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Using Persuasive Technology to design effective mHealth Systems

@twitterhandle

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Panel Members

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- Scott Sittig, PhD, Associate Professor, Health Sciences, University of Louisiana Lafayette
- Elena Vlahu-Gjorgieska, PhD, Senior Lecturer, University of Wollongong
- Jose F Florez-Arango, MD, PhD, Assistant Professor, Weill-Cornell Medical School

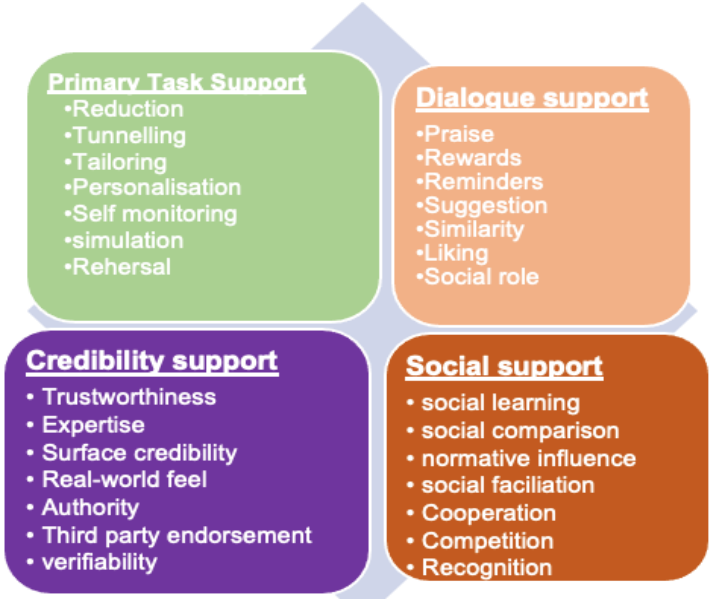
Persuasive Technology (PT):

What is persuasive technology?

Persuasive Technology (PT)

- Technology created specifically to change its users' opinions, attitudes, or behaviors to meet its goals
- PT helps design engaging and motivating learning experiences
- PT is increasingly used in the health and wellness domain

Persuasive Systems Design Model



Persuasive System Design model

Persuasive Technology

7 Principles

Tunneling
Leading the user through a guided series of steps

Reduction
Providing just enough information in a step to enable user to understand

Tailoring
Customizing content to the ethnic, cultural, educational background of target users. *Supports Precision medicine*

Personalization
Content should be personalized
Supports Precision medicine

Self-Monitoring
Track one's own performance / status

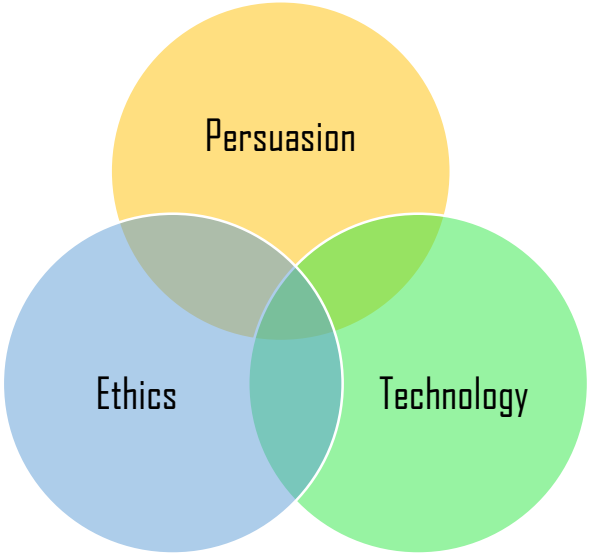
Rehearsal
Be able to rehearse a target behavior

Simulation
Observe the link between cause and effect

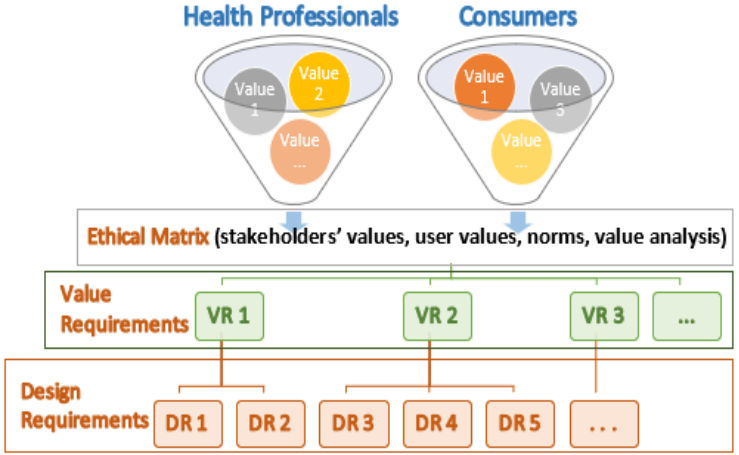
Persuasive Technology:

How can it be applied in solutions design?

Ethics of Persuasive Technology

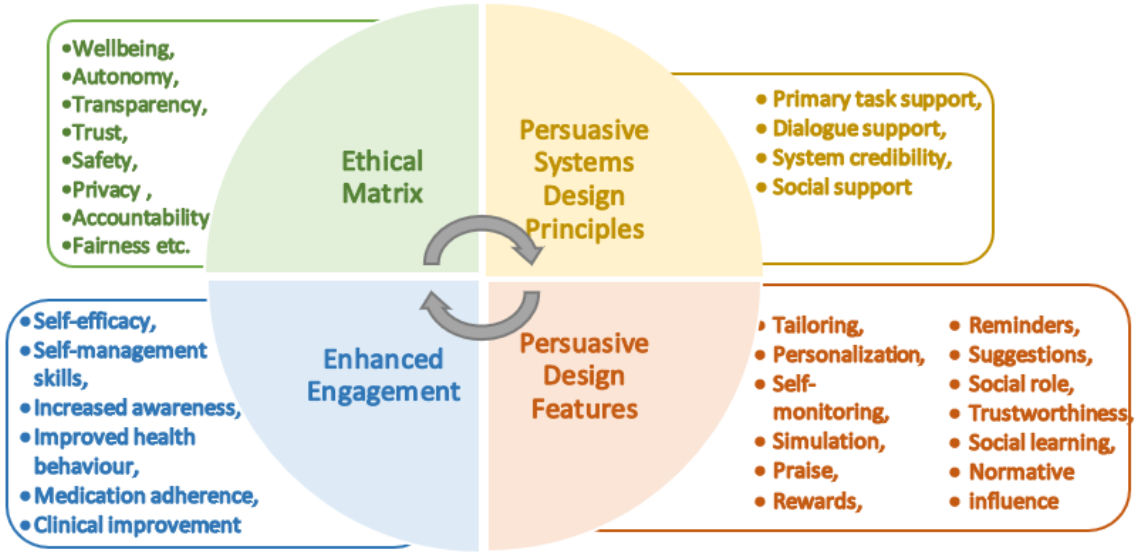


Ethical evaluation of Value sensitive design



values to design requirements

Persuasive system design



Mapping the value into PSD features for enhanced engagement

Persuasive Technology:

What is the role of PT in the mHealth apps?

What is the role of PT in the mHealth apps?

- A framework bridging attributes of Information & communications technologies and the goals of public health interventions

  Note that tech of various kinds, especially Information & Communication tech is playing an increasing role in our lives

- Provides a systematic basis to understand why interventions work, or don't work

What is the role of PT in the mHealth apps?

- Design effective interventions to encourage health-improvement behaviors of :
  - End-users: Healthy behaviors by those who are well: proper exercise, nutrition
  - End-users: Self-efficacy and self-management by those who are sick (or their caregivers)
  - Health-workers: Enhance compliance with clinical practice guidelines by Health workers, especially community health workers in developing countries
- There is a growing evidence base showing that Persuasive Technology can be effective in encouraging healthful behaviors.

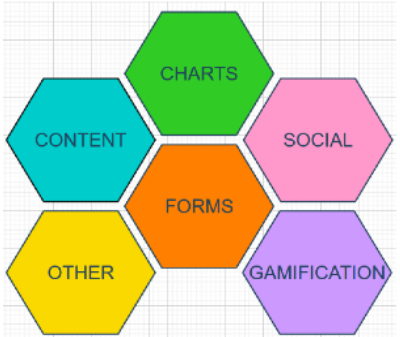
  Recent Special issue of Journal of Biomedical Informatics was devoted to Persuasive Technology, Editors: Sriram Iyengar, Harri Oinas-Kukkonen, Khin Than Win

Target users	PT Principle	Design Solution
Literacy deficits	Tailoring	Media rich: images, video, audio in addition to text information Culture and language sensitive to target users
Poor internet connectivity in user's environment	Tailoring	App should be able to function stand-alone
Training/Educational deficits	Reduction	Break up the health information in the apps into small chunks
Training/Educational deficits	Tunneling	App should present health information (eg, clinical practice guidelines) as a series of steps and help user choose the next step
Performance feedback needed for improvement	Self-monitoring	App should document user activities and provide reports

Use of PT to promote effective mHealth design

- mHealth applications adherence - health interventions delivered by mHealth apps are short-lived
  - most users cease mHealth app activity within a few uses
  - quarter of mHealth apps are found to be used only 1 time after installation

- Use of design patterns in the implementation of PSD features



Vlahu-Gjorgievska E, Burazor A, **Win KT**, Trajkovik V (2023), mHealth Apps Targeting Obesity and Overweight in Young People: App Review and Analysis, JMIR Mhealth Uhealth 2023;11:e37716
URL: https://mhealth.jmir.org/2023/1/e37716, DOI: 10.2196/37716

Persuasive Technology:

Which are some examples of applied PT?

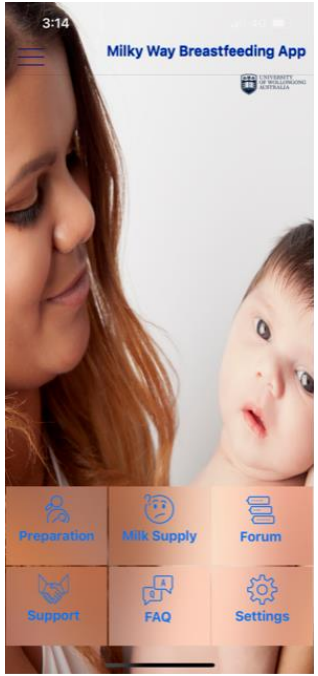
Accountability	The owner of the application is responsible for the information in the application. However, the disclaimer states, in case of any health concerns with the baby or the user, the user should always get a professional opinion
Autonomy	The application use and breastfeeding is voluntary
Breastfeeding	Application should support breastfeeding, but not make the user feel guilty for not breastfeeding regardless of the reason
Courtesy	Taking the cultural differences into account e.g. by image selection
Human welfare	Providing information for the users can gain the benefits of breastfeeding
Elaboration	Providing evidence-based information, so that the user can make her own decisions
Evidence-based knowledge	All the information provided should be evidence-based, trustworthy, and up-to-date
Ownership	The owner is responsible of what information will be provided and its accuracy. The owner have to be stated clearly in the application.
Privacy	Identities of the users should be protected. E.g. users are anonymous in the discussion forum and users' information is not collected
Unobtrusiveness	The application should not disturb the users e.g. via notifications

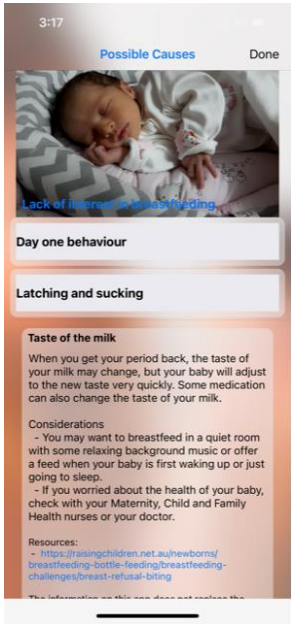
Kuonanoja L, Meedya S, Win KT, et al. (2018) Ethical evaluation of a value sensitive persuasive system: Case milky way. Proceedings of the 22nd Pacific Asia Conference on Information Systems - Opportunities and Challenges for the Digitized Society: Are We Ready?, PACIS 2018.

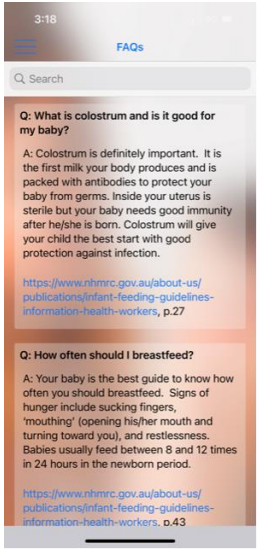
Milky Way app

Meedya S, **Win KT**, Yeatman H, Fahy K, Walton K, Burgess L, et al. (2021) Developing and testing a mobile application for breastfeeding support: The Milky Way application. Women and Birth. 34(2):e196-e203, DOI: 10.1016/j.wombi.2020.02.006

- Health education







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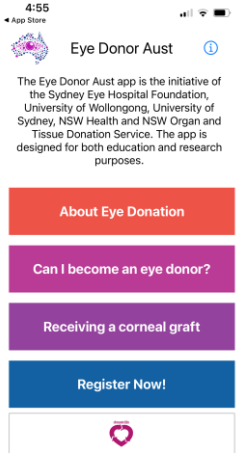
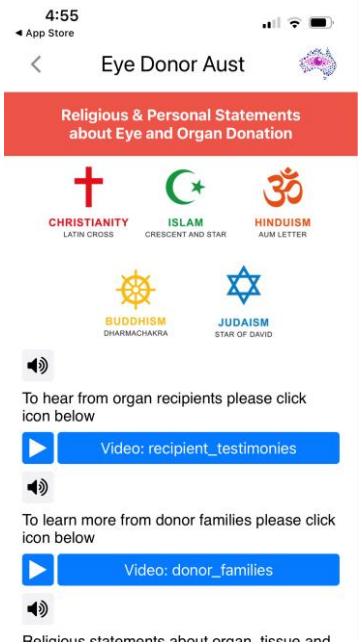
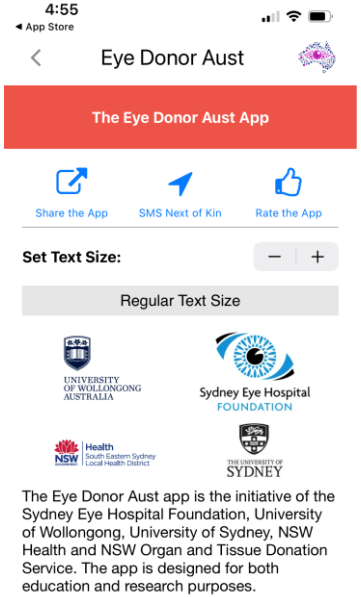
Eye Donor Australia app

Chumkasian W., Fernandez R., Win K. T., Petsoglou C., Lord H. (2021), Adaptation of the MAUQ and Usability Evaluation of a Mobile Phone-Based System to promote Eye donation, International Journal of Medical Informatics, 151:104462. doi: 10.1016/j.ijmedinf.2021.104462

- Stakeholders' values
- Health education







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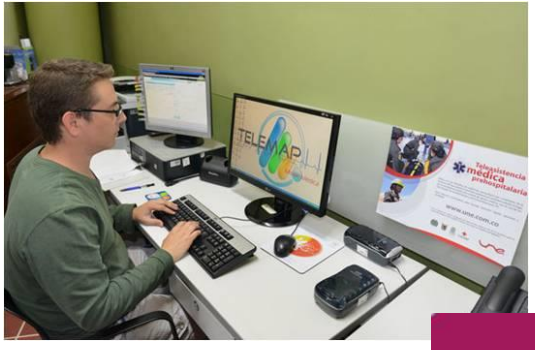
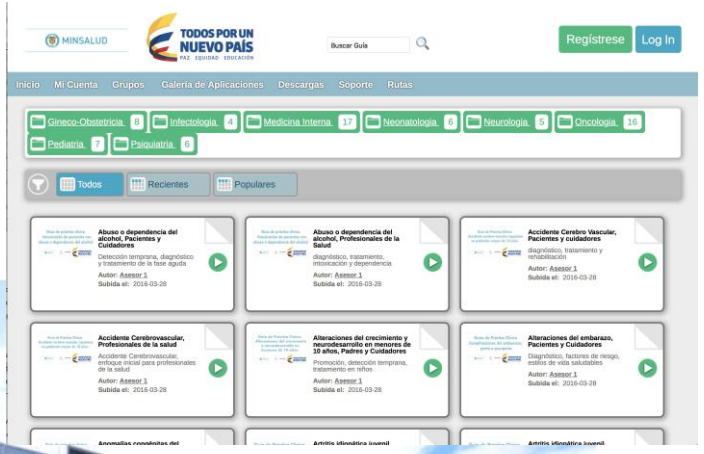
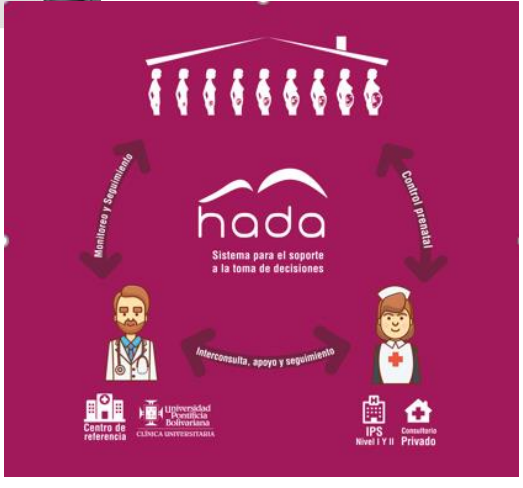






Persuasive Technology:

What are some challenges to PT?

mHealth Attrition

- Utilizing mHealth is an excellent solution to address public health needs through the ubiquitous nature of smart phone usage.

- One challenge in utilizing mHealth tools for prolonged periods of time is high attrition rates[1].
  - A solution to mitigating high attrition rates is leveraging persuasive technology to improve engagement[2].

Engagement through Persuasive Technology

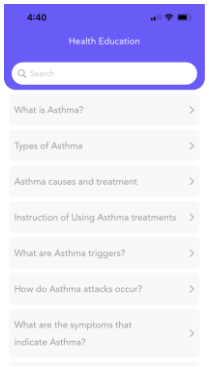
- Utilizing persuasive technology in which the consumer interacts with an mHealth app while receiving tailored messaging can promote user engagement, improve motivation and increase self-efficacy in individuals with complex chronic health conditions[3].
- Some of the most effective persuasive technology techniques include self-monitoring, tailoring, gamification and utilization of nudge/push messaging for engaging patients in the management of their healthcare[3].

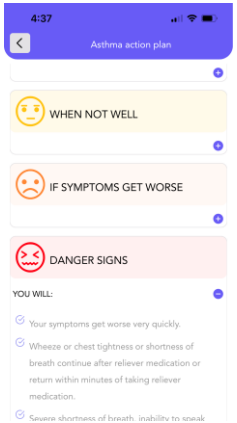
Engagement through Persuasive Technology

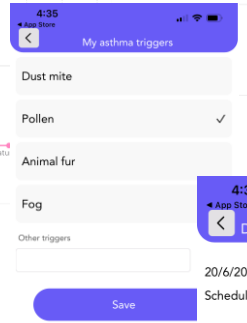
- In a recent research study (college nursing students) persuasive technology was utilized to deliver relevant positive psychology, motivation and hope feedback in an effort to promote user engagement, improve motivation, and bolster the participants self-efficacy through nudging[4].
- A 2022 research article showed that moving from a "one-size-fits-all mHealth approach to a personalized persuasive approach has the potential to create long-term engagement, which often plagued mHealth researchers and developers[5].

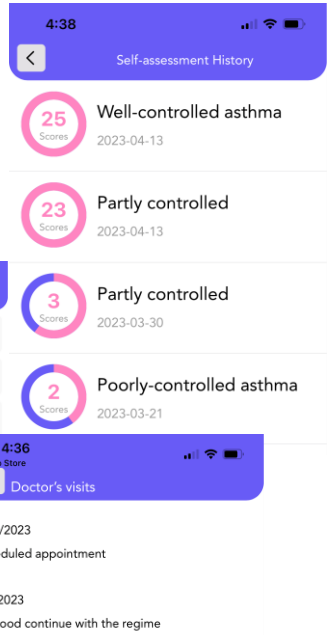
My Asthma app

- Self-management
- Health education







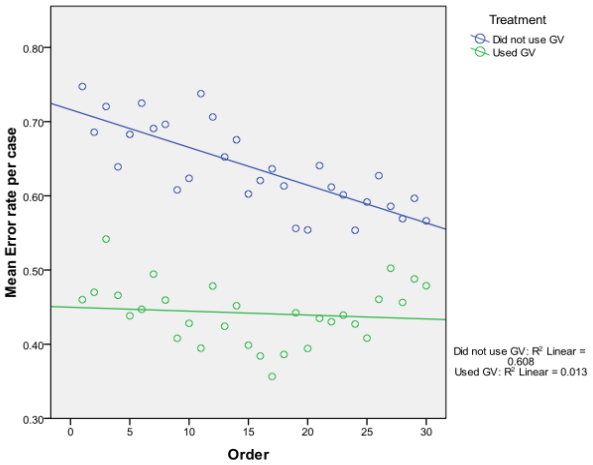


Panelist Questions

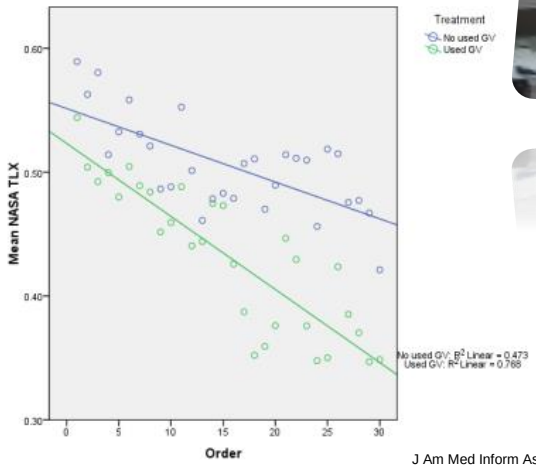
- Which types of persuasive technology components work best for engagement?
- How do we move from a one-size-fits-all mHealth system design to a tailored/personalized engaged mHealth system design?

Workload and Performance Factors Associated with Multimedia Job Aids for Community Health Workers

Error reduction and Training Time



Workload Reduction



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