Handwashing and the Science of Habit
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2 classic failures of behavior change...

1. Interventions change beliefs, but not behaviors (Webb & Sheeran, 2006).

2. Interventions change beliefs and behaviors, but behavior change is temporary and relapse occurs (Marteau et al., 2012).

3. Knowledge/beliefs $\neq$ behavior change (Rabbi & Dey, 2013).

4. Short-term change $\neq$ long-term maintenance (Vindigni et al. 2011).
WHY?
HANDWASHING INTERVENTIONS REQUIRES A “DUAL SYSTEMS APPROACH”

**DRIVER**
- Attitudes
- Intentions/Goals
- Social Norms
- Rational benefits
- Emotions

**BRAIN SYSTEM**
- System 2 – Mainly neocortex
- System 1 – Basal ganglia in interaction with neocortex

**CHARACTERISTICS**

**“MENTAL ECONOMIST”**
- Fast to learn/slow to respond, effortful, conscious, outcome-driven…

**“MENTAL SATISIFIER”**
- Slow to learn/fast to respond, effortless, automatic, cue-driven…

(Handwashing) interventions typically target here…

...and don't optimally tailor here
THE POTENTIAL GAIN?
HANDWASHING WILL BE HEAVILY INFLUENCED BY THE HABIT SYSTEM

Frequent context-stable behaviors involve...

Behavioral level
• Around 45% of daily life is “habitual” (Wood et al., 2002)

Cognitive level
• From declarative to procedural memory (Poldrack et al., 2001)
• Action chunking into ballistic sequences (Graybiel, 2008)
• Formation of cue-response links in memory (Neal et al., 2011)

Neural level
• Functional changes in the brain (e.g. Sakai et al., 2003)
• ...and even structural changes (Draganski et al., 2006; Maguire et al., 2000)
THIS CHANGES THE DRIVERS OF ACTION & TARGETS FOR INTERVENTION

A. Behavior Prediction Meta-analyses:

Things we do rarely or in different environments…

Intentions / Attitudes ➔ Habit Strength ➔ FUTURE BEHAVIOR ➔ Intention / Attitudes

.62 ➔ .12

Things we do often and in the same environment…

Intentions / Attitudes ➔ Habit Strength ➔ FUTURE BEHAVIOR ➔ Intention / Attitudes

.27 ➔ .45

B. Do Intention-Based Interventions Change Behavior?

✓ Large effect,
Cohen’s d = .77

✗ Small effect,
Cohen’s d = .22
## TARGETING HABIT? 7 HABIT-FORGING PRINCIPLES
INTEGRATING FINDINGS FROM COG-NEURO, ANIMAL LEARNING, HEALTH PSYCH, SOCIAL PSYCH ETC.

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1. Supporting Environment

Supporting environments/products for new behavior must be immediately & consistently available

Basic science

• Habits are environmentally triggered. Critical environmental cues must be immediately available (without seeking/effort), or behavior won’t occur unless motivation is extremely high (Wood et al., 2005).

Handwashing domain tactics

• Designated handwashing place with soap and water
  • In/near the latrine
  • In/near area food where is prepared/cooked

• Convenience, lack of materials where needed → commonly cited barrier

• When soap/water immediately available, compliance much higher (Luby, 2009)
2. Leverage Context

Leverage context from old behavior via disruption or piggybacking

Basic science

• Context changes (e.g., moving) create window of opportunity to instill new behaviors (Verplanken, 2008). Interventions can be timed to co-occur.

• Alternatively, new behaviors can be paired with/piggyback on existing habits (Labreque, Wood, Neal, & Harrington, under review).

Handwashing domain tactics

• Timing interventions to occur when other major changes to physical/action environment have occurred.
  • Pregnancy/Motherhood as a potential teachable moment for handwashing (Greenland et al., 2013)

• Adding handwashing to list of good manners for school children (SuperAmma project).

• Adding mirror to wash station to “piggyback” on mirror-checking behavior.
3. **Eliminate Friction**

**Basic science**

- Choice is the enemy of habit formation (Wood & Neal, 2007)
- Even small perceived friction from new behavior can trigger relapse to old (Murray & Häubl, 2007)

**Handwashing domain tactics**

- Complexity of handwashing instructions (3-steps vs. 6-steps vs. 9 steps)
- Combining soap and water automatically
- Handwashing station is convenient to access

Source: www.who.int
4. Ownable Cues

Create cuing ecosystem, ideally rewarded

Basic science

- Habit formation involves outsourcing control to context cues, which can be:
  - Visual cues in action environment (Neal et al., 2011)
  - Other actions (Graybiel, 2014)
  - Other people (Wood et al., 2005)

- If rewards are used, they should be immediate and tied to performance (Yin & Knowlton, 2006)

Handwashing domain tactics

- Health improved among (intervention) children receiving cues (wall hangers, danglers) to wash hands and rewarded by mothers (stickers, coins) compared to the control group children (Nicholson et al. 2013).

  E.g.,
  - Filthy or foul smelling hands
  - Pictorial cue cards placed in line of sight
  - Colored footsteps leading from latrine to wash station
5. Accelerate Links

Enhance cue-response learning

Basic science

• Cue-response learning can be “sped up” by implementation intentions - “If x, then y” associations in memory (Gollwitzer & Sheeran, 2006)

Handwashing domain tactics

• Glo Germ™

• “Poo-tag” (SuperAmma)
6. Intervention through doing

**Foster procedural memory through doing**

**Basic science**

- Habit learning relies on procedural memory systems in the basal ganglia.
- Procedural memory is formed through trial and error engagement in the behavior; not through learning declarative/abstract “rules” (Poldrack et al., 2001).

**Handwashing domain tactics**

- Students wash hands with soap and brush teeth at school
  - Daily
  - As a group
Conscious storytelling

Basic science

- People infer their motives partly from observing their own behavior (Bem, 1967) including habits (Neal et al., 2011)
- Attributing meaning/motive/purpose to handwashing habits may:
  - Further prevent relapse
  - Promote advocacy – “spreading the habit”

Handwashing domain tactics

- “Good mums” club (Nicholson et al., 2013)
- SuperAmma or “super mom” (Biran et al., 2014)
- Women’s groups
CONCLUSION: AUGMENTING EXISTING APPROACHES WITH A “HABIT STRATEGY”

DRIVER

- Attitudes
- Intentions/Goals
- Social Norms
- Rational benefits
- Emotions

BRAIN SYSTEM

- System 1 – Basal ganglia in interaction with neocortex
- System 2 – Mainly neocortex

AUGMENTED APPROACH

Intervention might have a strong focus here...

But needs to have a habit strategy addressing here

PRINCIPLES

1. Supporting Environment
2. Leverage Context
3. Eliminate Friction
4. Ownable Cues
5. Accelerate Links
6. Intervention through doing
7. Conscious Storytelling
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