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).

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

...occur for handwashing too...


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 SATISFICER”**
- Slow to learn/fast to respond, effortless, automatic, cue-driven...

(Handwashing) interventions typically target here…

…and don’t optimally tailor here
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)
A. Behavior Prediction Meta-analyses:

Things we do rarely or in different environments...

Intentions / Attitudes → Habit Strength → FUTURE BEHAVIOR

Intentions / Attitudes → FUTURE BEHAVIOR

Things we do often and in the same environment...

Intentions / Attitudes → Habit Strength → FUTURE BEHAVIOR

B. Do Intention-Based Interventions Change Behavior?

✓ Large effect, Cohen’s d = .77

✗ Small effect, Cohen’s d = .22
### PRINCIPLES

1. Supporting Environment

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

2. Leverage Context

   **DEFINITION**
   
   Leverage context by disruption or piggybacking on old behavior

3. Eliminate Friction

   **DEFINITION**
   
   Eliminate choice, steps, and perceived effort

4. Ownable Cues

   **DEFINITION**
   
   Create cuing ecosystem, ideally rewarded

5. Accelerate Links

   **DEFINITION**
   
   Enhance cue-response learning

6. Intervention through doing

   **DEFINITION**
   
   Foster procedural memory through doing

7. Conscious Storytelling

   **DEFINITION**
   
   Encourage meaning-making around habit
1. Supporting Environment

- 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)

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

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

Eliminate choice, steps, and perceived effort

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
Create cuing ecosystem, ideally rewarded

4. Ownable Cues

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)
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
- Heuristics
- Habits

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

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3. Eliminate Friction
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6. Intervention through doing
7. Conscious Storytelling
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