Techno-spiritual Engagement:
Mechanisms for Improving Uptake of mHealth Apps Designed for Church Members

Hye Sun Yun[1], Shuo Zhou[1], Everlyne Kimani[1], Stefan Olaffson[1], Teresa K. O'Leary[1], Dhaval Parmar[1], Jessica Hoffman[1], Stephen Intille[1], Michael Paasche-Orlow [2], and Timothy Bickmore[1]

[1]Northeastern University
[2]Boston Medical Center

HEALTHI Workshop
March 21, 2022

Northeastern University

Relational Agents Group

Introduction

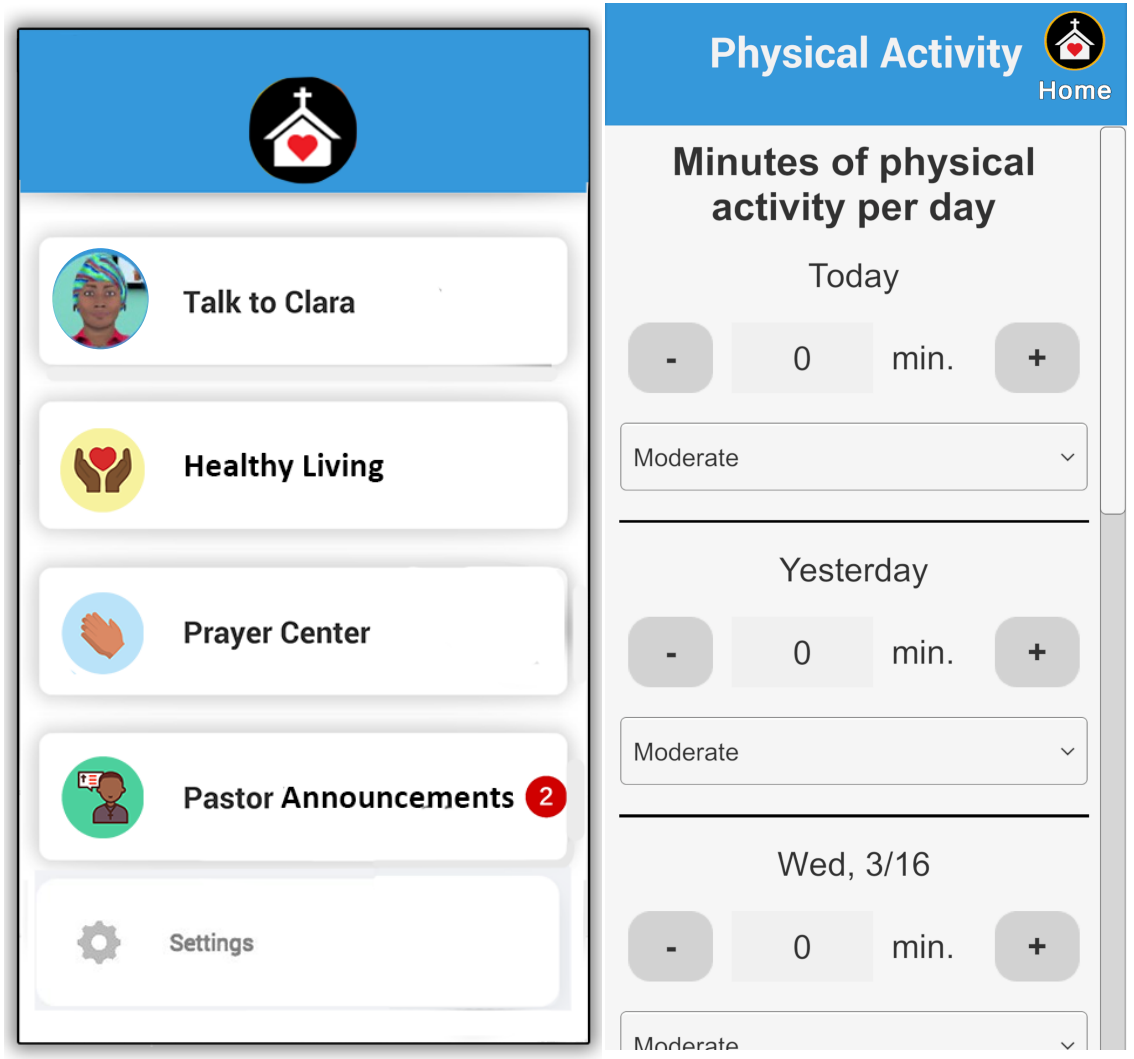
www.forthedge.co.uk

Church Connect:
Clara, a Peer Health Advisor

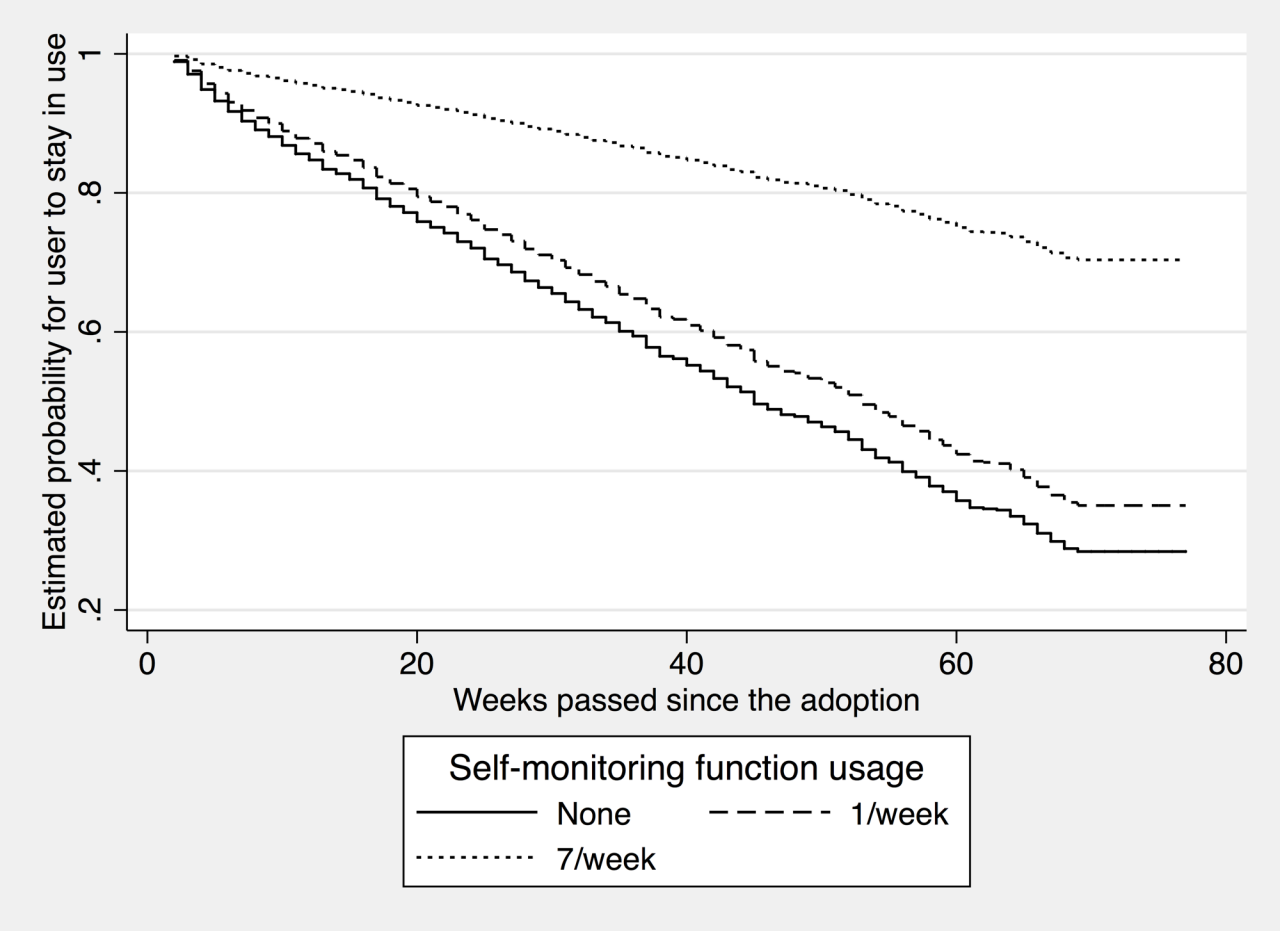
- **Promotes** healthy eating and exercise
- **Motivates** users to set health goals

Church Connect:
Setting Goals and Tracking

- **Track and log** exercise and fruits, vegetable, and water intake

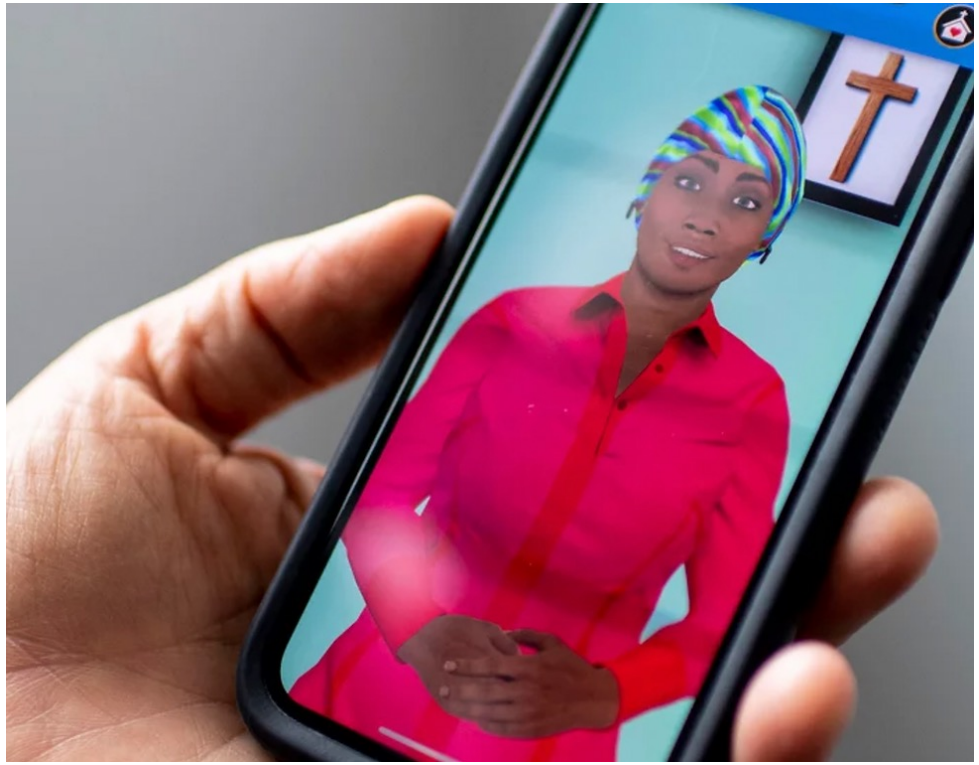


Problem



Lee K, Kwon H, Lee B, Lee G, Lee JH, Park YR, et al. (2018) Effect of self-monitoring on long-term patient engagement with mobile health applications.

Types of Engagement Mechanisms



- Non-health related, techno-spiritual functions
- Tailored virtual agent health advisor for the church community

Community Based Participatory Research

- 9 focus groups [O'Leary et al., 2020; Stowell et al., 2020, O'Leary et al., 2021]

Community Based Participatory Research

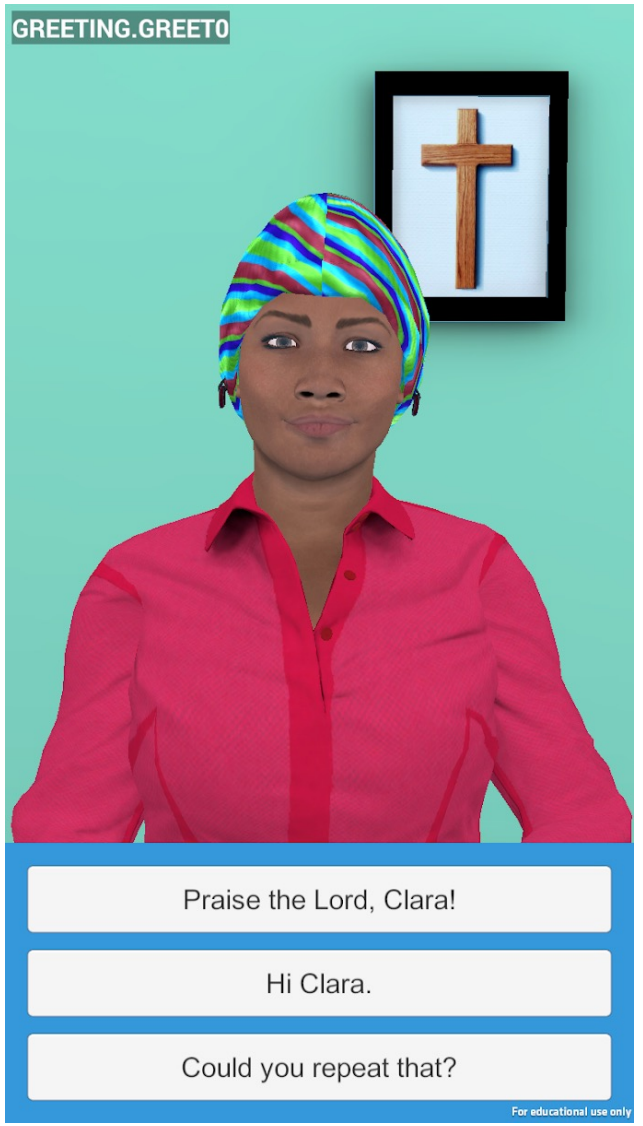
- 9 focus groups [O'Leary et al., 2020; Stowell et al., 2020, O'Leary et al., 2021]
- The look and dialogue of Clara (ECA)

Community Based Participatory Research

- 9 focus groups [O'Leary et al., 2020; Stowell et al., 2020, O'Leary et al., 2021]
- The look and dialogue of Clara (ECA)
- Exploring additional engagement mechanisms
  - importance of staying connected to their church communities
  - communication directly from leadership
  - scriptural and Biblical activities for interacting with Clara

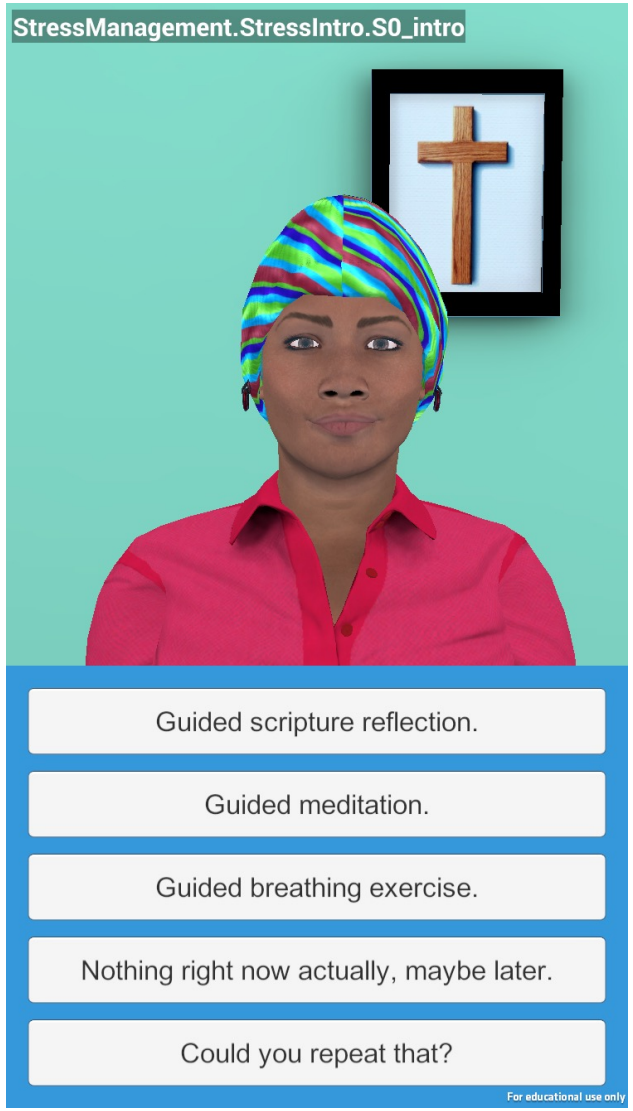
Religiously-Tailored ECA

- Religiously-tailored social chat
  - Community-situated greeting (e.g., “Hello, Sister Kathy!”) and farewell (e.g., “Blessings to you. Take care!”)
  - Scripture verse sharing



Bible Story of the Day/Scriptural Meditation

- Guided scripture meditation via Clara
- Sharing of same Bible story to all users for a given day via Clara

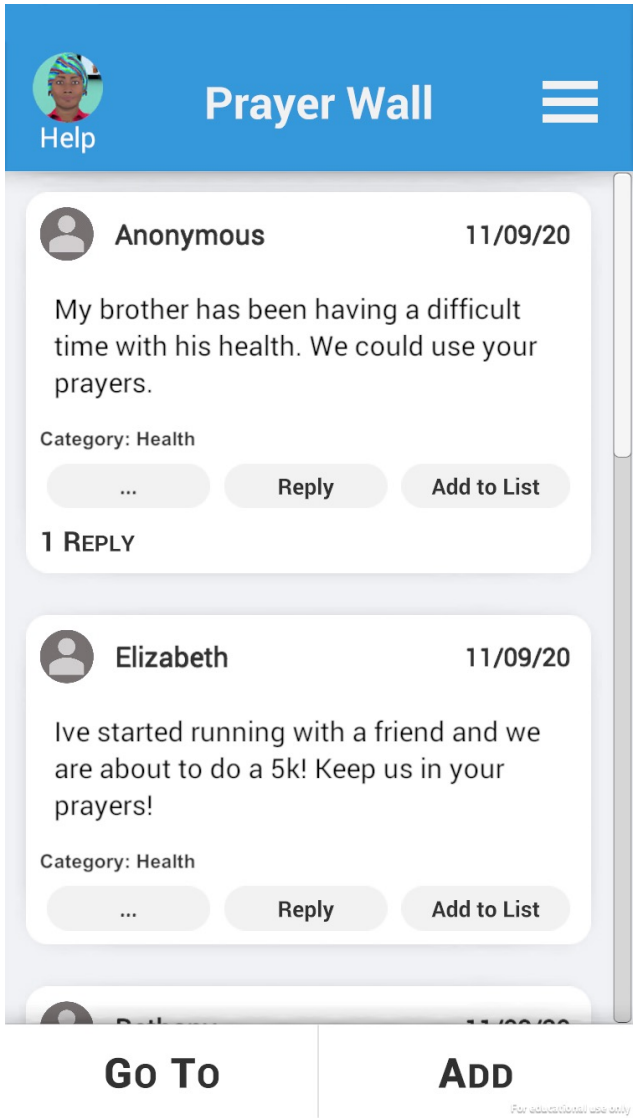


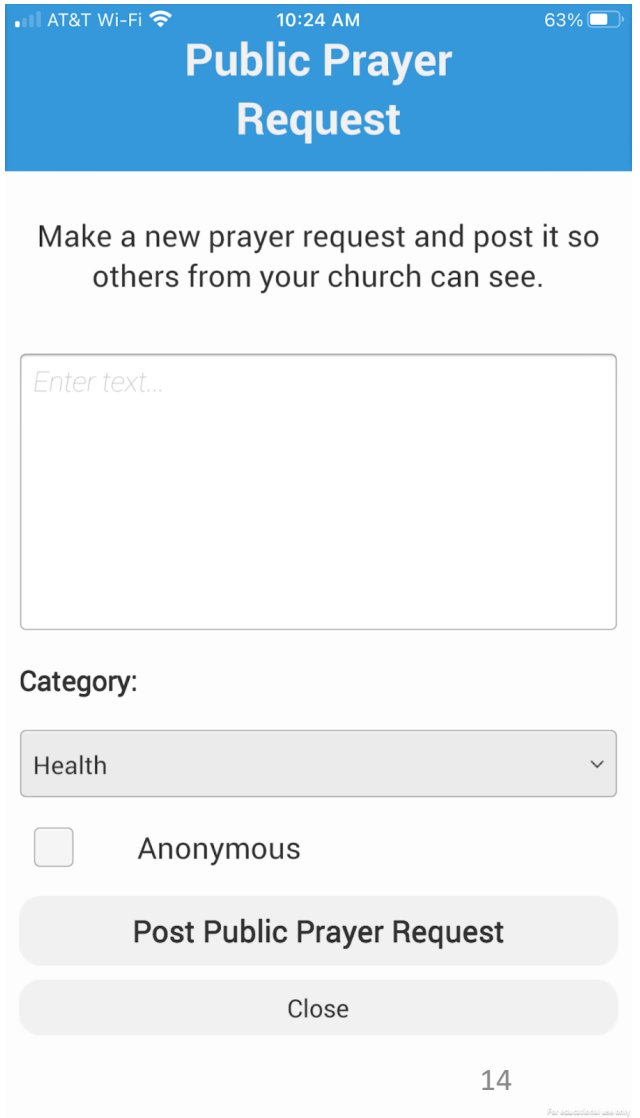
"Yet he did not waver through unbelief regarding the promise of God, but was strengthened in his faith and gave glory to God, being fully persuaded that God had power to do what he had promised."

Romans 4: 20-21

Prayer Center

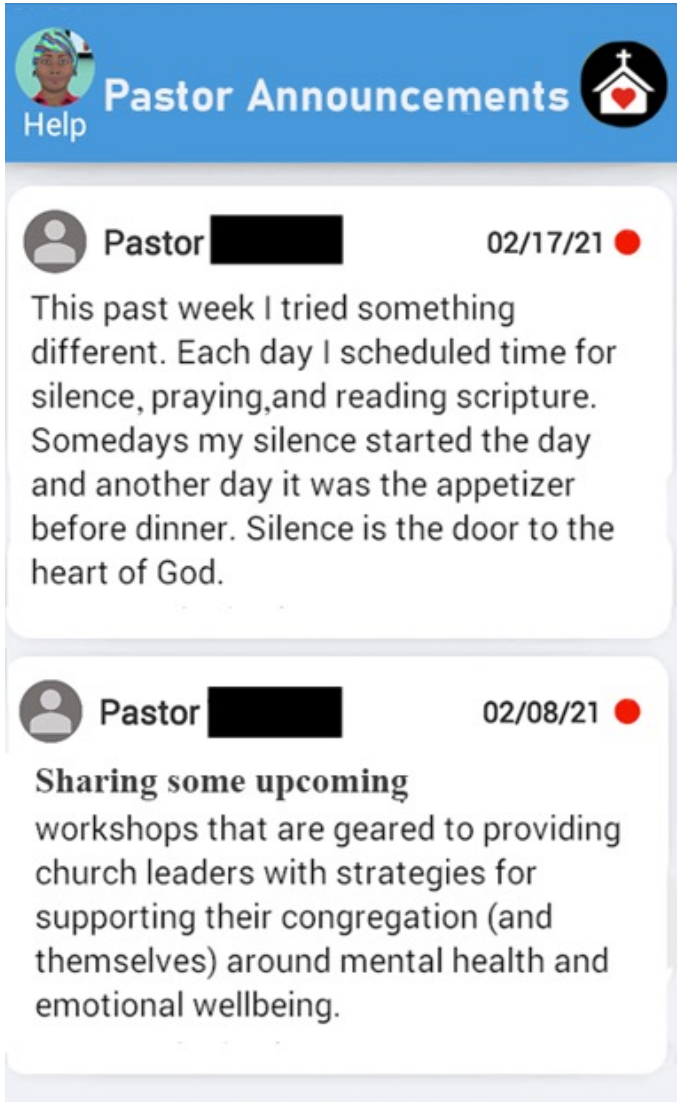
- Prayer Wall
  - Prayer requests and praises
  - Updates
  - Replies
- Private List



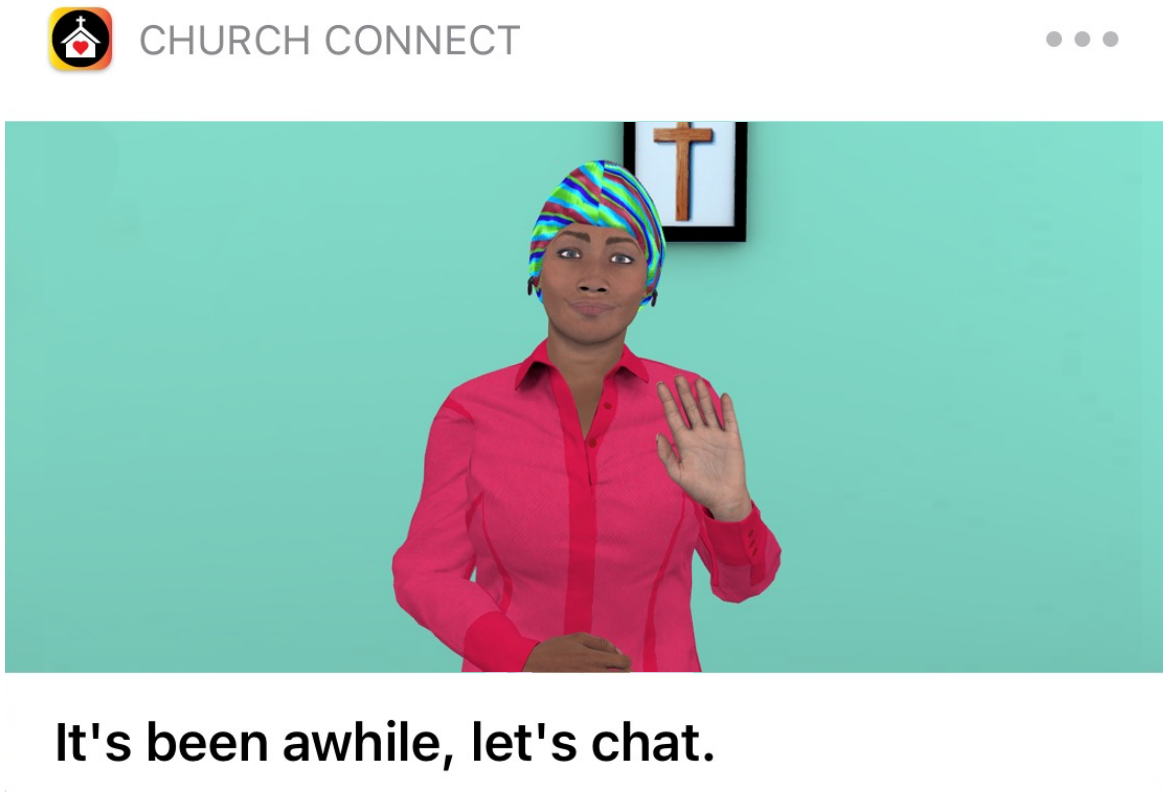


Pastor Announcements

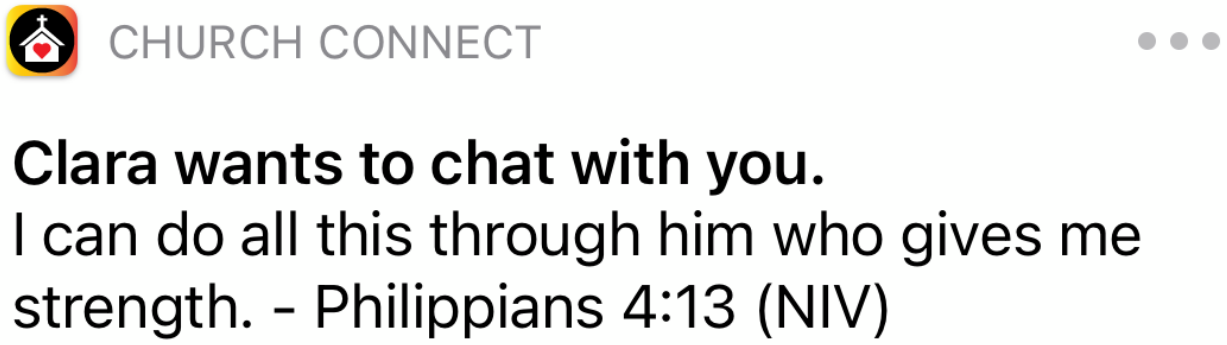
- One-way broadcast communication from church leadership
- Push notification and numbered indicator on main menu for new and unread



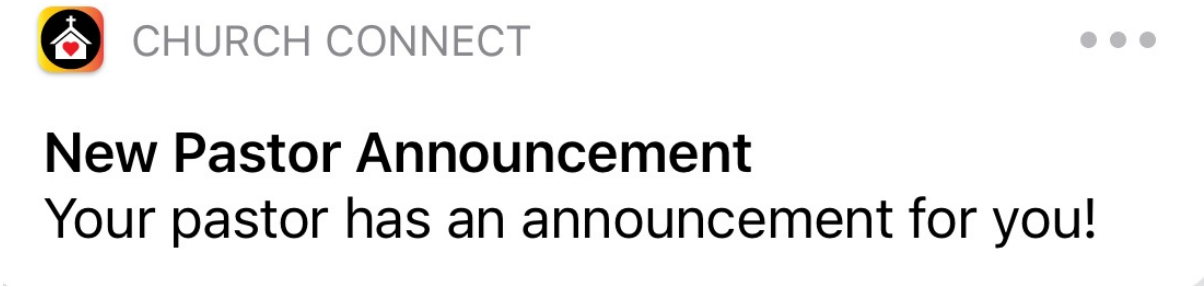
Push Notifications: Reminder

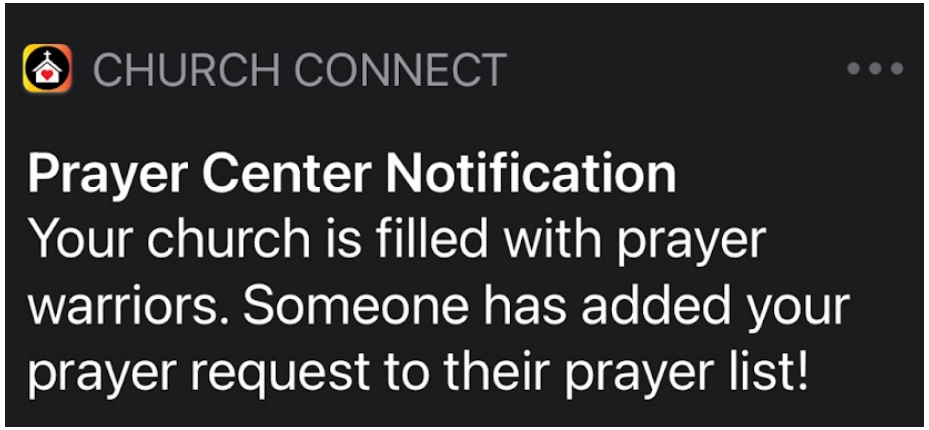


Push Notifications: Reminder

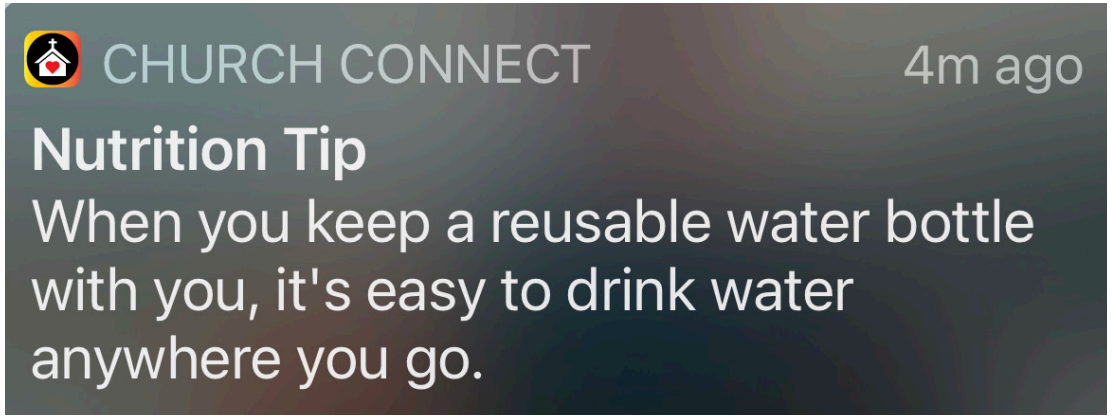


Push Notifications: Social





Push Notifications: Health



Evaluation Study

- A single-group, quasi-experimental field study
- 4 weeks
- 25 participants from two churches
  - 19 Black, 2 Black & Hispanic, 2 Black & Native American, 1 Hispanic/Latinx, 1 White
  - 18 women, 5 men, 1 genderqueer, 1 non-binary/third gender
  - aged 19 to 75 (Mean=55, Median=62, SD=18)

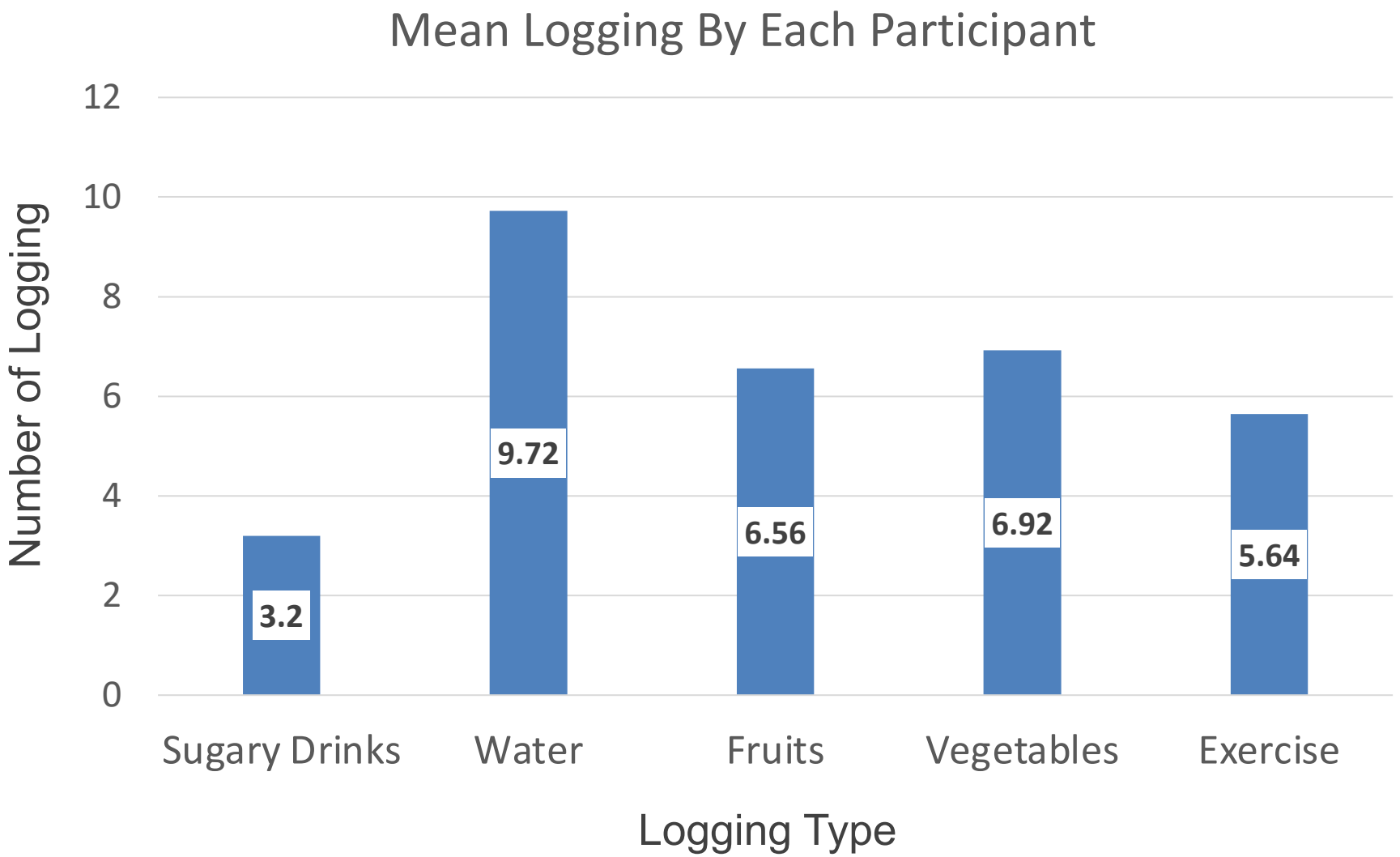
Measures & Data Collection

- Self-reported measures and system-logged usage metrics
  - Brief Multidimensional Measure of Religiousness/Spirituality [Masters 2013]
  - Satisfaction (4-item, 7-point composite measure)
  - Post-study Interviews

Results: Usage & Satisfaction

Feature	Mean	Mean Satisfaction Score
Application	22.4	5.2
ECA (Clara)	8.2	5.1
Prayer Center	6.8	5.4
Pastor Announcements	1.4	5.1
Scriptural Meditation	3.4	6.0
Bible Story of the Day	2.0	6.0

Results: Logging



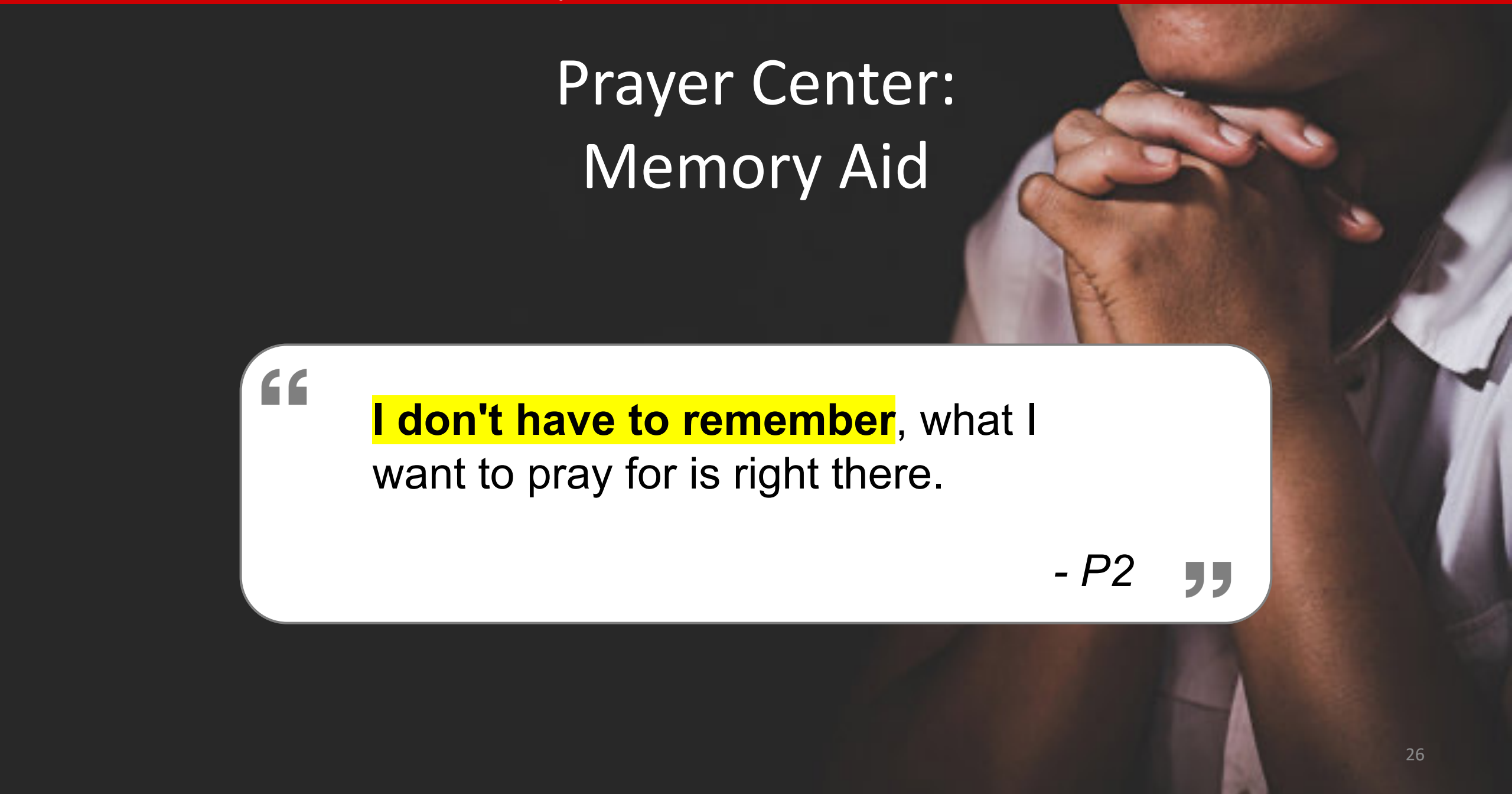
Perceptions of Clara: Member of the Church

> “**Clara felt like home**. Even if we are laughing and rolling on the floor. **We still end in prayer**.
>
> *- P11* ”

Perceptions of Clara: Calming, Relaxing, & Reflective

> **Clara gave me room to think**.
>
> *- P7*

Prayer Center: Memory Aid

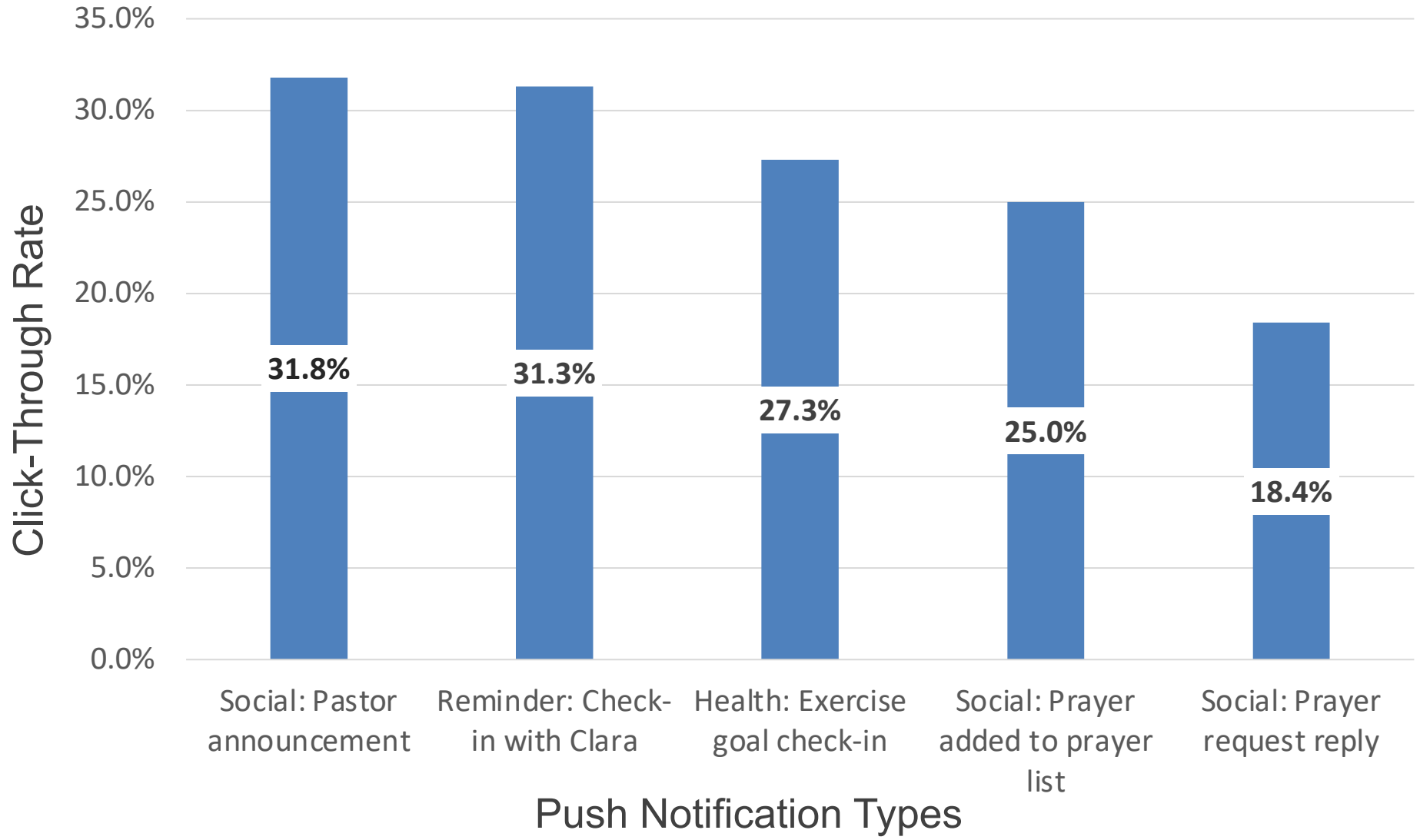


> **I don't have to remember**, what I want to pray for is right there.
>
> *- P2*

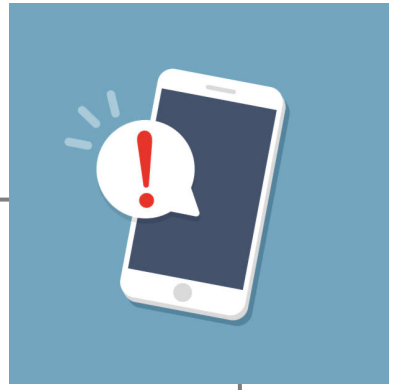
Prayer Center:
Connecting with Church Members

> “**It's nice to be connected to the church**, especially right now. **I just wish more members had been there**.
>
> – *P3* ”

Results: Push Notifications



Push Notifications: Reminders



> I did get some notifications from time-to-time **since there were times I would forget it, but I would get a notification from Clara**, and I'm like, you know what, I'm sorry shorty, forgot, hold on!
>
> – *P7*

Results: Engagement Over Time

$$\texttt{Daily \# Of Logins} = 0.696 - 0.039 * \text{SD} + 0.164 * \text{N} + 0.117 * \text{R}$$

where SD is study day, N is daily number of notifications received, and R is private religious practices score

Parameter	Value	Std. Error	p-value
Intercept	0.696	0.276	$p < 0.05^*$
Study Day	-0.039	0.007	$p < 0.001^*$
Daily Number of Notifications Received	0.164	0.039	$p < 0.001^*$
Private Religious Practices Score	0.117	0.052	$p < 0.05^*$

Conclusions

- Religiously-tailored engagement mechanisms that fulfill techno-spiritual functions can help religious users engage with an mHealth application
  - High user satisfaction
  - Push notifications were effective at driving the use of the app
  - Several participants finding Clara to be relatable and having personal resonance with the religiosity, spirituality, and role she exhibits

Thank you!

Questions?

Contact:
Hye Sun Yun
yun.hy@northeastern.edu