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Drink Up: A Closer Look at Cognitive Factors and Their Relationship with Habit and Behavior Change in the Context of Drinking Water for Improved Health in Emerging Adults

Olivia M. Godfrey
Department of Psychology
University of North Carolina at Asheville
One University Heights
Asheville, North Carolina 28804 USA

Faculty Advisor: Dr. Melissa Smith

Abstract

This study was an examination of the connection between executive function (EF) and understood factors related to behavior change, i.e., self-efficacy and motivation. Participants were expected to change drinking habits by drinking more water. It was hypothesized that water intake would increase over 90 days, and that there would be a positive relationship between EF scores and successful behavior change. It was hypothesized that it would be easier to exhibit the desired behavior and create "healthy habits" if one tracked progress daily, set goals, reported higher motivation, and was presented with comprehensive information. At time 1, all participants (N=33, aged 18-25) received a water bottle and completed a battery of habit (motivation for change, readiness to change-RTC) questionnaires and EF tasks (Stroop, go-nogo task, running span, trail-making, verbal fluency). The treatment group (n=16) set goals, tracked, and reported daily water consumption with a free smartphone app, and were presented with information on healthy water drinking. The control group (n=10) did not track water intake or learn about benefits of drinking water. All participants returned in 90 days for repeated-measures testing. Analysis of variance and post hoc testing revealed a significant difference in water intake between month 2 (more water intake) and month 3 (less) for the treatment group. Water intake did not consistently increase over time. At time 2 (n=15) inhibition scores were marginally negatively correlated with total water intake; this negates the hypothesis that better inhibitory skills may lead to more successful control of personal behaviors. At time 1, intention to change was marginally negatively correlated with total water intake, and was also negatively correlated with total water intake at time 2. This negates the hypothesis that greater motivation to change is consistently correlated with long-term successful behavior changes.

Keywords: Executive Function, Habit Change, Motivation

1. Introduction

This study sought to better understand the psychology of habit changes and assessed the factors of self-efficacy, motivation to change, and executive function. Habits are typically measured through self-reflection of established, repeated behaviors that an individual perceives to be automatic in nature[1]. This self-report measurement is a facet of "Habit Theory," which is based on specific goal setting and achievement standards in implementing a behavior change[2]. The present study utilized the concepts of goal setting and reinforcement common in Habit Theory to implement a change in the habitual behavior of beverage consumption. Further discussion of habit theory and its use of "automatization" as a measure of habit suggests an interaction between cues leading to automatic behavioral responses and actions thereafter that involve planning and higher-order processing[1]. For this reason, the present study sought to understand underlying cognition involved in habit changes, specifically in terms of inhibitory responses.

Inhibition has been correlated with previous research in successful behavior changes related to food consumption. The go-nogo task, which involves inhibiting responses to certain stimuli (in the present study, participants completed a computer task in which participants responded as fast as possible to a green square, and did nothing for a red square), may be related to more complex inhibitions such as inhibiting intake of foods an individual would like to eat[3]. Female individuals who perform worse on go-nogo tasks are more likely to binge eat, and males who perform worse on go-nogo tasks are more likely to consume sugar-sweetened beverages[3] (SSBs). The gender differences in this previous research may be due to sample-specific factors such as cultural differences, as many female participants in the Ames et al. study were Spanish-speaking adolescents, and the cues were food- (and thus culturally) specific. Tasks which pair palatable foods with no-go signals have proven to decrease consumption of palatable foods in individuals who are chronic dieters, but not in non-dieters[4]. This suggests that there is a correlation between inhibitory task performance and planned behavior changes, and that this may be mediated by past experiences or personal traits (identifying oneself as a "chronic dieter"). Findings in executive function in early adulthood have proven that age is an active predictor of executive function abilities[5]. There is empirical evidence to support age-predicted differences within a young adult sample for verbal fluency, card-sorting, and a tower test measuring executive function[5]. Most research on the cognition of habit change focuses on reducing intake of alcohol[6] and sugary foods[7], but not on changing a habit that is less apparently harmful or improving an already healthy routine. The present study used the method of increasing water intake (and thus decreasing intake of sugar-sweetened beverages) as a healthy habit to develop and measure.

Drinking water is an important aspect of one's health given that it is required to sustain life. Sweetened-beverages contain "empty" calories which some may not perceive as being detrimental to their diet or health. In a survey of over four thousand adults in 2014, 37.8% of the respondents reported drinking more than two SSBs per day[8]. The reported frequency of SSB intake for those adults was correlated with participant knowledge of how SSB intake is related to heart disease[8]. In a study examining children's intake of SSBs, factors that influence knowledge and perception of sugar-sweetened beverages included taste and preference, parental control and peer influence, accessibility, advertising and novelty, and judgements about whether a beverage could be "healthy"[9]. Behavior in the case of drinking water may be explained by habits developed by the individual.

Factors for considering behavior change include behavior monitoring, motivation, capacity for control, and self-efficacy. Action control (planning and monitoring) is a significant predictor of sugar consumption in those with weak self-efficacy but not for those who reported higher levels of self-efficacy[7]. Past behavior levels measured by self-report have also been found to influence sustained changes in behavior over time[10]. The theory of planned behavior examines behavioral intentions, perceived behavioral control, subjective norms, and attitudes in understanding the reason why an individual behaves the way they do, and research also suggests that these factors directly influence one's intake of sugar-sweetened beverages[8]. Measures for motivation are wide-ranging in purpose, and many focus on behavior in the context of addiction. Behavior change programs generally focus on goal-setting that is specific, achievable, and based on positive reinforcement. Interventions focused on goal setting and "check ins" (primarily electronically) have been proven effective in the context of adolescent behavior change targeted at reducing sweetened-beverage intake[11]. Providing information to encourage behavior change can also facilitate development of healthy habits. Concrete representations of sugar content in SSBs has been proven to be effective in motivating participants to decrease their intentions of drinking SSBs and reduce the likelihood that they will choose an SSB in a drink-choice scenario[12].

The present study utilized motivational measures, stages of change reporting, and behavioral intervention to assess habit change over a three-month period in the context of a battery of executive function measures. It was hypothesized that water intake would increase over the period of 90 days, there would be a correlation between executive function performance and relative success in achieving the desired goal, and that water intake would increase over time based on an individual's motivation to change this behavior.

2. Method

Participants (N=33) were recruited from a college campus in the Southeastern U.S., and exclusion criteria required participants to be between ages 18 and 25. Participant enrollment was achieved via flyers that read "would you like to drink more water?" and person-to-person recruitment. Most study participants were female (n=26). There were five male participants and one individual who identified as "other." Participants were randomly assigned to treatment and control groups. The mean age for the treatment group (n=19) was 21.2, and the mean age for the control group (n=14) was 19.6. Seven participants did not complete testing at time 2, with a final sample for analysis of complete data at n=26 (treatment n=16, control n=10).

2.1. Measures

2.1.1. demographic survey

After providing informed consent, all participants completed a measure of demographic information including age, gender, and any previous relevant mental health diagnoses (mood or eating disorders).

2.1.2. beck depression inventory (bdi-II)

Participants completed this questionnaire to assess mood over the previous two weeks. These demographic assessments were used to exclude participants with suicidal thoughts or a history/current diagnosis of an eating disorder, given that participation in a behavior change study may put them at risk for greater harm. Nine participants reported depressive symptoms in the BDI, but these reports aligned with reported mental health diagnoses.

2.1.3. executive function tasks

Running Span Task: This task assessed working memory, an important function of cognition, by requiring participants to repeat back the last four letters in a list of letters random in length, which was read aloud. Scores were calculated as the number of correct answers from the 16 items.

Verbal Fluency Task: This task required participants to say as many words as possible that began with a certain letter (F,A, S) within a 60-second time period. Scores were calculated as the average total number of words for each letter generated by the participant.

Trail-making Test: This task assessed participant ability to shift and monitor their attention by connecting randomly-placed numbers in sequential order with a single line (participants were instructed to refrain from picking their pencil up from the page while completing the task). Scores for this task were calculated by subtracting the time it took to complete this task with that of a similar task in which participants were asked to connect numbers and letters in alternating sequential order (e.g. 1, a, 2, b).

Online Go-Nogo Task: This task assessed an individual's ability to inhibit their responses to stimuli on a screen (40 trials, 1000ms each). If participants were presented with a red square, they were to refrain from pressing a spacebar until the timer ran out for that trial. If presented with a green square, participants were instructed to press the space bar as soon as possible. Scores were calculated based on average reaction time per correct trial response in milliseconds.

Online Stroop Task: This task examined inhibitory ability by requiring participants to inhibit their responses to colored color-words in order to accurately report the color of a square presented on the screen for 1 second (40 trials). Participants responded by pressing keys corresponding to the color names (R,Y,G,B) and scores were recorded as the reaction time (out of 1000ms per trial) per correct response.

2.1.4. behavior change measures

Motivation for Change Questionnaire (adapted from de Jonge, Barelds, Schippers, & Schaap, 2009): This survey (likert scale from 1-5, with 1 representing most disagreement with an item and 5 meaning most agreement with an item, assessed the level of motivation to change and current stage of habit change. Subscales for this 20-item measure were intention to change, self-efficacy, negative outcome expectancy, and stage of change (precontemplation, contemplation, and action). The scores for each subscale were calculated as a total score for the items in each subscale. The intention to change subscale (12 items) was used for analysis of the data for level of motivation.

Readiness to Change Questionnaire (RTC) (adapted from Heather & Stephen, 1993): This survey (likert-scale, with 1 representing most disagreement with a statement and 5 representing most agreement with a statement) assessed the stage of change fit best for participants during the study. Scores were calculated by tabulation of a total for three subscales (precontemplation, contemplation, and action), with the highest score among the three categories representing that participant's stage in behavior change.

2.1.5. taste and preference (t&p)

T&P Survey (adapted from Naughton et al., 2015): This survey (15 items) assessed individual differences in taste and preference for SSBs and unsweetened beverages. Participants rated each beverage (10 sweet items, 5 unsweet items) on a scale from 1-5 with 1 being least tasty and 5 being most tasty. Scores for these items were calculated as a total for each subscale, sweet and unsweet.

2.1.6. treatment measures

Self-Report of Water Intake: Participants in the treatment group were instructed to report a total number of intake of liters of water per week using a daily water-intake tracking app. Weekly reports were sent via email to the researcher on a weekly basis as screenshots of the in-app screen which displayed total number of liters for the last seven days. Participant water intake was calculated as a total number of liters per 4 weeks within a three-month period. With designated time points for analysis at months 1 (4 weeks), 2 (8 weeks), and 3(12 weeks).

2.2. Procedures

2.2.1. control procedure

Participants in the control group were given a water bottle after completing the initial battery of tasks, and were instructed to return after 90 days for repeated testing. Control participants were not given specific instruction on how they might drink more water or any supplemental information about the benefits of drinking more water. This group did not report water intake at any time. At the end of twelve weeks, control participants returned to complete an identical battery of tasks as that completed at the start of participation.

2.2.2. treatment procedure

Participants in the treatment group, after completing executive function and habit measures, were given instructional handouts on sugar-sweetened beverages and water drinking. These handouts included information about the amount of sugar (in grams and tablespoons) in different popular beverages and how much sugar is healthy to consume. The handouts also provided information on the benefits of drinking water and tips for replacing SSBs with water. Participants were required to read this information in the presence of the researcher and take their copy of the handouts home.

Treatment participants were then required to download the free Nalgene "Refill Not Landfill" app, and the researcher demonstrated how to set the water drinking goal (2 liters per day), track daily water intake, view weekly tracking information, and report it via email as an image file. Each treatment participant received a "Drink Up" water bottle and was instructed to report weekly water intake and return for post-testing in 90 days.

Participants in the treatment group received check-ins every week for twelve weeks for tracking from the researcher. These participants also received regular notifications from the Nalgene app to track their water intake. If participants did not respond to the researcher's email with their weekly report within two days, they were again contacted by email until a response was received. In the email for the week five report, treatment participants received electronic copies of the printed information about water and SSBs given in the initial testing appointment, and a link to a free online quiz on the sugar content in a number of popular beverages. At the end of twelve weeks, treatment participants returned to complete an identical battery of tasks as that completed at the start of participation.

2.3. Statistical Analysis

2.3.1. analysis of executive function performance

Correlational analysis was used to assess the relationship between executive function performance and change in water intake over time. The correlational values between inhibition scores (using the data from the Stroop and go-nogo

tasks), readiness to change scores, and total water intake (month 1 to month 3) for treatment participants were calculated. 1-tailed t-tests were performed to determine significance at the lowest possible p-value.

2.3.2. analysis of motivation to change

Readiness to change was assessed by comparing the total number of participants in each stage of change (based on highest reported score from the three subscales) at the beginning and end of the study. This comparison method can be observed in Table 1.

Correlational analysis was used to assess the relationship between intention to change and reported water intake for treatment participants. 1-tailed t-tests were again performed to determine significance.

2.3.3. analysis of change in water intake

A one-way ANOVA was used to assess the significance of difference in water intake within-subjects over time. A Greenhouse-Geisser correction was used on this ANOVA to reduce type-I error. Post-hoc testing using the Boniferroni correction was then used to further assess the ANOVA for water intake differences.

3. Results

3.1 Participant Water Intake

Treatment participants had a daily goal of two liters, and the average monthly water intake goal was 56 liters. Treatment participants reported a wide range of water intake from month-to-month. Month 1 water intake had a range of 61.14L, M=32.41, SD=15.72. Month 2 water intake range was 58.67L, M=30.44, SD=16.05. Month 3 water intake range was 58.92, M=25.64, SD=15.39. A one-way repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean reported water intake for the treatment group differed significantly between time points ($F(1,2)=4.323$, $p=.028$, $\eta p2=.194$). Post hoc tests using the Bonferroni correction revealed a significant decrease in reported water intake for the treatment group between month 2 (M=30.44, SD=16.05) and month 3 (M=25.64, SD=15.39), p=.05.

3.2 Executive Function Scores

At time 1 for treatment participants (n=19), inhibition was not correlated with total water intake or RTC. At time 2 for treatment participants (n=16), inhibition (go-nogo) was marginally correlated with total water intake (r=.430, p=.055, 1-tailed), but not RTC. Total water intake at time 2 was not correlated with Stroop task performance, verbal fluency, trail-making, or running-span scores.

3.3 Readiness to Change (RTC)

Table 1 explains the relationship between RTC scores for each participant between times 1 and 2. Among treatment participants from time 1 to 2 (n=16), four scores went up (contemplation to action), one score went down (action to precontemplation), and eleven stayed the same for RTC stages. In the control group (n=10), one score went down (action to contemplation), five scores went up (contemplation to action), and four stayed the same for RTC stages.

3.4 Intention to Change (ITC)

At time 1, ITC was marginally negatively correlated with reported total water intake for treatment participants (r=-.381, p=.054, 1-tailed). At time 2, ITC negatively correlated with reported total water intake for treatment participants (r=-.437, p=.045, 1-tailed), which did not match participant perceptions of having changed (RTC). Mean ITC scores for control participants remained steady between testing times one and two (time 1 M=41.79, n=14, SD=5.1; time 2 M=43.7, n=10, SD=5.5), which, similar to treatment participants, was not correlated with RTC scores.

Table 1. Readiness to Change results (participants assigned stage based on highest score from that category) from time 1 to time 2 for treatment and control groups.

Group			**Time 2**			
Treatment			Precontemplation	Contemplation	Action	**Total**
	Time 1	Precontemplation	1(6%)	0	0	1(6%)
		Contemplation	0	4(25%)	4(25%)	8(50%)
		Action	1(6%)	0	6(37.5%)	7(43.5%)
	Total		2(12.5%)	4(25%)	10(61%)	16(100%)
Control	**Time 1**	Contemplation		1(10%)	5(50%)	6(60%)
		Action		1(10%)	3(30%)	4(40%)
	Total			2(20%)	8(80%)	10(100%)

3.5 Taste and Preference for SSBs

Taste and preference scores for treatment participants at time 1 showed no major differences in preference for sweetened or unsweetened beverages (*M*=34.56 of 50(69.12%), *SD*=7.41 for sweetened beverages, *M*=14.421 of 25(57.68%), *SD*=4.2 for unsweetened beverages). Control participants at time 1 reported similar levels of preference for beverage types (*M*=37.71 of 50(75.42%), *SD*=6.85 for sweetened beverages, *M*=13.64 of 25(54.56%), *SD*=3.18 for unsweetened beverages).

4. Discussion

4.1. Participant Water Intake

Participants tracking daily water intake had a daily goal of two liters, meaning that they should have tracked 14 liters per week and 56 liters per month. The downward trend in mean water intake across all treatment participants (month 1 *M*=32.41, month 2 *M*=30.44, *M*=25.64) was significant for the difference between the last two months of participation. The average intake for treatment participants across all months in the study did not reach more than 60% of the 56-liter goal. The goal of two liters per day is an acceptable amount of water for most healthy adults to consume in one day[18]. More than half of a sample of 100 patients (age *M*=50) in a recent study consumed less than one liter of water per day[18]. This data suggests than many individuals regularly under-consume water in comparison to the recommended amount per day. It is important to note that the function of drinking more water in the present study was to decrease the amount of SSBs consumed daily, an intervention used in other studies attempting to reduce SSB intake[15].

Participants reported different levels of motivation and stages of behavior change, and it was assumed that participation in this study signified a desire to drink more water because recruitment was achieved through posters asking, “Would you like to drink more water?” To encourage treatment participants to change their behavior, this study provided evidence-based informational sheets on SSBs and water-drinking in the context of health. Participants

also received free one-liter water bottles, which were labeled in milliliters for easy tracking. An educational intervention from a 2007 study on children, which was aimed at reducing SSB intake and increasing water intake, rendered similar results regarding changes in drinking behavior when similar methods were employed[15]. Participants in that study reported stable levels of SSB consumption and did not report more water-drinking after an intervention which made water a more accessible drinking source (compared to SSBs), and which provided ongoing education for the health benefits of this behavior change[15]. Providing education about the benefits of something may not effectively influence a person's long-term habitual behaviors, or perhaps this education is outweighed by other factors which influence that habit, as proposed by previous research[15]. The method of intervention in the present study was lacking in adaptability to the experiences of each participant, and prior knowledge regarding the presented information was not assessed during the study.

Instead of recording baseline and end-reporting of water intake, this study relied on the tracking of treatment participant water intake over time using an app and the perceived stage of change reported by participants at the beginning and end of the study. The tracking of water intake using a smartphone app in this study did not correlate with increasing (or stable) self-reported levels of intake over the three-month period. This finding does not match that of previous research on the use of smartphone apps in nutritional behavior change intervention[16]. This could be because of the lack of individualization in the type of information sent to participants from the researchers and the app in the present study, which was previously reported as an important component of effective tracking intervention using an app[16]. Participants in the present study also reported that the app did not always regularly send reminders, and that ignoring the app for a few days would lead to cessation of regular app reminders altogether. Previous research on successful interventions combining printed materials and electronic (text message) reminders has focused on regular daily reminders[17], instead of intermittently dispersed reminders, as were provided in the present study.

4.2. Readiness to Change (RTC)

Participants were expected to increase in water intake over 90 days and report perception of having changed their own behavior with the RTC model of precontemplation, contemplation, and action. Many participants stayed the same in terms of behavior change stages (n=11(68.7%) treatment, n=4(40%) control), or went down a stage in the changing process (n=1(6.25%) treatment, n=1(10%) control), which suggests that many participants (n=65.38%)) did not perceive having successfully changed over the 90-day period.

One participant went down from action to precontemplation, which may be because they were already acting and had moved to "maintenance" of the new behavior, therefore reporting that they were not currently thinking about changing their behavior, or actively changing their behavior). This is a potentially problematic aspect of the Readiness to Change model used in the present study, which was adapted from a study on alcohol abuse[6]. There are two other possible stages in the model for RTC, which are preparation (preparing for action after contemplation) and maintenance (maintaining changed behavior). In a study examining the application of RTC theory to healthy eating behaviors, participants were asked if they were currently trying to eat a healthy diet (action), and, if yes, if they had changed their diet (maintenance)[14]; this survey study may provide insight into the large amount of variability in reported stages of change for participants of the current study. Individuals may perceive changes differently in the context of time. Most participants who reported being in the action and maintenance stages of behavior change stated that they had started to change their behavior six months or longer prior to answering the survey[14]. A smaller percentage of survey respondents said that they were acting or maintaining a behavior change which they started less than six months ago[14]. This data provides support for the variability in individual perceptions of self-change within a given time, 90 days, in which participants were instructed to practice the same behavior with varying results and motivations. The data suggests that some participants perceived that they had changed their behavior (moving from precontemplation to contemplation status, or from contemplation to action), but this was not reflected in their behavioral reports or intentional outcomes.

4.3 Intention to Change (ITC)

The finding that subscale scores for ITC were negatively correlated with participant water-drinking outcomes negates the hypothesis that more motivation to change may lead to more successful execution of change behaviors. The study from which this measure was adapted for use in the present study compared individual's intention to change score with self-reported change in number of alcoholic drinks consumed on a regular basis and self-reported stage of change under the RTC model[19]. Intention to change and action scores at the initial testing time were more positively correlated for individuals who successfully reduced the amount of alcohol consumed after six months[19]. The intention to change

scale from this measure contained items that were focused on recognizing current behavior as problematic and agreeing with positive statements about changing[19]. Perhaps the concepts of general problem recognition and positive thoughts about future changes are not predictive of behavior change in the context of "healthy habits" and outside of the context of "abuse."

It was predicted that intention to change would decrease after a person begins changing their behavior. The similar mean scores for intention in time 1 and 2 (both high) could reflect a problematic amount of time for changing a behavior. The study in which the scores for intention to change were correlated with successful changes was conducted with a time frame of six months for assessing change[19]. Individuals may be motivated to change their behavior, but the amount of time allotted for this process in the study[14], the method of the intervention[15,17], and the scope and style of measurement[14] could be limiting factors for understanding the ways in which reported motivation is related to behavior change.

4.4 Executive Function Scores

The time 2 correlation between total water intake and inhibition (go-nogo) suggests that better inhibitory skills may be related to better water drinking behavior. This more successful behavior change did not match participant perception of having changed (RTC). The evidence is not robust enough to support the hypothesis that better inhibitory skills may lead to more successful control of personal behaviors. In a study assessing older adults in a behavior change program for exercise, adherence to the intervention program was predicted by performance on executive function tasks[20].

Performance on inhibitory tasks, such as the go-nogo task, usually compares the speed of reaction time for "go" stimuli with the speed of reaction time for no-go stimuli (which is ideally the duration of the trial, 1000ms). In the present study, the finding that individuals who reacted faster performed better on the long-term behavior change tasks should be evaluated for replicability, as evidence for the correlation between EF and behavior change is inconclusive[20,21]. Some research suggests that EF within the context of behavior change may be related to the concept of deliberation or impulsivity in day-to-day life. This idea was posited in a recent study on EF and behavior change in a weight loss program for adults[21]. In this study, those who performed "better" on inhibitory tasks (because they responded faster and more impulsively) lost less weight than their peers[21].

4.5 Taste and Preference for SSBs

Preference for SSBs was not significantly predictive of participant behavior. While treatment participants were instructed to increase water intake and decrease SSB intake, there were no clear guidelines for how one may decrease SSB intake (i.e. how much to decrease, what kinds of drinks). Individuals preferred sweetened and unsweetened beverages at a similar rate on the self-report measure, but this may not represent the way that a person chooses a drink in daily life. Perhaps including a measure for SSB intake would explain a decrease in intake of some beverages (SSBs), a stagnation or decrease in water intake, or an increase consumption of drinks other than water that are still sugar-free, which could be one explanation as to why water intake did not increase over time.

5. Limitations

It is possible that there is a certain degree of dissonance between actions and feelings in daily life and those reported in an in-person testing environment. In previous research, people may encounter new stimuli that elicit similar social or contextual cues and are generalized as normative habitual behavior. Situations such as this may not be accurately reported using self-report measures.

Relating cues (like the pairing of palatable foods with no-go responses) to long-term behaviors is explained by an impulsive system instead of a reflective one. An example of a reflective system is Habit Theory in which individuals spend time reflecting on their behaviors over time[1]. Theoretical models suggest that impulsive systems connect semantic and episodic memory with behavior and may include reactions like positive/negative affect[13]. An individual may have automatic biases that self-report scales based on experience do not measure[13]. This study did not include measures of general trends in positive or negative affect at testing or during water intake reporting, which is an example of a potentially limiting factor regarding automatic biases. Reflecting on past behavior and current feelings may not accurately represent an individual's feelings and behaviors outside of a controlled, ideal environment.

The timeline for the study (based on popular wellness programs) could be a potentially limiting factor for participant outcomes. Changing the testing and behavior change timeline or changing report methods over the course of the study could improve outcomes. There were problems with consistent app notifications/performance, with participants reporting that they were not notified regularly, or that their app was not functioning and needed to be re-downloaded (resulting in loss of data for the week). In terms of reporting, behavior tracking was also limited by inconsistent reporting, with some individuals not responding after several days of emails requesting weekly intake. Problems in reporting and measurement led to limitations in a comprehensive analysis of behavior change in the context of inhibitory skills.

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