Just-in-Time
Adaptive Interventions

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Why Make Interventions Adaptive?

Up until now, the methods and systems we have discussed have typically been one-size-fits-all

- Interventions are always triggered in the same way
    - Models are globally trained
    - Algorithms have limited personalization
- Everyone gets the same intervention

These methods and systems are easier to design and deploy, but they may work on certain people better than others

What Is A Just-in-Time Adaptive Intervention (JITAI)?

A JITAI is an intervention design aiming to provide the right type / amount of support, at the right time, by adapting to an individual's changing internal and contextual state
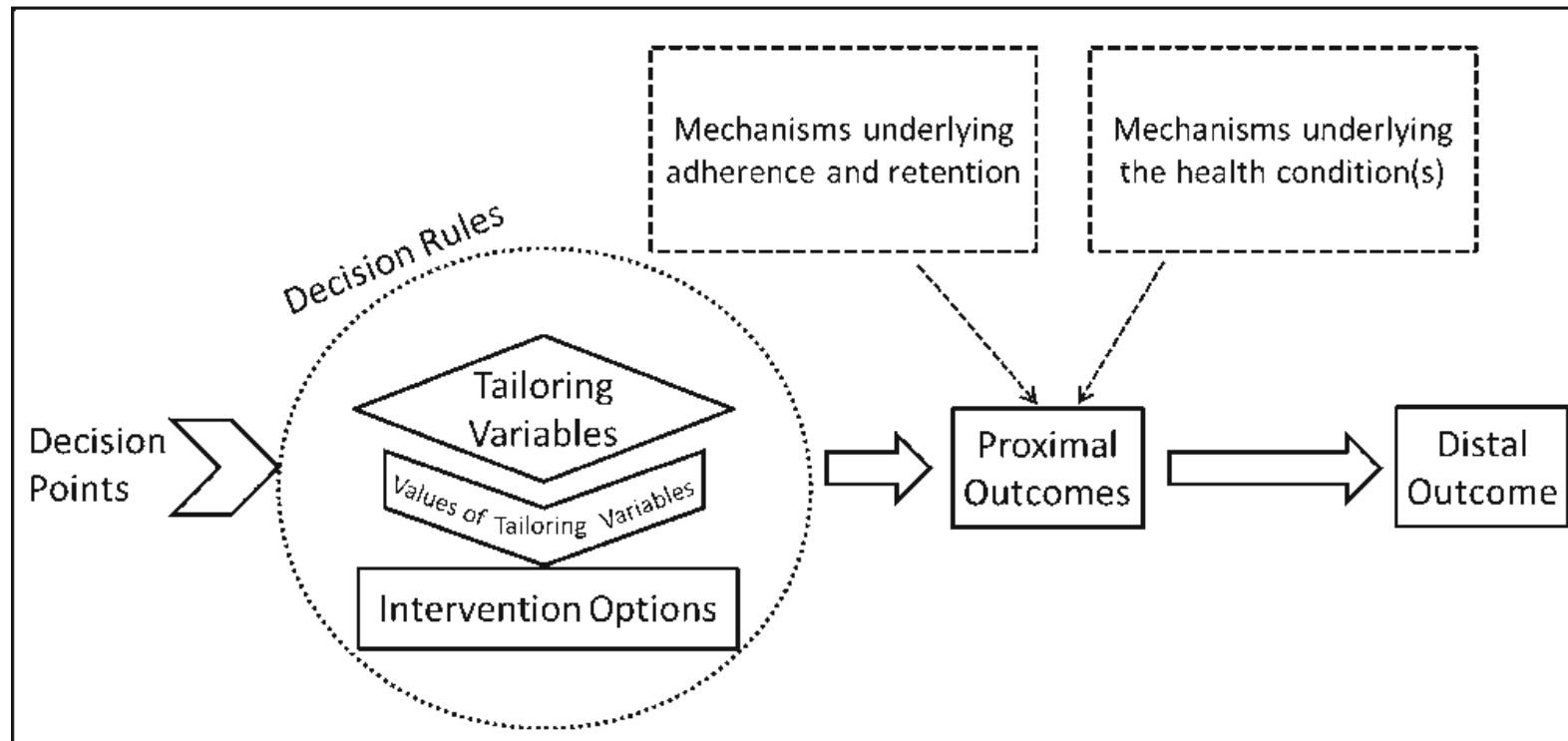
- Mobile phone sensors can be used to identify the right moments for delivering interventions
- Algorithms can be used to identify which interventions should be given

Examples of Tailoring Variables

Examples of Outcomes and Interventions

Table 2 Examples of decision rules in JITAIs

Example	Decision rule	Decision point	Tailoring variables	Intervention options

Substance abuse intervention based on composite risk assessment	At random EMA prompt
	  If composite substance abuse risk $\geq R_0$
	    Then, IO = [recommend intervention]
	  Else if composite substance abuse risk $< R_0$
	    Then, IO = [encouraging message]
		Random prompt [15, 51]	Composite risk [69]	Recommend intervention *OR* encouraging message [15, 70]

An individual does not access intervention within M minutes	At M minutes after random EMA prompt
	  If composite risk $\geq R_0$ and intervention use in past M minutes = NO
	    Then, IO = [message encouraging intervention use]
	  Else if risk $< R_0$ or intervention use in past M minutes = YES
	    Then, IO = [provide nothing]
		M minutes after random prompt [71]	Composite risk [69]; Intervention use in past M minutes [72]	Message encouraging intervention use *OR* provide nothing [72]

Physical activity intervention using passive assessments of step count	At 4 pm
	  If current accumulated step count $< P_0$
	    Then, IO = [recommend exercise]
	  Else if current accumulated step count $\geq P_0$
	    Then, IO = [encouraging message]
		Specific time of day [73]	Current accumulated step count [74]	Recommend exercise [75] *OR* encouraging message [74]

Examples of Outcomes and Interventions

Responding to passively assessed risky location, using active assessments of urge	Every 3 min, If location = close to a liquor store, Then, If self-report urge $\geq U_0$ Then, IO = [send alert to sponsor] Else, if self-report urge $< U_0$ Then, IO = [recommend an intervention] Else, if location = not close to a liquor store Then, IO = [provide nothing]	Pre-specified time interval [5]	Passively assessed location [5]; self-reported urge [51]	Alert sponsor [5] *OR* recommend an intervention [15] *OR* provide nothing [5]
An individual ignores request for assessment	At *M* minutes following a random prompt If EMA completion = NO Then, IO = [TXT encourage EMA completion] Else if EMA completion = YES Then, IO = [provide nothing]	*M* minutes following random prompt [71]	EMA completion [76]	Text encouraging EMA completion *OR* provide nothing [76]

Resources

Just-in-Time Adaptive Interventions (JITAIs) in Mobile Health: Key Components and Design Principles for Ongoing Health Behavior Support
([Nahum-Shani et al. '16](#))