Iterative optimization and decision-making using the multiphase optimization strategy (MOST) to optimize an online behavioral intervention

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Abstract

Background: MOST is an engineering-inspired framework for the development, optimization, and evaluation of multicomponent behavioral interventions. Optimization trials are randomized experiments designed to assess the effect of individual components, alone or in combination, on the desired outcome. When conducted in succession, optimization trials offer opportunities for data-driven decision making to refine content.

Objective: To demonstrate an iterative approach to optimization and decision-making using an applied example of an online intervention to address the intersection of alcohol and sexual risk behaviors among first year college students.

itMatters is an online STI preventive intervention targeting the intersection of alcohol and sexual behaviors.

In the Preparation Phase of MOST we identified 5 candidate components:
1. Descriptive Norms
2. Injunctive Norms
3. Alcohol and Sex-related Expectancies
4. Perceived Benefits of protective behavioral strategies
5. Self-efficacy to use protective behavioral strategies

We included a constant knowledge component.

Methods

Two sequential optimization trials using a 2^5 factorial experimental design (yielding 32 experimental conditions) were conducted to identify candidate intervention components (i.e., descriptive norms, injunctive norms, expectancies, perceived benefits of protective behavioral strategies, and self-efficacy to use strategies) most effective at changing sexual behaviors within the context of alcohol use. Students completed assessments at baseline, immediate post-intervention, and a 30-day follow up.

Decisions informing content revision were driven by quantitative findings (predetermined criterion for success $d \geq .15$) and feedback from participants. Findings of both optimization trials were used to identify the optimized intervention.

Optimization Trial 1

N = 2,135
- Due to missing data, multiple imputation was employed

A priori effect size was $d \geq .15$
- Note: Betas are presented, bold indicates $p < .05$

Only descriptive norms and injunctive norms met this criterion

	Descriptive Norms	Injunctive Norms	Expectancies	Perceived Benefits	Self Efficacy
Dnorm	**-.051**	-.016	.002	-.0001	-.002
Inorm	-.028	**-.111**	-.005	.008	.008
Expectancies	-.017	-.00005	-.003	.008	-.006
Perceived Benefits	0.004	-.001	.01	-.009	-.003
Self-Efficacy	-.011	.006	.003	.006	-.003

Revisions

Conducted focus groups with students and administrators to understand participation rates and get feedback on content/presentation. All components ended up being revised as the feedback indicated we needed to change the voiceovers.

Optimization Trial 2

N = 2,946
- Due to missing data, multiple imputation was employed

A priori effect size was $d \geq .15$
- Note: Betas are presented, bold indicates $p < .05$

Only descriptive norms and injunctive norms met this criterion

	Descriptive Norms	Injunctive Norms	Expectancies	Perceived Benefits	Self Efficacy
Dnorm	**-.099**	-.034	.001	.007	.005
Inorm	-.051	**-.193**	-.011	.009	.009
Expectancies	.016	.008	.005	-.004	.00002
Perceived Benefits	.008	.005	.007	.01	.01
Self-Efficacy	.016	.005	-.005	.001	.014

Conclusions

Both optimization trials indicated only two components produced the desired outcome (p < .05), even after revisions. The optimized intervention evaluated in the RCT is therefore not only effective, but also efficient, economical, and scalable. Without optimization interventions may include inactive components. When possible, an iterative approach to optimization and data-driven decision-making in the MOST framework maximizes the potential public health impact of an optimized intervention.