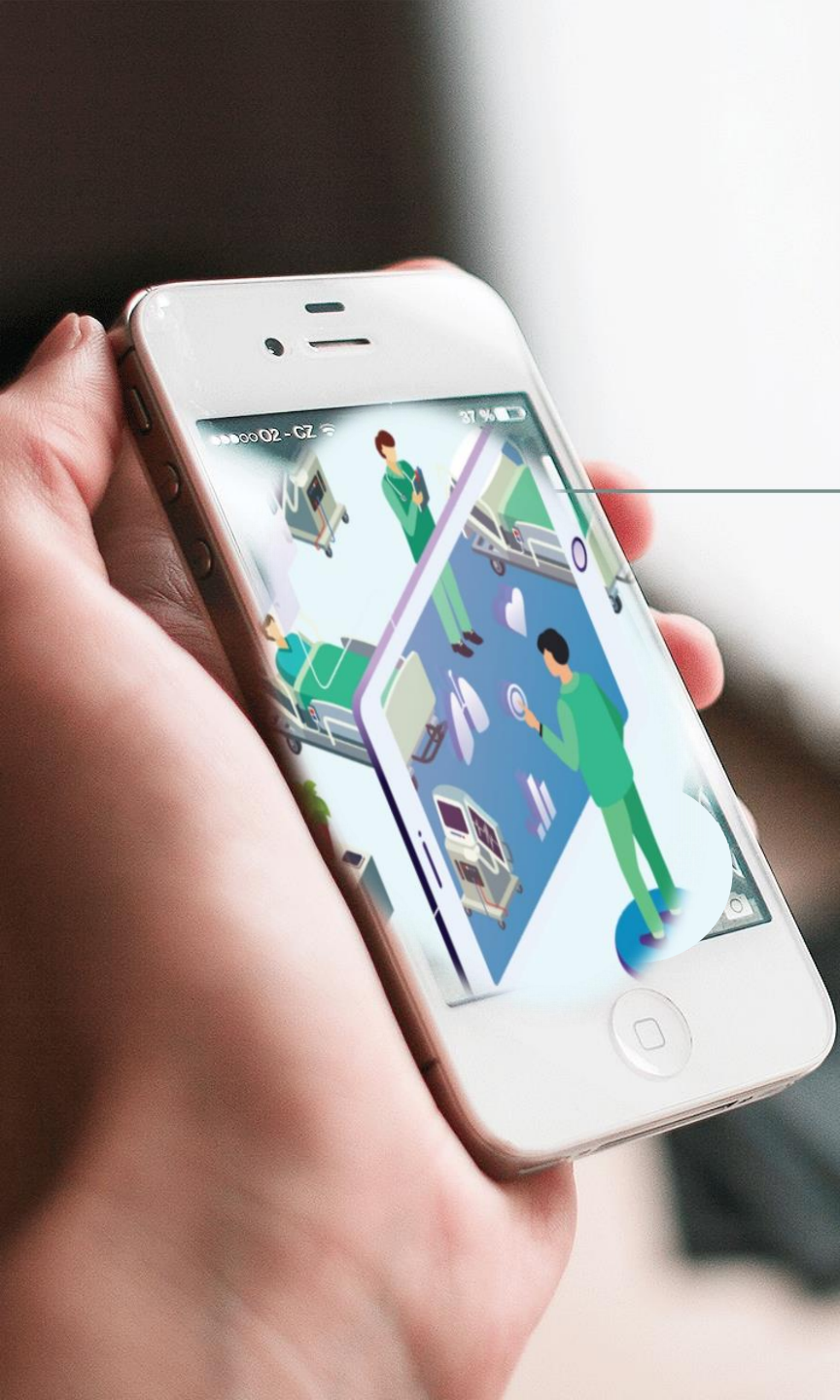
Iterative design & evaluation is a continuous process that examines:

- ❑ **Why:** *to check that users can use the product and that they like it.*
- ❑ **What:** *a conceptual model, early prototypes of a new system and later, more complete prototypes.*
- ❑ **Where:** *in natural and laboratory settings.*
- ❑ **When:** *throughout design; finished products can be evaluated to collect information to inform new products.*



When to Evaluate





Mobile Health apps Evaluation Methods

1. Content Analysis
2. Usability Testing
3. Observational Studies
4. Efficacy Testing

Content Analysis

- Content analysis is a *research methodology* that involves *coding and interpreting qualitative*, usually *text-based material*.
- *Commercial apps* include multiple *features, health information, and advice*, all of which can be subject to content analysis.
- The *first step* in conducting a content analysis is to *access the app content for review*.
- Although content analysis can simply *involve describing the content* included, another approach is *to select a comparator* against which the app content would be assessed.

1

Clinical Guidelines

2

Evidence-based Protocols

3

Behavior Change Techniques



Content Analysis: Clinical Guidelines

- Some content analysis studies have *compared app content with clinical guidelines* put forth by professional organizations.
- This approach can identify apps that are most comprehensive in their incorporation of clinical guidelines and *identify gaps in the content of other apps*. It can also *lend credibility to commercial apps* that score highly among researchers, clinicians, and patients.
- Studies comparing the content of *commercial health apps* with clinical guidelines have *found that guidelines are sparsely used*.
- One *challenge for app developers* is that *clinical guidelines change as the science evolves*, and some changes are heavily debated among scientists and practitioners, which can be confusing for developers and users. *Staying abreast of changing guidelines would be necessary to insure that information provided is current*.



Content Analysis: Evidence-Based Protocols

- Another comparator for commercial app content analysis is an *evidence-based protocol*. An evidence-based protocol is a *structured collection of behavioral strategies* that when implemented together and as recommended have produced *significant effects on behavior or a health condition in randomized trials*.
- A *comparison of apps with evidence-based protocols* can provide *useful information* about the *strategies* being deployed.
- The *findings* suggest that although *commercial apps do not generally appear to be providing a comprehensive set of behavioral strategies*, they may assist the user with *specific behavioral strategies*





Content Analysis: Behavior Change Techniques

- Another approach to analyze the content of apps has been to *identify and classify the behavior change techniques used in the apps*.
- A taxonomy of behavior change techniques was developed through a systematic process where health behavior theories and meta-analyses of interventions were reviewed to generate a list of discrete evidence-based techniques.
- The *goal of the taxonomy* is to provide a *list of behavior change techniques* in their smallest reducible size and to improve the specification, replication, and implementation of behavioral interventions.
- Furthermore, research has *shown* that certain *behavior change techniques are associated with more favorable outcomes*; therefore, evaluating apps for inclusion of these behavior change techniques could *aid in identifying appropriate apps for specific behavior change goals*.



Usability Testing

- *Usability* or user testing refers to how well *an app functions* and whether or not it *serves its intended purpose*.
- The *International Organization for Standardization (ISO)* is a leader in developing industry standards and evidence-based guidelines for the development of a range of services and products, including technologies. Two recent International Standards (*ISO 9241* and *ISO 25062*) provide *guidelines* for conducting and reporting on *usability testing of mobile apps*.



Usability Testing

➤ *Developers may approach the process of usability evaluation through methods such as:*

01

experts describe the problems that users might encounter

experts-based evaluation

02

watching users interact with the app

observation

03

to collect user feedback

surveys

04

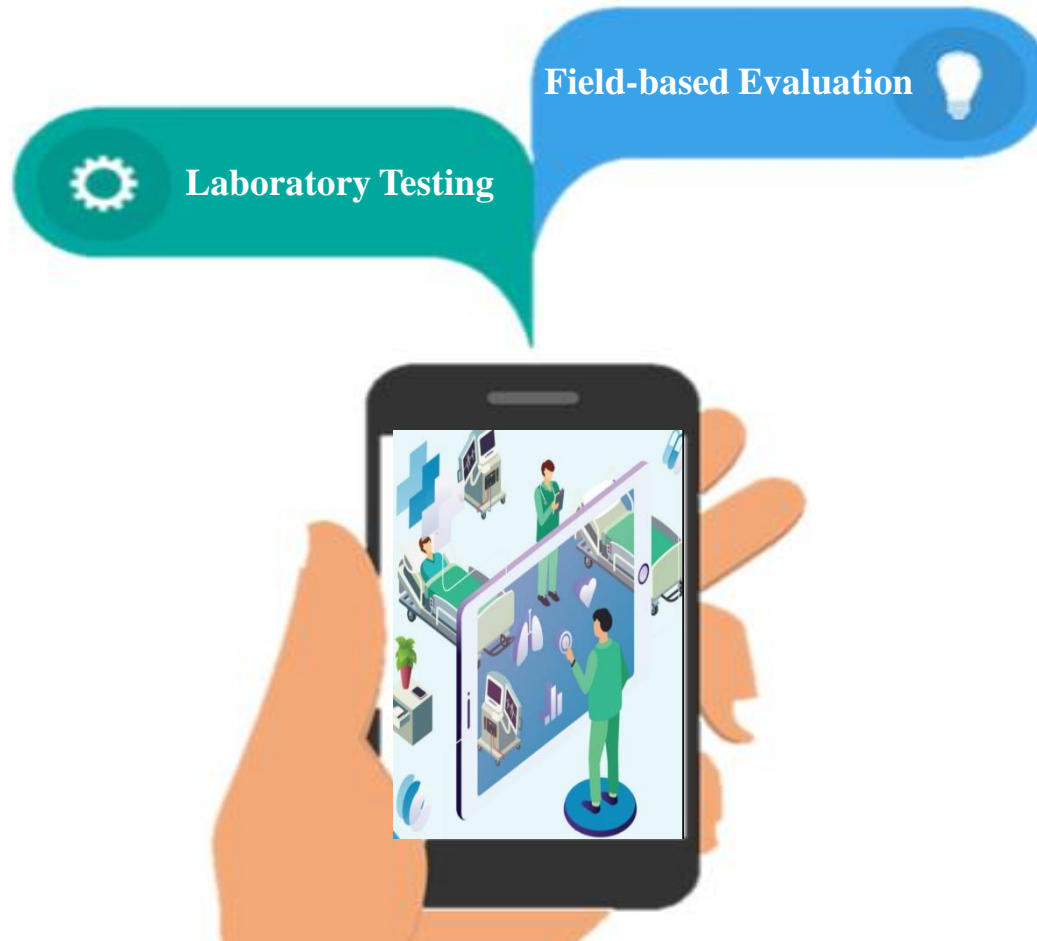
evaluation of a product through interaction with app by experts or users to collect feedback on usability issues

experimental evaluation



Where to Evaluate

- *Evaluation of commercial app usability can include:*





Usability Testing : Laboratory Testing

- Usability testing can be *conducted in a laboratory* where users are asked to carry out specific tasks with an app in a *controlled setting with extensive observation*.
- *Laboratory-based testing* can be helpful, especially *when* usability needs to be assessed in a specific *population who may have different characteristics* than the users targeted by the company.
- Usability metrics, such as comprehensibility and ease of use, can be collected over a short period of time with a small number of people. In a *single visit*, laboratory-based usability testing can *provide rich data by allowing user behavior to be audio- or video-recorded*.
- Results from laboratory-based testing can be used to *inform the instructions* and *training* given to the target population or additional technology needed to support use of the app.





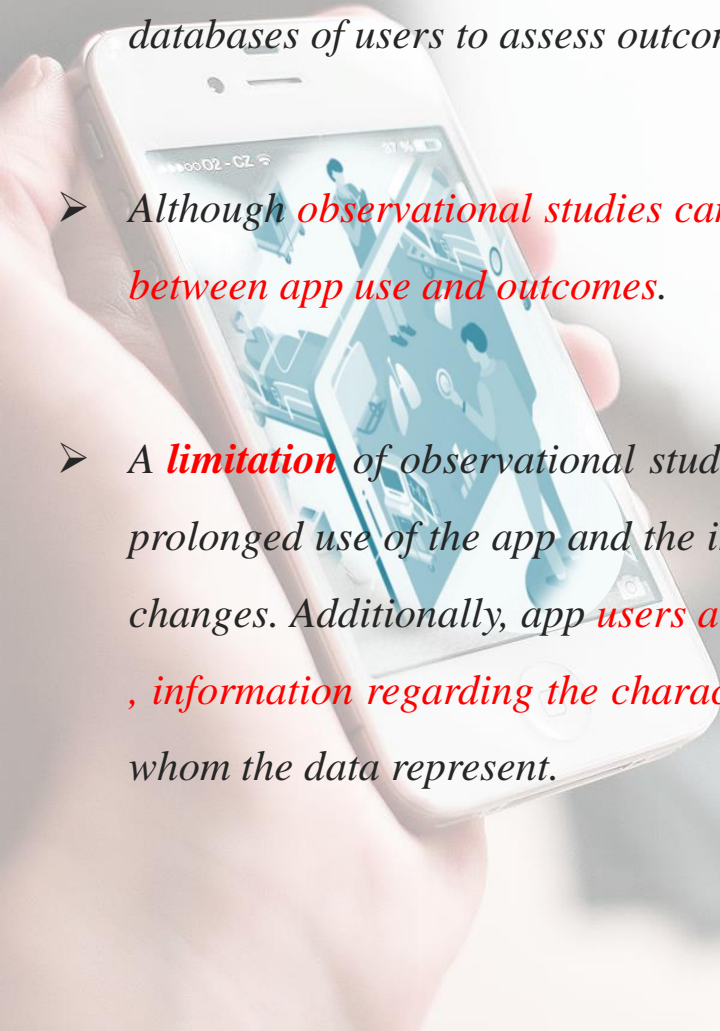
Usability Testing : Field Testing

- Field testing or mobile in the wild testing allows *observation* of how *people use the app in their real lives to better*.
- understand real-world usage of the app. Testing apps in the field can test usability of an app for a specific target population or help determine which of the several apps is best for a target population. *Few studies have used field-based methods to evaluate the usability of commercial health apps.*
- *Another method to collect field usability data is through app tracking software.* Software can be installed on mobile phones to monitor the *number of active app users, how long users spend in the app, what they click on, and so on.*
- Despite the rich data field tests can provide, capturing app use in a *dynamic environment makes direct observation difficult.* Furthermore, *findings may only be relevant to the sample of users selected and samples tend to be small.* Additional evidence for app usability in a variety of populations is critical to provide further insight into which apps might be best suited for whom.



Observational Studies

- *Observational studies can be used to assess **app use**, **satisfaction**, and the **predictive value** of app use on **behavioral** and **clinical outcomes**. Observational studies can be conducted via large databases of users to assess outcomes tracked by the app.*
- *Although **observational studies cannot establish causality**, they can be used to **explore associations between app use and outcomes**.*
- *A **limitation** of observational studies is the potential for **selection bias**, especially when examining prolonged use of the app and the inability to draw causal conclusions about observed behavior changes. Additionally, **app users are not likely representative of patient populations**. Furthermore, **information regarding the characteristics of users may be limited**, making it difficult to ever know whom the data represent.*





Efficacy Testing: Randomized Controlled Trials

- Efficacy testing is a *critical step* in establishing *whether use of a commercial app results in meaningful change in behavior and clinical outcomes*. The *gold standard approach* to efficacy testing is the *RCT*.
- *Evidence from RCTs* is considered the gold standard in the *context of clinical guidelines*, which is ultimately the gateway to becoming a part of standard practice.
- A *major decision point in RCTs* is the appropriate *control or comparison group* with each option addressing a unique question. Usual care *control groups* address whether a *commercial app* improves upon usual care.
- If the research *question* is *whether an app improves upon a standard practice*, a comparison could be made between standard practice with and without the app. *Comparative effectiveness studies* including both equivalence and noninferiority designs might *compare two apps* or an *app with another treatment approach*.





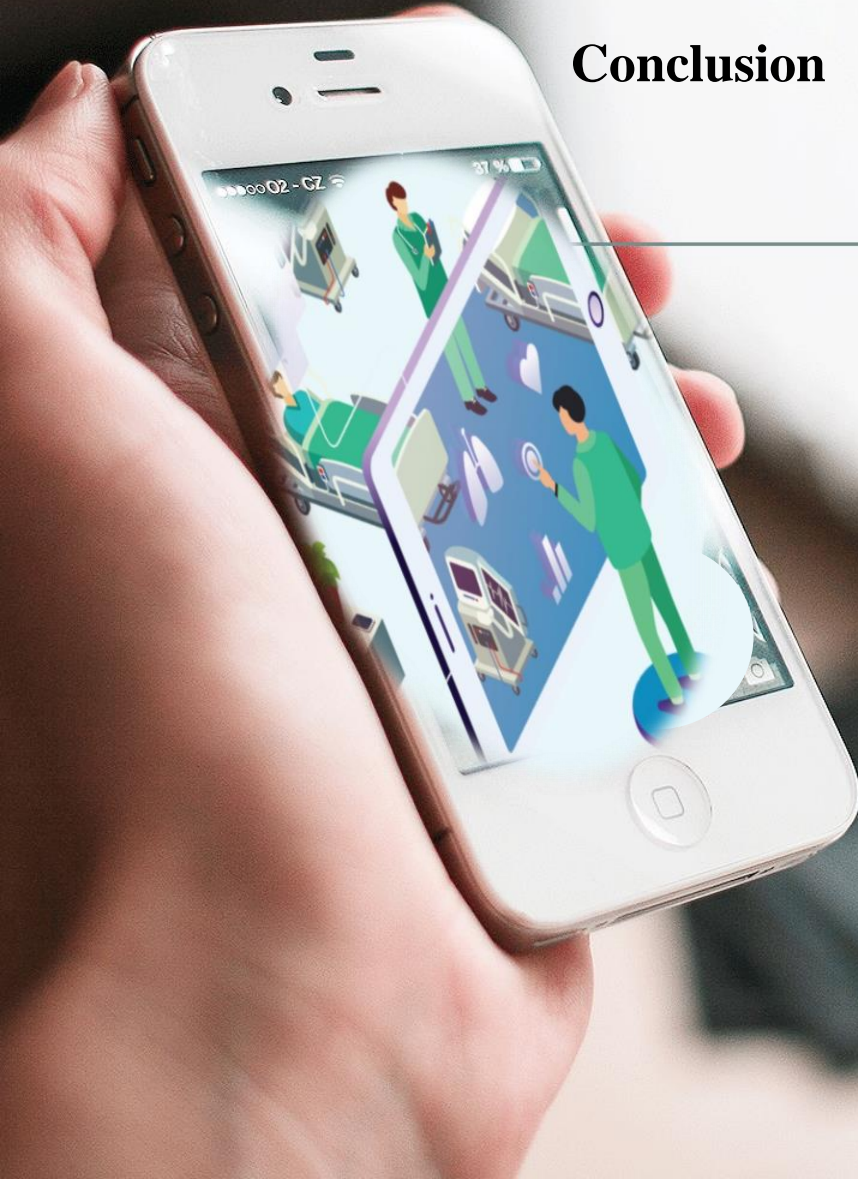
Randomized Controlled Trials: Challenges

- *RCTs are **time** and **resource** intensive, which means their use must be reserved for apps in which other previously discussed forms of evidence support the investment.*
- *Another challenge to RCTs with commercial apps is that **frequent app updates** make it difficult to **ensure that all participants receive identical intervention**. Treatment fidelity and receipt should be tracked so that such deviations can be documented and controlled for in analytic models.*
- *Finally, **researchers have no control over the features in a commercial app**, making it difficult to test whether the “**success**” of an app-delivered intervention is attributable to the **total package of the app** or because of **specific app components**.*



Conclusion

Research on commercial mHealth apps can take many forms depending on the research question as well as the time and resources required to complete it. No single methodology is best as each provides a different type of evidence and involves a unique set of advantages and limitations.





Dr.zakerabasali

Assistance Professor of Medical Informatics

Department of Health Information Management

Shiraz University of Medical Sciences



zakerabasi@gmail.com



09173054817

*Thank You
for Your attention*