Evaluation of information systems

based on mHealth

Dr.zakerabasali
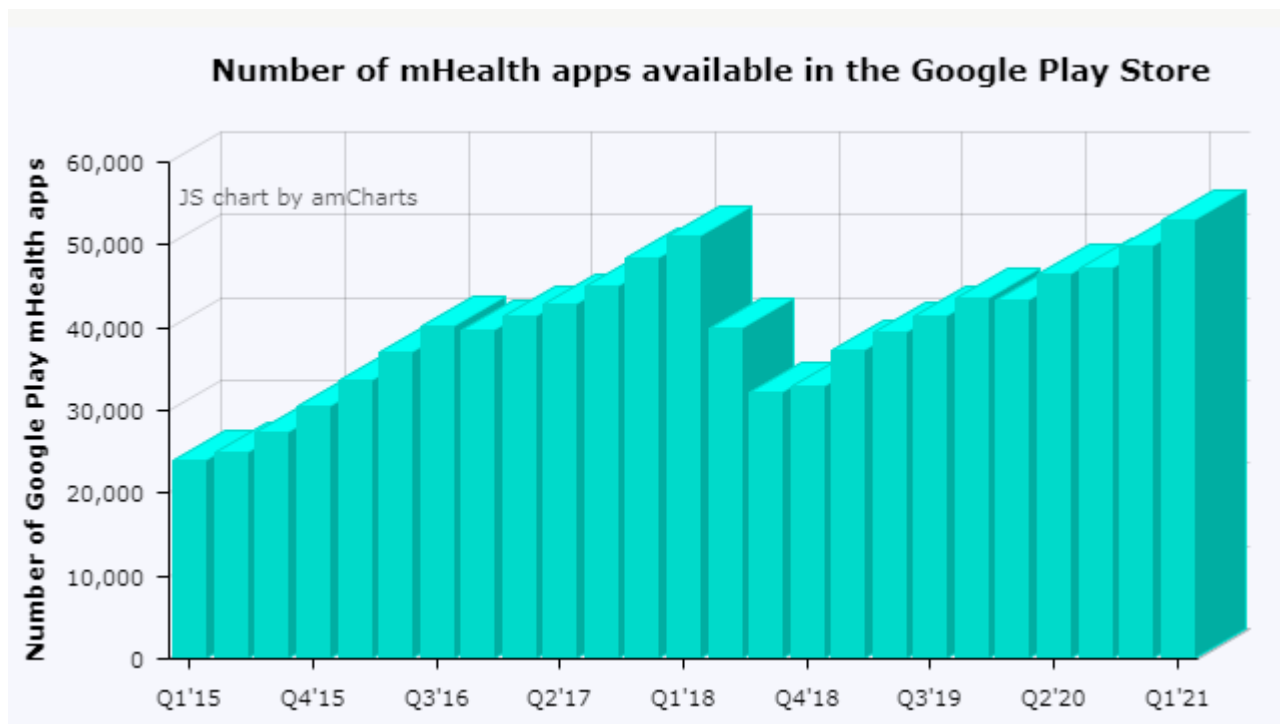
CONTENTS

How many health apps are there in 2022?

➤ *The rise of mHealth demand increased mobile apps available in the* *App Store* *and* *Google Play* *market. Thus for Q1* *2021*, *there were* *53,979 iOS* *healthcare apps and* *53,054 apps available at* *Google Play.*

### Number of mHealth apps available in the Google Play Store
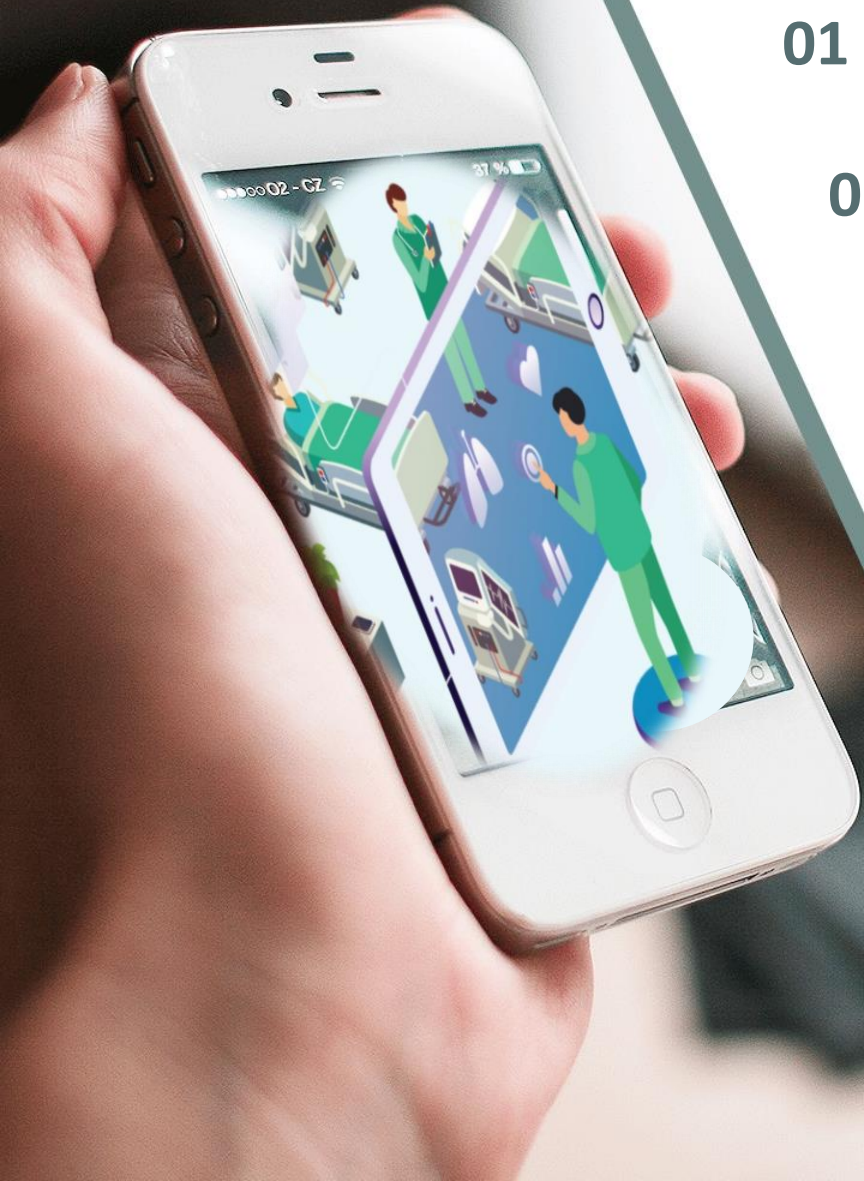
Importance of Commercial apps

➤ 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.

➤ *Health care providers* also have great interest in determining the *evidentiary basis of commercial apps*. In fact, the American Medical 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.

Importance of Evaluation
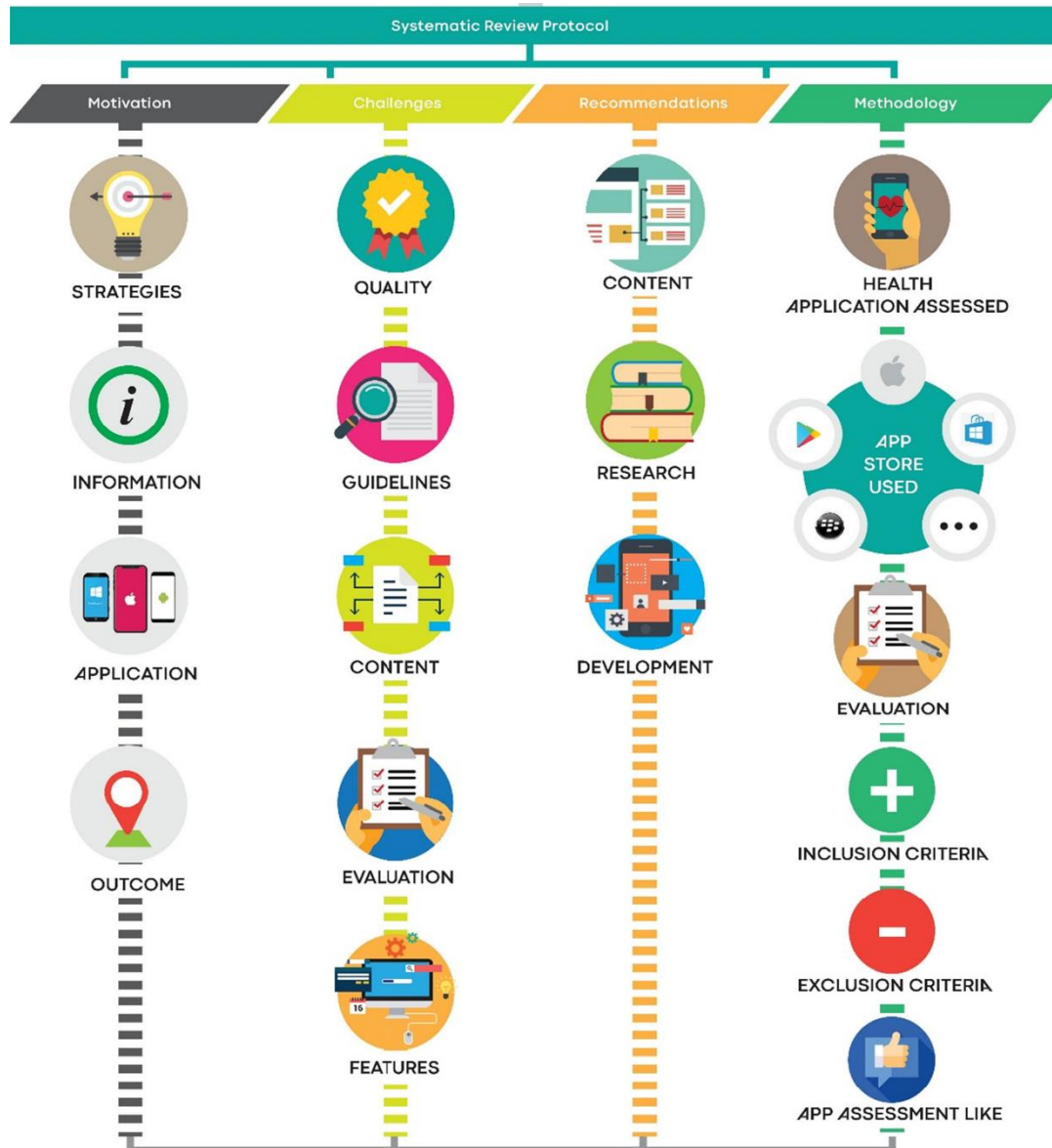
A systematic review into the assessment of medical apps (2021)

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 presentation 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?"

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.*

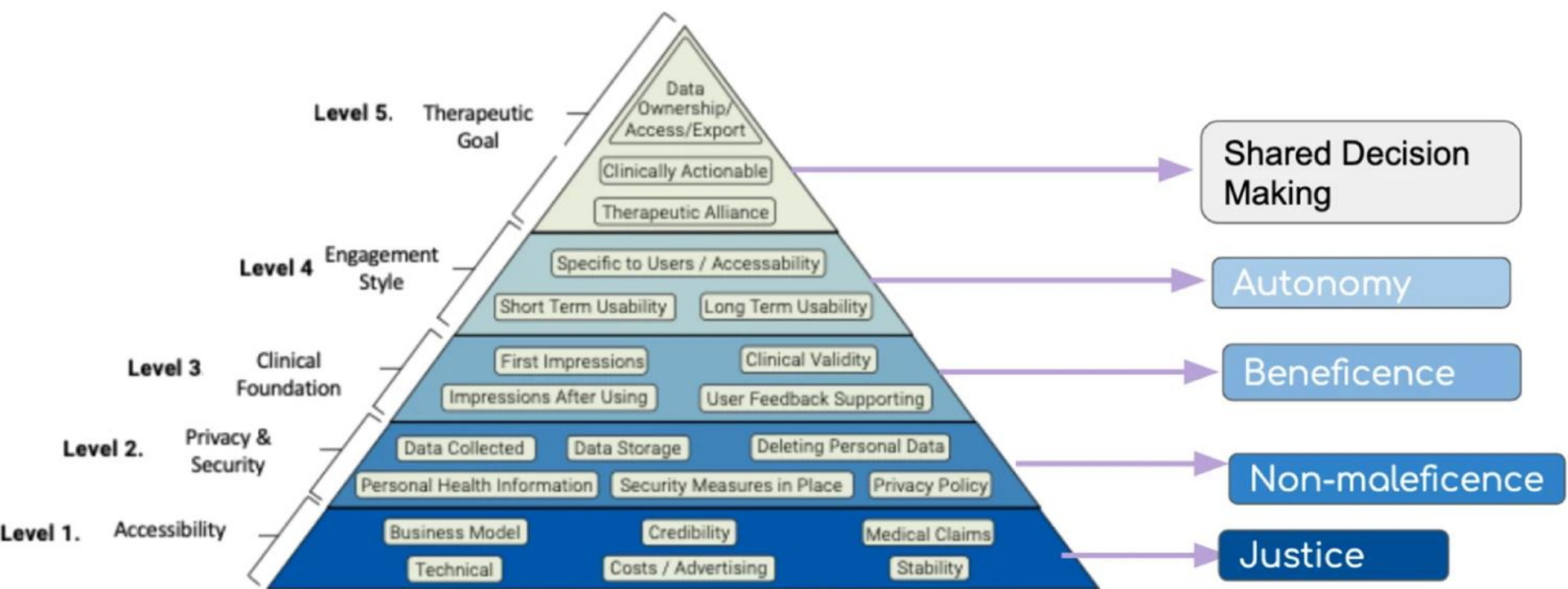❑ **When**: *throughout design; finished products can be evaluated to collect information to inform new products.*
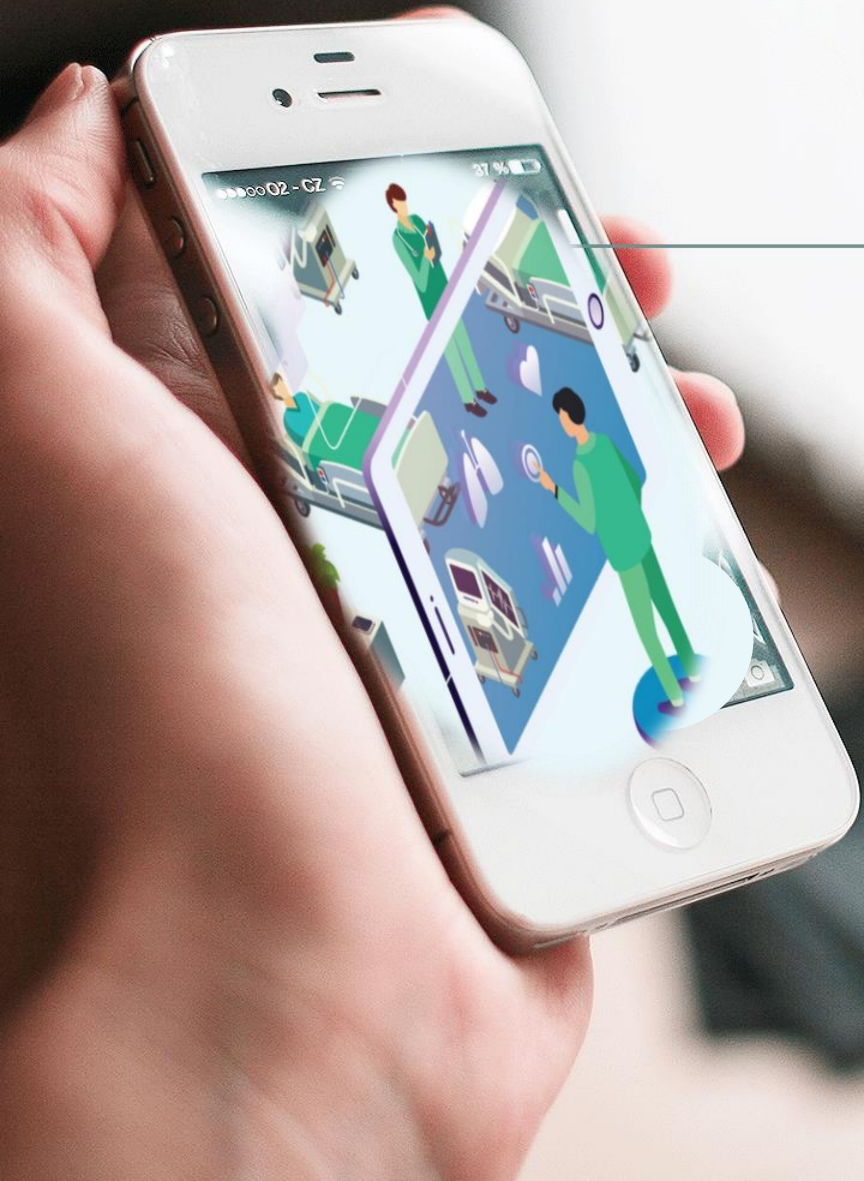
When to Evaluate
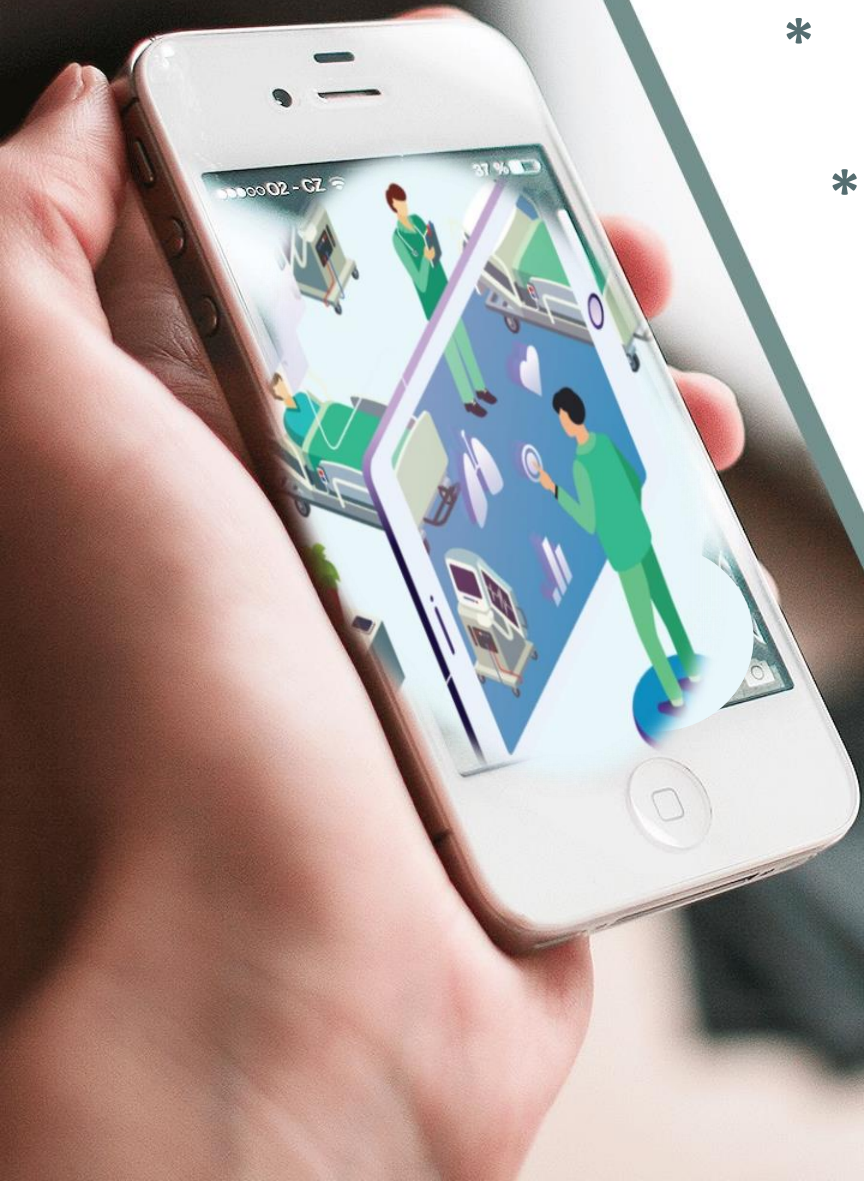
* Requirements specification

* Conceptual design/ formal design

* Task analysis/Functional analysis

* Prototyping

* Implementation

* Use of Apps

Actionable Health Apps Evaluation

Actionable health app evaluation: translating expert frameworks into objective metrics (2020)

Mobile Health apps Evaluation

1. Content Analysis
2. Observational Studies
3. Usability Evaluation
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.*

Clinical Guidelines

✓ compared app content with clinical guidelines

✓ identify gaps in the content of other apps

✓ Staying abreast of changing guidelines would be necessary to insure that information provided is current.

Evidence-based Protocols

✓ is a structured collection of behavioral strategies

✓ significant effects on behavior or a health condition in randomized trials

✓ comparison of apps can provide useful information about the strategies being deployed

Behavior Change Techniques

✓ identify and classify the behavior change techniques used in the apps

✓ research has shown that certain behavior change techniques are associated with more favorable outcomes
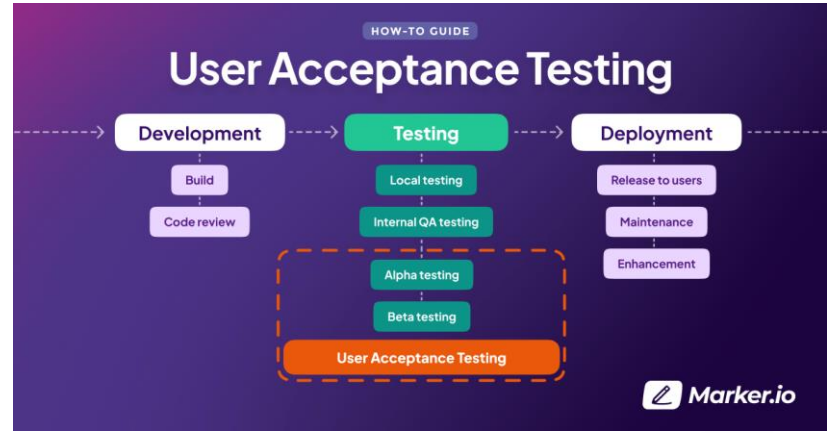
Observational Studies

➢ 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.
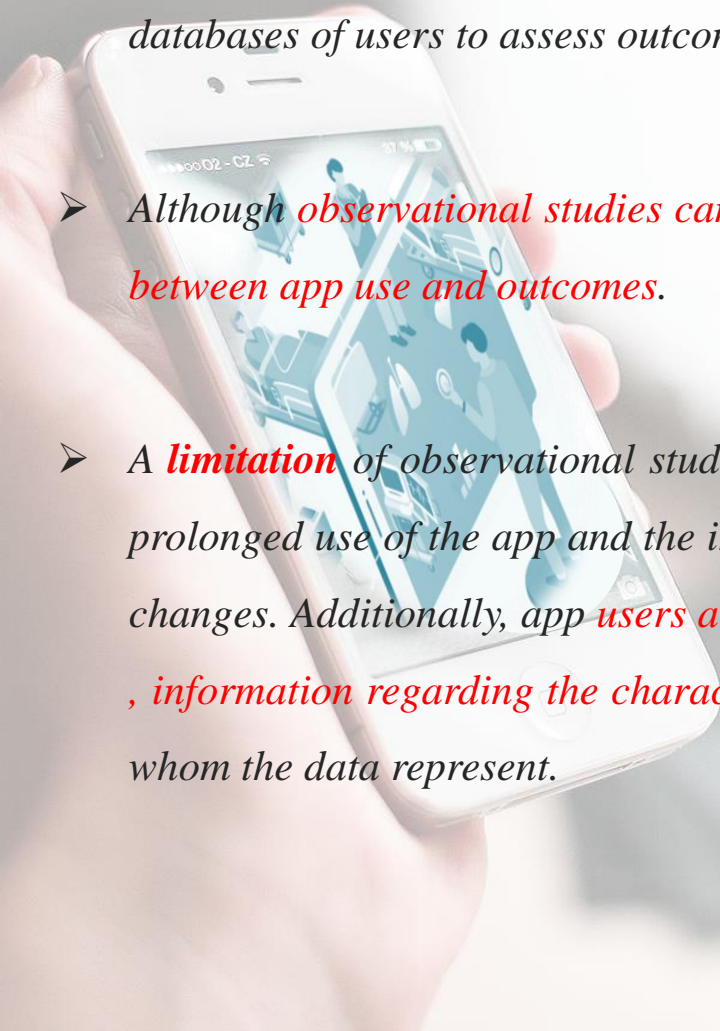
➢*The primary purpose of running a mobile usability testing is to identify possible glitches to ensure it truly delivers the expected value and practicability from users.*

➢*Usability testing helps to ensure that your app is adding value to your business, as well as meeting the expectations of the final users.*

➢*a list of reasons why it's crucial to run a mobile app usability test:*

❑ *Identify challenges in design*

❑ *Discover opportunities to enhance design*

❑ *Understand your user behavior and preferences*

❑ *Cut down overall troubleshooting expenses and time*

❑ *Provide delightful user experience*
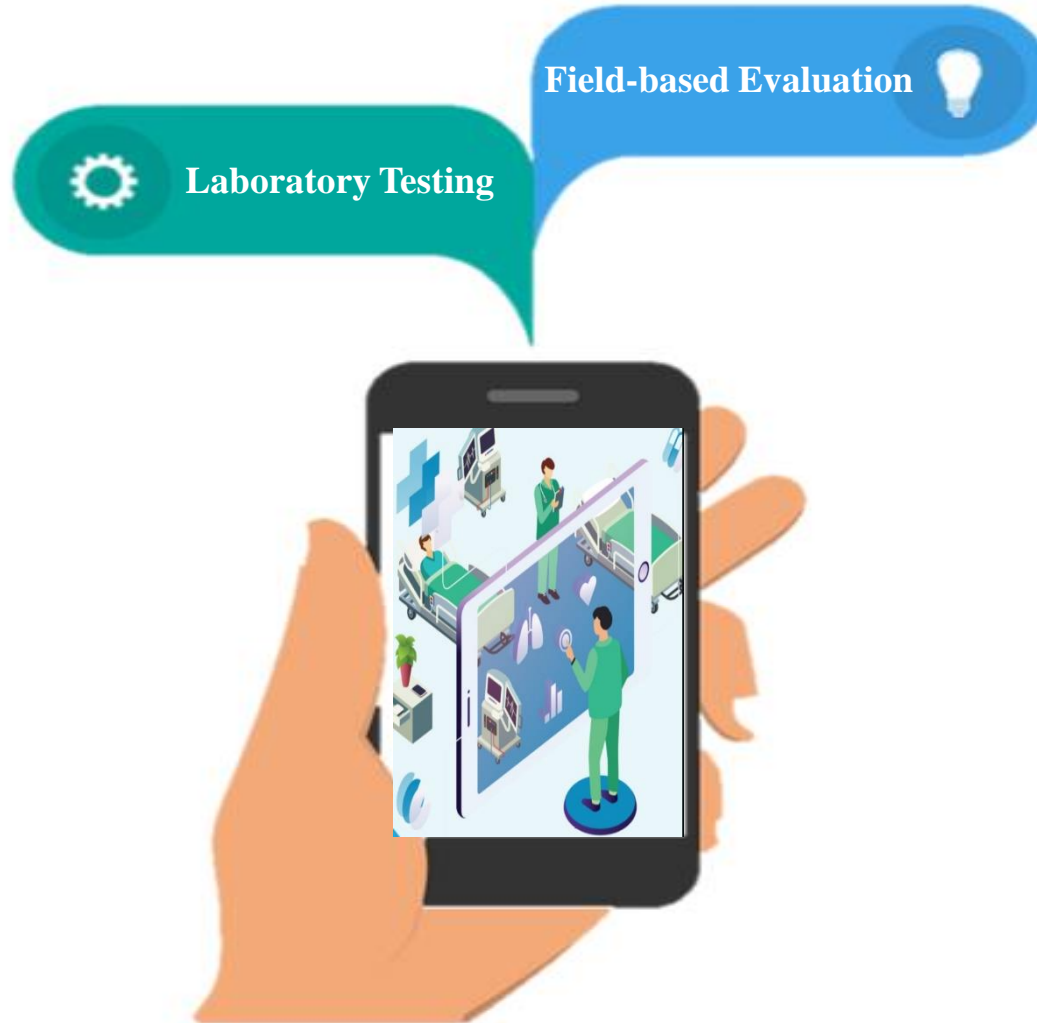
➢ *Usability Evaluation should occur continually through the design and implementation process.*

➢ *Evaluation methods are applied as the interface is being developed, rather than at the end.*
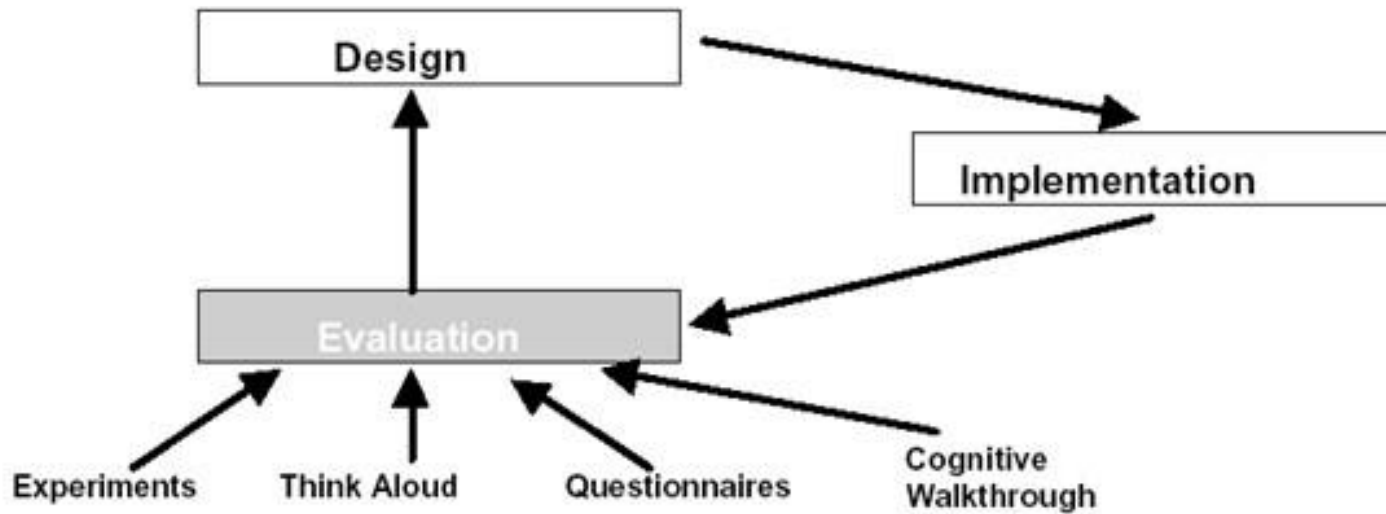
➢ *Evaluation of commercial app usability can include:*

Laboratory Testing

Field-based Evaluation

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.*

➢ *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.*

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*.

➢ *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*.

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.
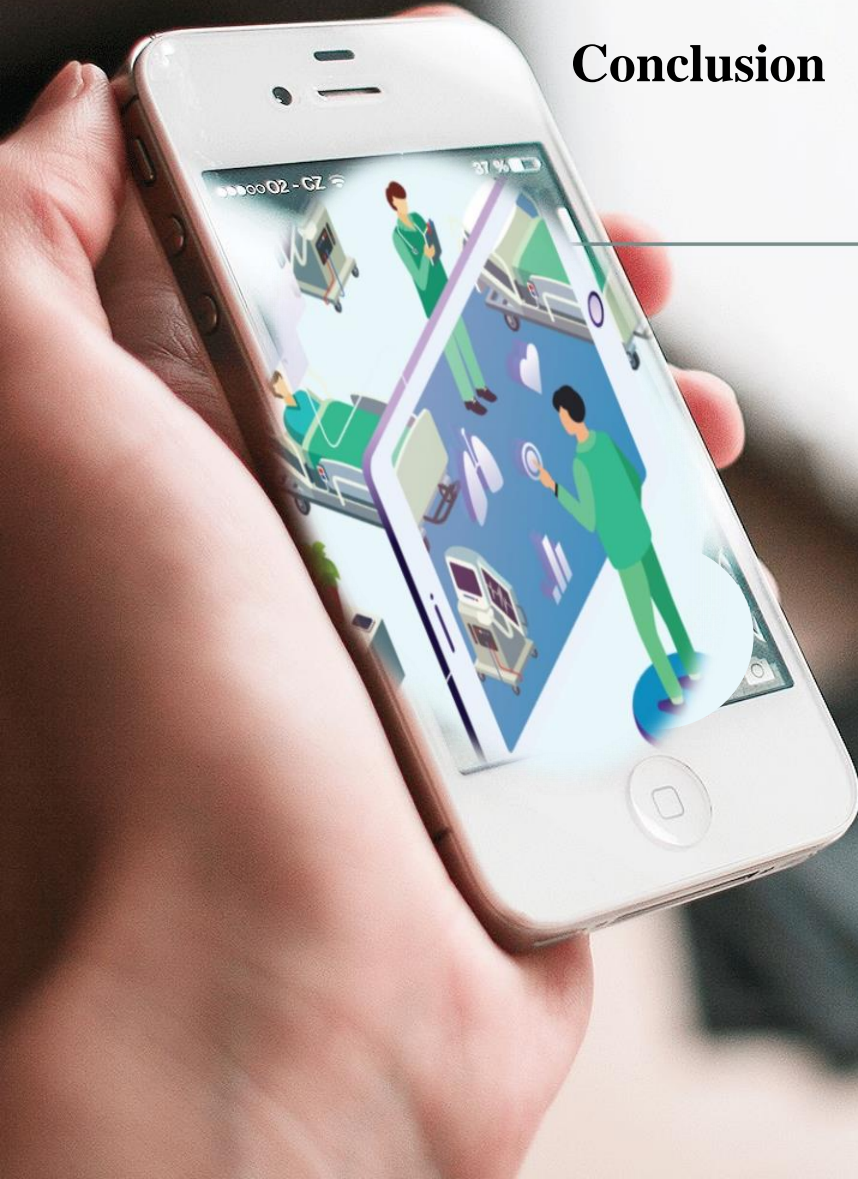
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Thank You
for Your attention