The Relationship Between Self-Reported Habits, Intrinsic Motivation, and Objective Behavior

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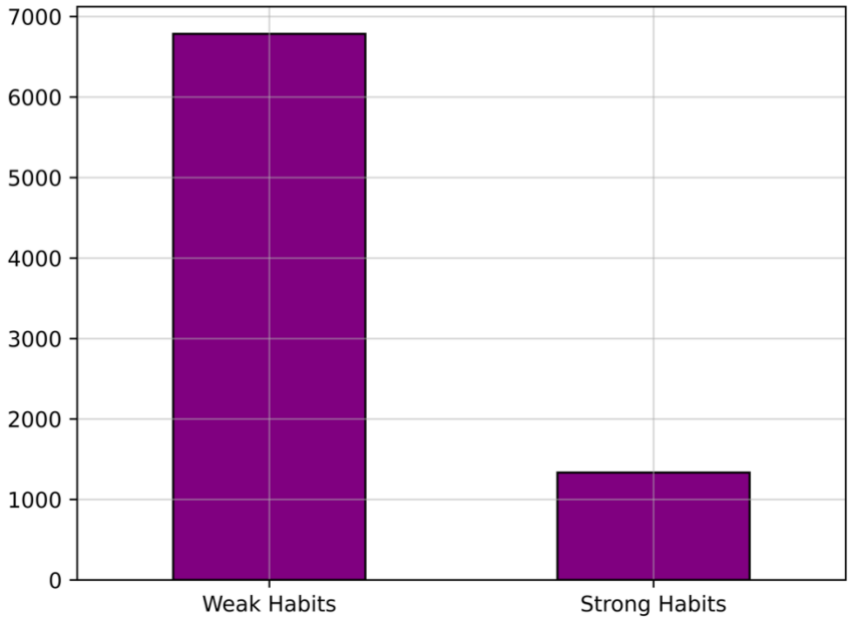
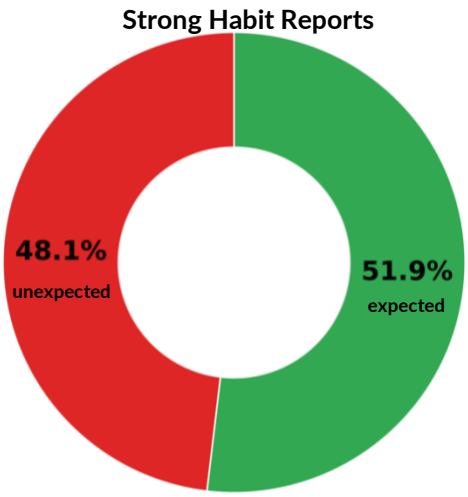
Background

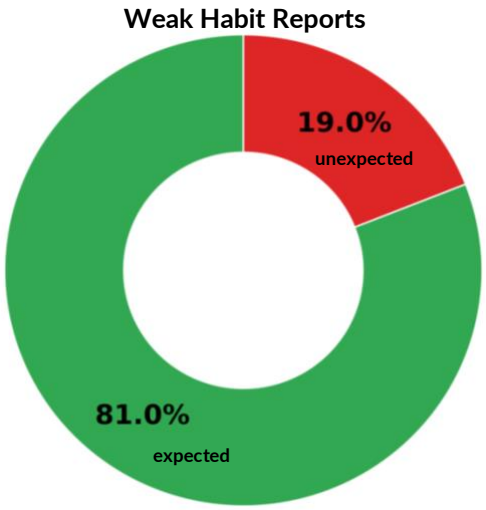
Healthier habits can improve many physical and mental health outcomes, but habits are often difficult for people to form on their own. Understanding the habit formation process can inform new behavioral interventions, but existing measures of habit strength are limited to self-reports, which suffer from known biases. The purpose of this study was to better understand what self-reported habits mean by examining the relationships between measures of self-reported habit strength, intrinsic motivation, and objective behaviors.

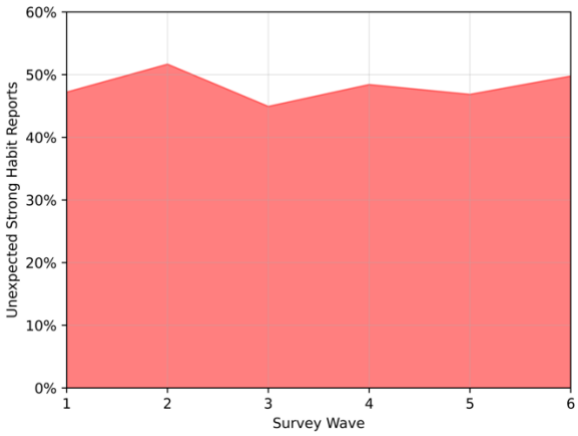
Sample characteristics

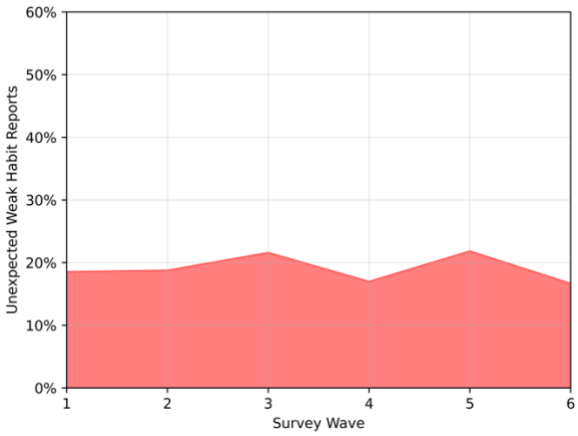
	Percent	Count
18 - 44 y.o.	42.46	(3184)
45 - 64 y.o.	42.02	(3151)
65+ y.o.	15.52	(1164)
Employed	66.19	(5374)
Household income over $100,000	46.43	(3770)
Private insurance	69.05	(5606)
Observations	8119	


7000
6000
5000
4000
3000
2000
1000
0
Weak Habits
Strong Habits


Strong Habit Reports
48.1%
unexpected
51.9%
expected


Weak Habit Reports
19.0%
unexpected
81.0%
expected


60%
50%
40%
30%
20%
10%
0%
Unexpected Strong Habit Reports
1
2
3
4
5
6
Survey Wave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Unexpected Weak Habit Reports
1
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3
4
5
6
Survey Wave

Methods

Data from a 6-wave panel survey about app-based meditation was merged with objective meditation app usage data. The survey included the Self-Reported Behavioral Automaticity Index (SRBAI), the Intrinsic Motivation Inventory (IMI), and measures of participants' socioeconomic status. We used the app usage data to determine whether participants were meditating with both high frequency and low variability (HFLV) at the time of each survey wave, and then categorized survey responses as being either 1.) unexpected habit strength reports (i.e., SRBAI ≥ 16 but no HFLV, or SRBAHI < 16 with HFLV), or 2.) expected habit strength reports (i.e., SRBAI ≥ 16 with HFLV, or SRBAI < 16 and no HFLV). We then estimated regression models to determine predictors of unexpected habit responses using socioeconomic status and IMI. We estimated these models on the entire sample, and among two subsamples: 1.) unexpected habit responses among participants not showing HFLV, and 2.) unexpected habit responses among participants who were showing HFLV.

Table 2. *Association between meditating with high-frequency and low-variability (HFLV) & strong habit reports (SRBAI)*

	(1) HFLV b/se	(2) HFLV b/se	(3) HFLV b/se
HFLV			
SRBAI>=16	4.542***	5.111***	1.756***
	(0.646)	(0.786)	(0.256)
Account age	1.000*	1.000**	0.999***
	(0.000)	(0.000)	(0.000)
Less than $100,000		1	
		(.)	
More than $100,000		0.848	
		(0.143)	
Other		1	
		(.)	

Private or group insurance		1.283	
		(0.284)	
18-44		1	
		(.)	
45-64		2.462***	
		(0.444)	
65+		5.540***	
		(1.658)	
Employed		1	
		(.)	
Not employed		0.838	
		(0.166)	
/			
lnsig2u	8.491***	8.251***	
	(0.724)	(0.741)	
Observations	8119	7144	2483

Exponentiated coefficients

HFLV and SRBAI are related.

Results

The sample contained 2,429 participants who were mostly female (78%), employed (66%), and had an annual income above $100,000 (46%). 32% of survey responses were completed while participants were displaying HFLV, and the mean SRBAI was 11.15 (SD = 4.16; range 4 - 20). Across the entire sample, IMI was significantly associated with unexpected habit reports (OR = 1.21, SE = 0.09, p = 0.02). IMI also played a significant role when predicting unexpected habit strength among participants who were not displaying HFLV (OR = 1.42, SE = 0.19, p = 0.007). However, IMI was not associated with unexpected reports for the participants who were showing HFLV (OR = 0.82, SE = 0.17, p = 0.34).

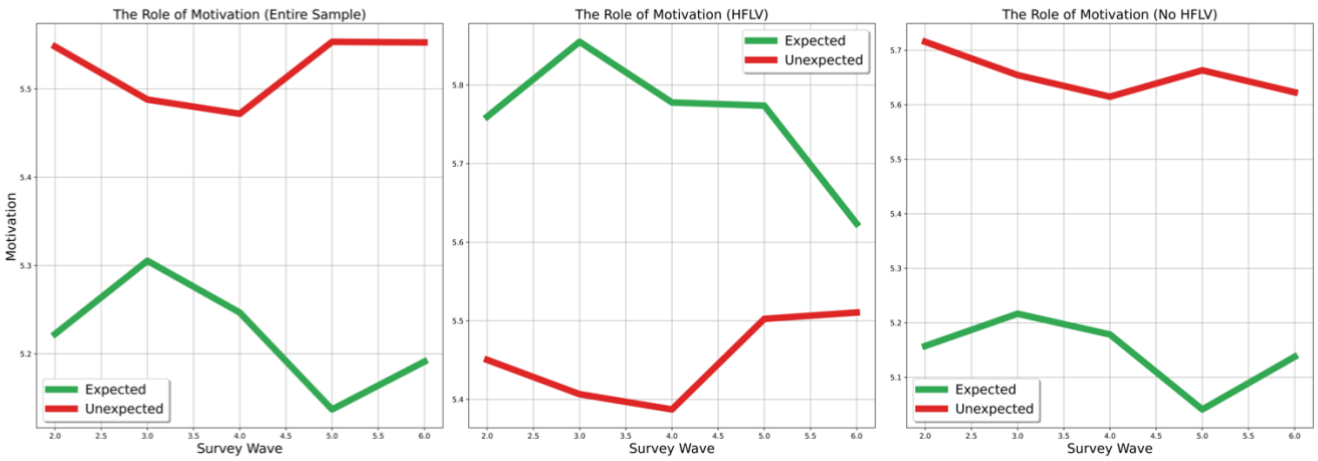

Table 3. *Association between unexpected habit reports and intrinsic motivation to meditate*

	(1) Unexpected Habit Strength Reports b/se	(2) Unexpected Habit Strength Reports b/se	(3) Unexpected Habit Strength Reports b/se
Unexpected Habit Strength Reports			
Intrinsic Motivation to Meditate	1.212*	1.423**	0.822
	(0.098)	(0.187)	(0.167)
Account Age	0.999	0.999	0.999
	(0.000)	(0.001)	(0.001)
Observations	2281	675	502

Exponentiated coefficients

IMI explains Unexpected SRBAI reports

Conclusion

The relationship between motivation and unexpected reports of strong habits suggests that self-reported habit measures may capture both those who have formed a habit as well as those who were motivated to form a habit. However, motivation was not predictive of unexpected reports of weak habits, which suggests that self-reported habit measures can successfully identify users

who have not reached a state of automaticity, despite frequent and consistent meditation. These findings demonstrate the challenges in measuring habit strength through surveys and show how alternative measures, such as IMI, may be important intervention targets for promoting habits.

Supplementary Material

Unexpected SRBAI reports does not explain meditation outside of Calm.

Table 4. *Association between reported meditation without Calm and unexpected habit reports*

	(1) Meditating without Calm b/se	(2) Meditating without Calm b/se	(3) Meditating without Calm b/se
Meditating without Calm			
Unexpected habit reports	0.786*	0.664*	1.425
	(0.084)	(0.130)	(0.344)
Account Age	1.002***	1.002***	1.000
	(0.000)	(0.000)	(0.001)
Observations	3558	2354	692

Exponentiated coefficients