

Higher-Level Health Habits: MyPlate Guidelines

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Abstract

This study investigates the development of a higher-level health habit to eat dinner meals according to the MyPlate Guidelines published by the USDA (2010). The behavior of focus is aiming to fill half of your dinner plate with fruits and vegetables. Participants completed baseline, mid-study and final surveys, all measuring constructs related to habit formation. During a three-week period post baseline, participants were asked to send in images of their dinner plate three days per week. Results from the study conclude there was a significant main effect for the higher-level habit intervention. Individuals in the intervention group saw a significant mean difference in habit strength, from Time I to Time II, than those in a control group, who received limited information about MyPlate Guidelines. This research aims to better understand the formation and sustainability of higher-level health habits, helping people establish healthier lifestyles.

Introduction

Studies in recent years have explored the formation and mechanisms underlying habit development. It has been concluded positive health habits are essential to maintaining a healthy lifestyle. There are three main components of habit; “a habit is a behavior that is frequently repeated, has acquired a high degree of automaticity, and is cued in stable contexts” (Orbell & Verplanken, 2010). For example, flossing your teeth every night before bed is a simple habit. One task is completed in a context where the settings are presumably the same from night to night i.e. in the bathroom, at the sink, after brushing your teeth and using the same floss packet (Judah et. al. 2013).

This research is important because it aims to better understand the formation and sustainability of higher-level health habits. Currently, there are virutally no studies that have been conducted on higher-level health habit formation. According to Lally et. al. (2009) "we are not aware of any studies that have systematically investigated the habit formation process within individuals..." Higher-level habits are different from simple habits (lower-level habits) because they involve several options from which the habit can be fulfilled. In this study, the goal of aiming to fill half of ones dinner plate with fruit and vegetables can be successfully executed in many forms. There are several fruits and vegetables that would satisfy this habit requirement. One study concludes, “simply repeating an eating or activity behaviour in a consistent context has been found to result in increased automaticity,” a key component of habit (Lally et. al. 2007). Higher-level habits presumably require a more extensive formation process. Using automaticity as a basis for higher-level habit formation, this study utilizes and investigates this construct further.

As the prevalence of obesity continues to rise, eating a well-balanced diet is important. In this study, the behavior of focus is eating dinner meals according to the U.S Department of Agriculture MyPlate Guidelines (2010). The conclusions gained from this study would add to current research and further knowledge on the development of higher-level health habits, subsequently, helping people establish overall, healthier lifestyles.

Methods

Participants

Participants in introductory psychology courses (e.g. PSYCH 101, 230, 280) and Communication Studies 101 were informed of the opportunity to participate through an online sign-up system (SONA). Only those above 18 years of age were recruited. Participants recruited must have been able to eat at the dining halls or other venue where they are able to serve themselves from a variety of fruits and vegetables, for a majority of their dinner meals each week (five out of the seven days per week). They must have been willing and able to document images of their dinner plates three times per week. Upon completion, participants were compensated with partial course credit and a \$15 Target gift card.

Materials and Design

The baseline survey (Time I) measured the following: nutrition knowledge, past behaviors, attitudes, perceived norms, perceived behavioral control, habit strength (Self-Report Behavioural Automaticity Index [SRBAI]), perceived dietary efficacy, intentions, intrinsic motivation, body perception, dieting behaviors, body appreciation and demographics (all in reference to consuming fruits and vegetables). The intervention group received the following three additions during the baseline visit: 1) explicitly asked to aim to fill half of their dinner plate with fruits and vegetables, 2) information about MyPlate through a YouTube video, and 3) an

implementation intentions exercise for the desired behavior. Two mid-study surveys re-measured habit strength, perceived dietary efficacy, intentions and intrinsic motivation. Mid-study surveys were collected to analyze process hypotheses that are not relevant to the current analyses. The final survey (Time II) re-measured all baseline components, with an additional task evaluation measure. Photo submissions were not formally used in the current analyses, but served as a completion check for participants (Figure 1.1).

Item Examples

Higher-Level habit: “Filling half of my plate with fruits and vegetables is something...”

Lower-Level habit: “Eating [your most frequently eaten fruit/vegetable] at dinner is something...”

- I do automatically
- I do without having to consciously remember
- I do without thinking
- I start before I realize I’m doing it

The four statements (SRBAI) were measured on a 5-point Likert scale from “Strongly Disagree to Strongly Agree.”

Procedure

Participants were recruited from lower level undergraduate courses at Iowa State University through the online SONA sign-up system. At Time I, participants came to the lab. Participants provided their consent in the first computer survey, before beginning. The researcher assigned each participant a unique study ID# and give this number to the participant for entry in the computer surveys. Participants completed the baseline survey, in lab, lasting approximately 40 minutes. Participants were compensated with two SONA credits upon completion, regardless

of completion of the remainder of the study. Before leaving the lab, participants were asked to give their preferred email address to the researcher. This email was used to send the two online mid-study surveys during the three-week period. Additionally, they were asked to choose either Snapchat or email as a submission method for their photos. The researcher recorded both the email address and photo submission method. The two online mid-study computer surveys were sent by email during the three-week period and completed online by the participants. The two online surveys were sent out one week from each other and participants were expected to complete the survey within 24 hours of receiving the email link from the researcher. During the three-week period, participants were expected to send in images of their dinner plates three times per week, resulting in nine images. Pictures were sent electronically, via email or via a phone application called Snapchat, on the day each picture was taken. Participants received three credits for submitting three images per week of their dinner plates and completing the two mid-study online surveys (one credit per week of completing study measures). The second in-lab visit took place three weeks after the first in lab session. Participants completed a final survey with all of the baseline survey questions repeated, plus an additional task evaluation measure. After the completion of the final survey, participants received one SONA credit and a \$15 Target gift card.

Hypotheses

Primary - Individuals who are given a habit development intervention, to aim to fill half of their dinner plate with fruits and vegetables, will have greater higher-level habit strength at Time II than individuals in the control group, who are only given limited information about MyPlate Guidelines.

Secondary - Individuals in the Intervention group will show a greater mean difference in higher-level habit strength than in lower-level habit strength from Time I to Time II.

Results

Participants

A total of 82 participants were recruited at baseline. More participants were randomly assigned to the Intervention group, providing data for future hypotheses to be tested regarding longitudinal habit development in the Intervention group alone. There were six participants who did not return to complete Time 2, resulting in a total of 76 participants, 28 in the Control group and 48 in the Intervention group. A majority (84%) of the participants were female. A majority (84%) of the participants were first year students, with the $M = 1.22$ years in school, $SD = 0.60$ years in school. About half (49%) of participants were 18 years old, with the $M = 18.74$ years, $SD = 0.99$ years.

Statistical Analysis

Average scores were calculated for each habit level (i.e. higher-level habit and lower-level habit), for the Control and Intervention group (Table 1.1).

1) A between subjects analysis of co-variance (ANCOVA) was performed on the data set, comparing the Control and Intervention group for changes in habit strength (higher-order habits and lower-order habits) from Time 1 to Time 2, controlling for differences in baseline habit strength. Higher-order habit comparison: There was a significant main effect for the intervention regarding higher-order habit strength, $F(1,76) = 5.96, p = 0.017$. The Intervention group had greater increased higher-order habit strength than those in the Control group (Figure 2.1). Lower-order habit comparison: There was a significant main effect for the intervention regarding lower-order habit strength, $F(1,76) = 8.11, p = 0.006$. The Intervention group had greater increased lower-order habit strength than those in the Control group (Figure 2.2).

2) A paired samples t-test was performed on the Intervention group data, comparing average changes in habit strength, between higher-order habits and lower-order habits, from Time I to Time II. There was a significant effect habit intervention, $t(47) = 4.32$, $p < .001$, with a greater change between Time I and Time II in habit strength for the higher order habit, than the lower-order habit (Figure 2.3).

Discussion

The purpose of this study was to investigate the development and sustainability of higher-level habits. Studies examining the formation of simple habits (lower-level habits) have concluded there are several contributing factors to habit development. Using some of the same constructs, such as habit strength, and implementation intentions, this study was able to apply those measures to study the formation of higher-level habits. The results of this study support the primary hypothesis, concluding individuals who receive a habit development intervention have a greater increase in habit strength (higher-level habit and lower-level habit) than those who receive limited information regarding the target behavior. The secondary hypothesis was also supported; meaning individuals who receive a habit development intervention experience a greater increase in higher-level habit strength compared to lower-level habit strength. Overall, the study provides evidence a person has the ability to develop higher-level habits, related to health.

Limitations

Participants may have only adhered to the study requirements to receive course credit and gift card compensation. If so, participants may have only given answers they believed we sought. This would reduce the significance of our findings, possibly requiring a replication study. Only three images per week were required and participants were allowed to choose which three days

they sent in their images. This could have resulted in participants only sending in images on the days they felt their plate met the fruit and vegetable requirement. An image of every dinner meal across the three weeks could have controlled for this issue.

Future Directions

Further studies would need to be conducted to address the previously mentioned limitations. A more tightly controlled experiment could narrow down the additional mechanisms used to develop higher-level habits, as opposed to lower-level habits. Additionally, analyzing the mid-study surveys collected during this experiment would provide further investigation into the longitudinal nature of habit development. Analysis of the images could provide insight into the variety of fruits and vegetables being eaten at dinnertime. This data could be analyzed for correlations between fruit/vegetable variety and habit strength.

References

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Appendix

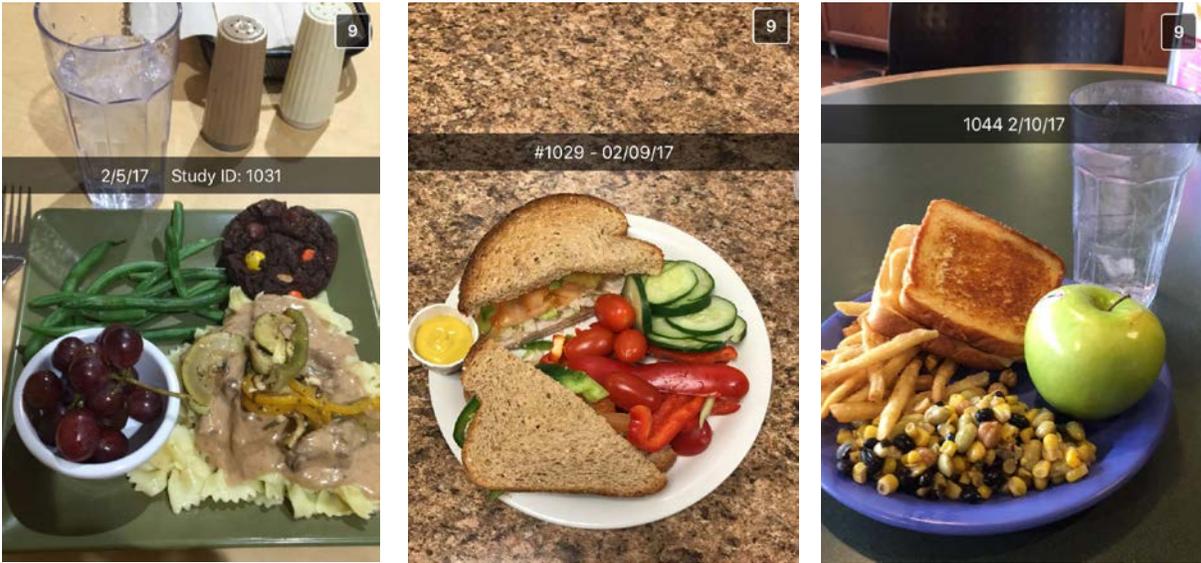


Figure 1.1
Samples of images sent in by participants using Snapchat.

Higher-level habit			Lower-level habit		
	Time I	Time II		Time I	Time II
Intervention	3.22	4.06	Intervention	4.10	4.38
Control	2.84	3.50	Control	3.57	3.69

Table 1.1
Mean habit strength scores for Intervention and Control group at Time I and Time II.

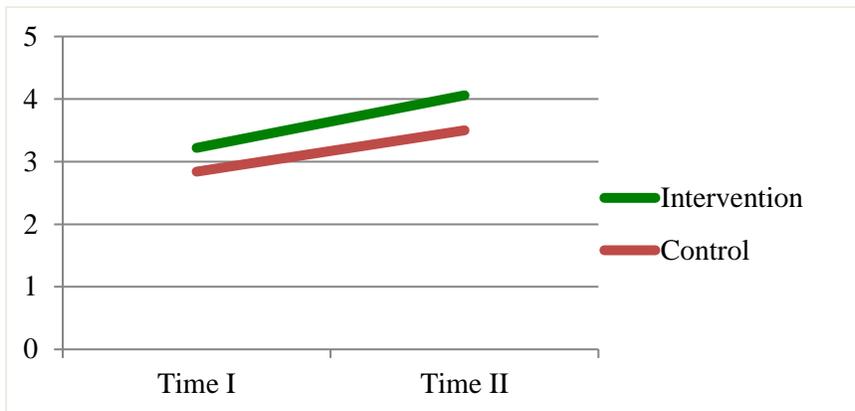


Figure 2.1
Higher-level habit strength changes from Time I to Time II.

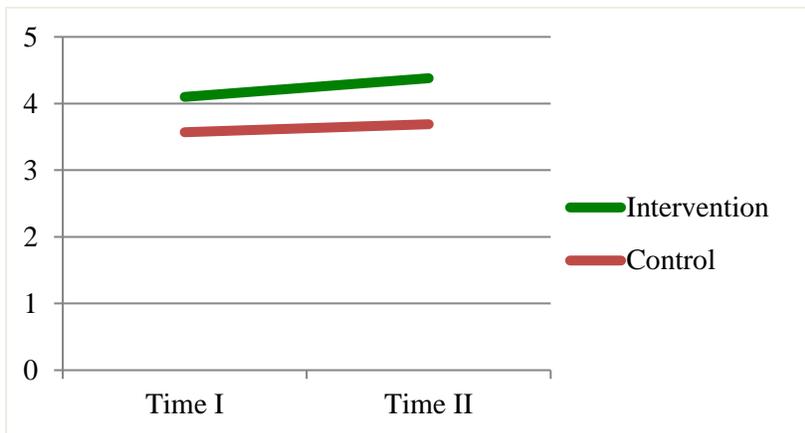


Figure 2.2
Lower-level habit strength changes from Time I to Time II.

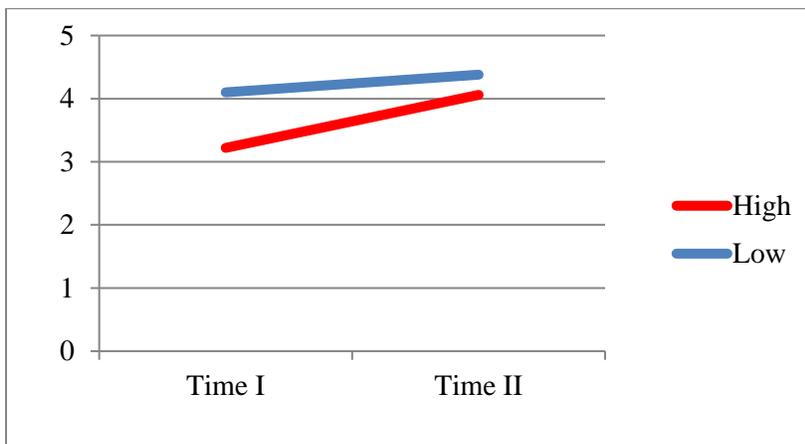


Figure 2.3
Intervention group habit strength changes from Time I to Time II.