

## The influence of learning context of implementation intentions over the increase in fruit consumption: Preliminary results from a pilot study

Roxana Păcurar<sup>1</sup> & Silvia Măgurean<sup>1</sup>

<sup>1</sup>*Department of Psychology, West University of Timișoara, Romania*

Received 27.09.2016; Received revised 20.12.2016; Accepted 21.12.2016  
Available online 30.12.2016

The present research is aiming to investigate the influence of the context of learning implementation intentions over the efficiency of the intervention. 73 participants enrolled for participation in this study. They learned a behavioral self-regulation strategy meant to help them implement their intentions to increase fruit consumption. The participants were randomized in one of the three experimental conditions: ego-depletion, control, hopelessness. All the participants, regardless of the experimental condition they were assigned to, were given a presentation on implementation intentions. They all designed "if-then" plans to increase fruit consumption. The pretest results concerning fruit consumption within the 48 hours before participation showed that approximately half of the participants already eat more than three fruits within the last 48 hours before pretest. Hence we decided to exclude them from the analysis, because they would benefit less from implementing an implementation intention strategy as they are already eating at least two fruits / day as a minimum intake. The preliminary analyses made on the retained sample showed that there are no significant differences between the three experimental conditions regarding a change in quantity, calories or pieces of fruit from fruit intake. Even though the results are not statistically significant, in this pilot study we have noticed a descriptive trend suggesting that the ego-depletion effect might be less intense and transitory because the fruit intake (quantity, calories and pieces), at 96 hours after the experiment, seems to be almost the same as it was in pretest.

Keywords: Learning context, Implementation intentions, Ego-depletion, Hopelessness, Healthy food.

Address of correspondence: Roxana Păcurar, West University, Bld. V. Pârvan nr. 4, Timișoara, 300233, Romania.  
E-mail: roxana.sarbu@e-uvt.ro

### Introduction

Regular intake of fruits and vegetables is associated with a lower risk for developing cancer, cardiovascular diseases, stroke, and Alzheimer's disease. Even the deterioration associated with normal aging seems to be slowed down for people that have a regular intake of fruit and vegetables (Liu, 2003). Eating citrus and vegetables that contain carotene has proven beneficial in reducing the risks for developing cancer (Liu, 2003). Also, it seems that dietary supplements do not have the same health benefits as fruit consumption (Liu, 2003).

Most people are aware of the benefits brought by a healthy diet (O'Brien and Davies, 2007) and are motivated to eat healthily. However, studies show that even if people intend to eat healthy food, very few succeed in doing so (Kumanyika et al., 2000). Merely having an intention is not enough to initiate the desired behavior (Webb and Sheeran, 2008). For instance, that "I intend to eat more fruit" does

not guarantee that I will eat more fruit. The intention does not necessarily determine the intended behavior because initiating this behavior depends on a series of psychological resources like memory, attention span, or self-control. In some situations, people forget the intentions they have or do not seize the opportunities that would help them behave according to their intentions. Baumeister, Bratslavsky, Muraven and Tice (1998) state that in order to initiate an intended behavior, an individual needs to have the necessary psychological resources. The self is responsible for initiating behavior, making decisions, and inhibiting certain behaviors. To accomplish these tasks, certain resources need to be available. Individuals don't have a constant and planned control over their self, and this fact is supported by the studies that show how individual's behaviors are sometimes influenced by automated or unconscious processes (Bargh, 1994; Chen and Bargh, 1997). Hence, some parts of the self are involved in deliberative, conscious answers, and this

particular part of the self can be extremely important for the long-term health of the individual. The core idea is that ego-depletion determines a limitation of resources for willpower, which means that a previous effort of will can undermine the strength of a future act of will. Research has shown that resisting the temptation to eat chocolate can "tire" a person up, and subsequently make him/her quit the effort of accomplishing a frustrating cognitive task. This suggests that the two self-control acts draw from the same limited resources. Hence, the term ego-depletion is used whenever we speak of a temporary decrease in the self-capacity of engaging in acts of willpower, as a consequence of a previous act of will (Baumeister et al., 1998). Ego depletion contributes to a self-regulation breakdown, and this can subsequently undermine goal achievement (Gollwitzer and Sheeran, 2006). For instance, when we are tired, it's possible that we fail to remember our intentions, or we can even miss opportunities to act according to our intentions (Gollwitzer and Sheeran, 2006). Nonetheless, it is possible to act according to the intentions we established, even if the psychological resources we have at the moment are low.

A behavioral self-regulation technique that helps us translate our intentions into behavior is implementation intention (Gollwitzer, 1999). This technique advises to build "if-then" plans and has proven efficient in changing various behaviors (Gollwitzer, 1999). In latest years, research has focused on comprehending the mechanism underlying implementation intention, to increase the efficiency of interventions that aim to change behavior (Gollwitzer and Sheeran, 2006).

There are two processes that contribute to the efficiency of implementation intention in promoting goal-directed behavior. The first process implies to anticipate and specify a critical cue. This makes the critical cue easily accessible within the individual's memory. As a consequence, there is a high probability that the critical cue will be seized, whenever encountered again, as a good opportunity to act towards goal intentions. The second process implies to formulate one's intention according to the "if-then" model. This particular formulation connects the critical cue to the goal-directed behavior. The result is a behavior self-directed towards a particular cue, and this makes the goal-directed behavior to activate automatically whenever the critical cue is encountered. This means that the limited resources like memory, attention span, and self-control are no longer solicited to intervene over the intentions; the behavior is automatically-driven, without depletion of psychological resources (Gollwitzer, 1999; Parks-Stamm, Gollwitzer and Oettingen, 2007).

#### *The present study*

We believe it would be useful to test the effect of the context over the efficiency of the implementation intention-type intervention, in a situation that is as close as possible to day-to-day activity. This is why we are undertaking the development of a feasibility study meant to verify the effect of the context in which the "if-then" plan is formulated over the efficacy of the implementation intention. The question guiding our first study is: do the effects of ego-depletion and hopelessness in the moment of intention formation have an influence on the efficacy of the intervention (i.e. to increase fruit consumption)?

*Ego-depletion role.* Results have shown that the "if-then" plans were more efficient when cognitive resources were available ( $d=.85$ ) (Gollwitzer and Sheeran, 2006). Whereas most previous research was done to see if this

type of intervention is efficient in more specific areas of research, like changing eating behavior (Aadrianise et al. 2011), emotional regulation (Webb et al. 2012), increasing physical activity (Bélanger-Gravel et al. 2013), enhancing prospective memory (Chen et al. 2015), we believe that the context in which people formulate these plans has not been sufficiently investigated. For instance, students might wish to improve their learning process and establish a plan for implementation intention during their finals, when most of them are already in an ego-depleting situation. Another example is the case of people that wish to refrain from eating unhealthy food and establish an "if-then" plan to succeed this. Their plan is formulated to face a situation where they are craving, but the actual formulation of the "if-then" plan happens in a context where they are not exposed to cues that might engender cravings. It's important to know if the context or the moment when people are formulating their "if-then" plan has an effect on the efficacy of the implementation intention intervention.

Only one study has so far investigated the effects of context on the efficacy of implementation intention regarding performance in a task. Webb and Sheeran (2001) built an experiment to test this. They showed that participants that were ego-depleted during the first task, they had to accomplish and formulated a plan for implementation intention, performed better in a subsequent Stroop task compared to the participants that were not in an ego-depleted state when formulating their plan (Webb and Sheeran, 2001). The authors were surprised that the implementation intention strategy only enhanced the performance of the participants that were in an ego-depleted state (and not that of those that were not ego-depleted) (Webb and Sheeran, 2001). However, this single result is counter-intuitive, since being in an ego-depletion state also means having fewer resources to cope with various challenges an individual has to face. Therefore such a finding needs to be conceptually replicated.

*Hopelessness role.* To the best of our knowledge there are no past research to investigate the link between a hopelessness state and the effectiveness of if-then plans. However, by definition hopelessness refers to a loss in confidence that future events will be positive (Pan and Chou, 2004). The concept shares with if-then plans a temporal orientation, by focusing on potential future events. But whereas if-then plans can be seen as problem-solving messages within the control of a person, hopelessness contains a giving up message, due to a perceived lack of control on events, and due to a deficit in energy and drive to reach a desired goal. Therefore, our research question would be to see how if-then plans are affected within a primed hopelessness context where they are learned.

Being a pilot study, we conducted this research in order to assess the feasibility of all three manipulating conditions - control, ego-depletion that involves a conceptual replication of Webb and Sheeran's (2001) endeavor, and hopelessness that involves an entire new procedure to prime a hopelessness state. We are also interested to see whether such if-then plans work across conditions, from pre- to posttest assessment. Last, but not the least, we are interested to see any descriptive moderating effect of learning context, although given the small sample size we do not expect such an interaction effect would be statistically significant.

## Method

### Participants

73 Psychology students (both from Bachelor and Master programs) that were interested in increasing their fruit intake participated in the study in exchange for course credit. The participants were randomized in one of the three experimental conditions: ego-depletion, control, hopelessness. The pretest results concerning fruit consumption within the 48 hours before participation showed that approximately half of the participants already eat more than three fruits within the last 48 hours before pretest. Hence we decided to exclude them from the analysis, because they would benefit less from implementing an implementation intention strategy as they are already eating at least two fruits / day as a minimum intake. The final sample was composed of 36 students that stated they had less than three pieces of fruits within the last 48 hours.

### Procedure

The participants had to go through one training session, which lasted a total of 90 minutes. 48 and 96 hours after the experiment, participants were requested to answer the following questions by e-mail: (1) Did you eat any fruit in the last 48 hours? (2) If yes, please let us know what kind of fruit did you eat, and how many of each. This was the measure for fruit consumption, 48 hours and 96 hours after the experiment.

The experiment had three conditions: control (1), ego-depletion (2), hopelessness (3). The participants were randomized to one of the three arms. For step one of the process, each participant received an ID and consent form. All participants had to answer the following questions on a scale from 1 (hardly at all) to 5 (a lot): *Q2.1 Do you consider yourself to be interested in maintaining a healthy diet?*, *Q2.2 Do you consider it would be helpful if you would consume more fruit?*, *Q2.3 Do you consider it would be helpful to establish goals for eating fruit, specifying when will you do this?*.

For Q2.4, participants stated the frequency of fruit consumption in the prior week on a scale from 1 (never) to 5 (often, more than seven times). Last question (Q2.5.) was about fruit consumption in the two days prior to the experiment. Participants answered with YES or NO. Participants that answered with YES were further asked what fruit did they eat, and how many of each fruit.

For the participants in the control condition, the next stage was to recall and describe what they did in the recent week off: November 30th– 5th of December. They received the following instruction: *“Next, please let us know extensively how you spent the week off between November 30 and December 5th, 2016. For this task, you will have 20 minutes. Please focus and write at least 20 lines about your experiences”*.

The participants in the ego-depletion condition had a task similar to that of the control condition. The difference was that the participants in the ego-depletion condition were not allowed to use the letters "a" and "n" for writing their story. Instead, they had to use the characters "\_" and "!". The participants in the ego-depletion group received the following instruction: *“Next, please let us know extensively how did you spent the week off between November 30 and December 5th, 2016. While you are writing, please pay a lot of attention and not use the letters "a" and "n". Instead of the letter "a", you will use the character "\_" and instead of the letter "n" you will use the*

*character "!" For this task, you will have 20 minutes. Please focus and write at least 30 lines about your experiences”*.

According to a meta-analysis (Carter et al., 2015), this type of ego-depletive manipulation was previously used in 10 other studies and is known by the name of *the attentional essay*. For the purpose of the present study, the method was slightly changed in the sense that the participants were told what symbols to use instead of the two letters they were not allowed to, and this mention did not appear in the original manipulation. The purpose of this task was to determine an ego-depletion state.

The participants in the hopelessness group received the following instruction: *“Next, please recall and write about a situation when you felt discouraged and thought about giving everything up. A situation in which you thought that everything you did by then really did not matter. A situation in which you lacked the energy, self-efficacy, or a situation that you thought you cannot face. A situation in your life when what you wanted to do only depended on your input, and still, for various reasons, you failed, so maybe you thought it would be best to give up on your resolution. Please write extensively about that situation and about the feelings that you had at that particular moment (what where your thoughts, what feelings did you have, what did you do). For this task, you will have 20 minutes. Please focus and write at least 30 lines about your experience”*.

We chose to induce a hopelessness state because we know that when we want to change certain behaviors and we can't do this, we feel incapable, loose trust in ourselves and feel disappointed (e.g. when somebody can't maintain its healthy weight).

After this stage, all the participants received a questionnaire meant to check if the manipulation was effective. The participants in the control condition and the ego-depletion condition answered two questions: *Q1.1 How difficult was the task of describing your vacation? (1- very difficult, 6 - very easy)*; *Q1.2. How tired do you feel after describing in writing how you spent your vacation? (1 – Very tired, 5 – not tired at all)*. The participants in the hopelessness condition had to answer the same questions, but with a slight adaptation to match the treatment received: *Q1.1 How difficult was the task of describing a personal situation when you felt hopelessness (1- very difficult, 6 - very easy)*; *Q1.2 How tired do you feel after describing in writing about the personal situation when you felt hopelessness? (1 – very tired, 5 – not tired at all)*. All the participants completed a Mood Introspection Scale (Mayer & Gaschke, 1988) that was slightly adapted to fit the present study.

After completing this stage, all the participants received a presentation of the way they can formulate "if-then" plans to enhance their fruit intake. First, they were briefed about the benefits of fruit consumption and afterward they learned why people sometimes fail to behave according to their intentions. Also, the participants were taught how to establish implementation intention for increasing fruit consumption. They were asked to think of a plan and write it down according to the model. After they had done this, their plans were verified, and participants received recommendations for improvement when necessary. After their plans had been verified, they were requested to repeat their plan at least three times, until they know it by heart. Finally, they were reminded that they will be requested to answer the following questions by e-mail, after 48 and 96 hours: (1) *Did you eat any fruit in the last 48 hours?* (2) *If*

you answered the first question with YES, please mention how many fruit did you have, and how many pieces each.

## Results

### Experimental manipulation

To verify if the experimental manipulation was effective, we compared each experimental group to the other two groups. The participants in the ego-depletion condition were compared to all the other participants (control and hopelessness) regarding the assessment they made of task difficulty and the level of tiredness they felt. The participants in the hopelessness condition were compared to all the other participants (control and ego-depletion) regarding the general level of hopelessness. Since there is a small number of participants for each condition, we considered that the non-parametric U Mann Whitney test is the most adequate to use for checking the effectiveness of the experimental manipulation.

Table 1 shows that the participants in the ego-depletion condition felt more tired than the participants in the other two conditions (control and hopelessness):  $U=441.5$ ,  $p=.03$ . Also, they report an increased level of task difficulty:  $U=278.5$ ,  $p<.01$  than the participants in the other two conditions (control and hopelessness).

We compared the participants in the hopelessness condition and the participants in the other two experimental groups (control and ego-depletion). The results show that the participants in the hopelessness condition felt more hopeless, and had less hope compared to the other two groups (control and ego-depletion)  $U=378.5$ ,  $p=.03$ .

### The equivalence of the three experimental groups

We checked to see if the three groups are equivalent regarding: (1) the importance they place on a healthy diet, (2) eating more fruit, (3) establishing goals for eating more fruit, (4) the frequency of fruit consumption in the last week. According to the results in Table 2, we can see that there are no significant differences between the three experimental groups regarding the interest for a healthy diet ( $F(2, 33) = .107$ ,  $p=.899$ ), establishing goals for eating more fruit ( $F(2, 33) = .322$ ,  $p=.727$ ), and the frequency of fruit consumption in the prior week ( $F(2, 33) = .711$ ,  $p=.499$ ).

The only significant differences between the three groups is regarding variable 2 ( $F(2, 33) = 3.35$ ,  $p=.047$ )

(see Table 2), but this result can be also seen as a carryover effect of the hopelessness manipulation.

### The main effect

According to the results in Table 3, the means and standard deviation show that the quantity of fruit consumption tends to increase from pretest to posttest (48 hours after the experiment). Also, the results report a decrease of the quantity of fruit consumption for all the experimental groups from first posttest (48 hours after the experiment) to the second posttest (96 hours after the experiment). We can see that the increase of the quantity of fruit consumption for the ego-depletion condition is low, while for the other two conditions (control and hopelessness) is higher. The quantity of fruit consumption for the ego-depletion group at 96 hours after the experiment seems to be lower than the quantity of fruit intake in the pretest. For the other two experimental groups (control and hopelessness) the quantity of fruit consumption at 96 hours after the experiment is higher than the quantity of fruit intake in the pretest.

To check if there are significant differences between the three experimental groups regarding the change in fruit consumption from pretest to posttest (48 and 96 hours past the experiment), we used the non-parametric comparison test Kruskal-Wallis. The results indicate that there are no significant differences between the two experimental conditions regarding the quantity of fruit intake, neither at posttest  $\chi^2(2, N=36) = 3.72$ ,  $p=.155$ , nor at the follow up:  $\chi^2(2, N=36) = 3.54$ ,  $p=.170$ , but in both cases the trend was in the expected direction (e.g. lower effect for implementation intentions that were acquired during an ego-depleted state).

Likewise, to check whether there is a significant main effect of implementation intention over fruit consumption, we used the non-parametric comparison test Friedman Test -  $\chi^2(2, N=36) = 4.43$ ,  $p=.109$ . This marginal result underlines a significant increase in fruit consumption between pretest and posttest - Wilcoxon Sign Test  $\chi^2(1, N=36) = 2.75$ ,  $p=.003$ , one-tailed test, a marginal significant increase in fruit consumption between pretest and follow up - Wilcoxon Sign Test  $\chi^2(1, N=36) = 1.43$ ,  $p=.076$ , one-tailed test, and lack of significant differences between posttest and follow-up - Wilcoxon Sign Test  $\chi^2(1, N=36) = 1.14$ ,  $p=.254$ , two-tailed test.

**Table 1.** Experimental manipulation. Comparison between each experimental group and the other two groups

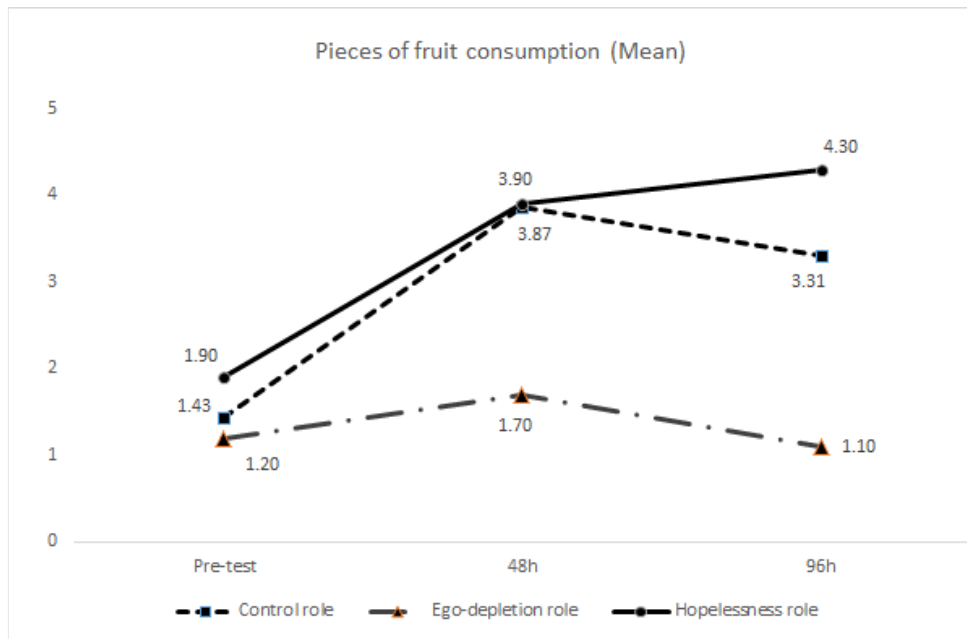
Variables	Ego-depletion (M Rank)	The other conditions (M Rank)	Statistical significance of the difference
Tiredness	30.48	40.61	$U=441.5$ , $p=.03$
Task difficulty	24.21	44.07	$U=278.5$ , $p<.01$
N	26	47	
	Hopelessness	The other conditions	Statistical significance of the difference
Hopelessness	44.98	33.78	$U=378.5$ , $p=.03$
N	21	52	

**Table 2.** The equivalence of the three experimental groups

Variables	Control group M (SD)	Ego-depletion M (SD)	Hopelessness M (SD)	Statistical significance of the difference
(1) Do you consider yourself to be interested in maintaining a healthy diet?	3.25 (.93)	3.10 (.56)	3.20 (.78)	F (2, 33) = .107, p = .899
(2) Do you consider it would be helpful if you would consume more fruit?	4.56 (.51)	4.70 (.48)	4.00 (.94)	F (2, 33) = 3.35, p = .047
(3) Do you consider it would be helpful to establish goals for eating fruit, specifying when will you do this?	3.31 (.79)	3.60 (.84)	3.40 (1.07)	F (2, 33) = .322, p = .727
(4) Please note the frequency of fruit consumption in the last week	2.68 (.94)	2.70 (.67)	2.80 (.90)	F (2, 33) = .711, p = .499

**Table 3.** Descriptive data at pretest, post-test (48h) and follow-up (96h)

Learning Condition	Pretest M (SD)	Posttest M (SD)	Follow up M (SD)
No of pieces			
Control / Standard (n = 16)	1.43 (1.31)	3.87 (4.14)	3.31 (3.99)
Ego-depletion (n = 10)	1.20 (0.92)	1.70 (2.21)	1.10 (1.28)
Hopelessness (n = 10)	1.90 (0.99)	3.90 (3.51)	4.30 (5.43)
Estimated weight (in grams)			
Control / Standard (n = 16)	219 (235)	615 (878)	439 (424)
Ego-depletion (n = 10)	190 (156)	317 (426)	146 (182)
Hopelessness (n = 10)	296 (172)	562 (564)	476 (496)
Estimated calories			
Control / Standard (n = 16)	151 (159)	333 (337)	255 (227)
Ego-depletion (n = 10)	111 (95)	214 (329)	91 (112)
Hopelessness (n = 10)	183 (92)	325 (326)	283 (285)
Eating fruits in the last 48 h (frequency)			
Control / Standard (n = 16)	10/16	15/16	12/16
Ego-depletion (n = 10)	8/10	6/10	5/10
Hopelessness (n = 10)	9/10	9/10	8/10



**Figure 1.** Illustrative picture for the evolution of fruit consumption (similar graphs are obtained for calories intake from fruits and for fruit quantity in grams, respectively)

## Discussion

This study investigated if the learning context of implementation intentions has any influence over the efficacy of the intervention, i.e. an increase in fruit consumption. The results show that there are no significant differences between the three experimental conditions regarding the change in quantity or calories of consumed fruit. This means that for this study the context of learning implementation intentions (control, ego-depletion, and hopelessness) do not impact the efficacy of the intervention. However, due to lack of statistical power in testing the interaction effect, descriptive data suggest that learning implementation intentions in a particular condition (e.g. while ego-depleted) could impact the effectiveness of this behavioral strategy.

To the best of our knowledge, only one study has so far investigated the effects of context on the efficacy of implementation intention regarding performance in a task. Webb and Sheeran (2001) showed that participants that were ego-depleted during the first task they had to accomplish, and formulated a plan for implementation intention, performed better in subsequent Stroop task compared to the participants that were not in an ego-depleted state when formulating their plan. In their study, the implementation intention strategy only enhanced the performance of the participants that were in an ego-depleted state (and not that of those that were not ego-depleted) (Webb and Sheeran, 2003).

The ego-depleted state seems not only to influence the efficacy of an implementation intention strategy, but also seems to impact the duration of the intended behavior change (the amount of fruit consumption drops at posttest at the baseline level in the ego-depletion condition, whereas it remains close to the posttest level for the other two experimental conditions).

There are a few limits of the present study. First, we allowed people to participate in the study even if they stated that they had consumed 10, 20, 30 and even 60 pieces of fruit in the 48 hours before the experiment. Therefore our data are based on a post hoc decision to eliminate participants who do not fit to our expected profile (people who have difficulties eating enough fruits). We did not expect this to happen since the recruitment announcement specifically mentioned that the study is addressed to people that do not eat fruit and want to include more fruit in their diet. We believe that the motivation to participate in the study was more related to the extra credits they received for courses as a reward, rather than the wish to learn a behavioral self-regulation technique meant to help them eat more fruit.

Since this was a feasibility study, valuable lessons are to be considered. The manipulation check provides a successful discrimination among the three experimental conditions. However, whereas the distinction between ego-depletion condition and the control condition was excellent (all post hoc comparison being significant at  $p < .001$ ), there were less clear cut difference between the hopelessness group and the ego-depletion condition (both groups felt more tired after the manipulation task, but those in the ego-depletion condition also find the target task as more difficult). Likewise, post hoc comparisons solely based on the adapted version of Mood Introspection Scale failed to differentiate between the hopelessness condition and the control condition on key aspects (hopelessness level as a state), although the result was in the expected direction. More importantly, eligibility conditions for

participants should be configured based on these pilot study findings. In future research, we intend to increase the number of participants in each experimental condition and only include in the experiment those participants that either do not consume fruit at all, or consume very little fruit (e.g. less than or up to two pieces of fruits per day), because we want to test the effectiveness of implementation intention strategy that was acquired on various learning contexts on target participants who otherwise face difficulties in their attempt to increase their fruit consumption.

## References

- Adriaanse, M., Vinkers, C., DeRidder, D., Hox, J., De Witt, J. (2010). Do implementation intentions help to eat a healthy diet? A systematic review and meta-analysis of empirical evidence. *Appetite*, *56*, 183–193. doi:10.1016/j.appet.2010.10.012.
- Bargh, J. A. (1994). The Four Horsemen of Automaticity: Awareness, Efficiency, Intention, and Control in Social Cognition. In R.S. Wyer and T.K. Srull (eds.) *Handbook of Social Cognition* (Vol. 1, pp. 1–40). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: is the active self a limited resource? *Journal of Personality and Social Psychology*, *74*(5), 1252–65.
- Bélanger-Gravel, A., Godin, G., Amireault, S. (2013). A meta-analytic review of the effect of implementation intentions on physical activity. *Health Psychology Review*, *7*(1), 23–54. doi: http://dx.doi.org/10.1080/17437199.2011.560095.
- Carter, E.C., Kofler, L.M., Forster, D.E., McCullough, M.E. (2015). A Series of Meta-Analytic Tests of the Depletion Effect: Self-Control Does Not Seem to Rely on a Limited Resource. *Journal of Experimental Psychology: General*, *144*(4), 796–815. doi: http://dx.doi.org/10.1037/xge0000083
- Chen, M., & Bargh, J. A. (1997). Nonconscious behavioral confirmation processes: The self-fulfilling consequences of automatic stereotype activation. *Journal of Experimental Social Psychology*, *560*, 541–560. doi:10.1006/jesp.1997.1329
- Chen, X., Wang, Y., Liu, L., Cui, J., Gan, M., Shum, D.H.K., Chan, R.C.K. (2015). The effect of implementation intention on prospective memory: A systematic and meta-analytic review. *Psychiatry Research*, *226*(1), 14–22. doi: http://dx.doi.org/10.1016/j.psychres.2015.01.011
- Gollwitzer, P. M. (1999). Implementation intentions. Strong effects of simple plans. *American Psychologist*, *54*, 493–503.
- Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement. A meta-analysis of effects and processes. *Advances in Experimental Social Psychology*, *38*, 69–119.
- Hooper, L., Summerbell, C. D., Higgins, J. P. T., Thompson, R. L., Capps, N. E., Smith, G. D., et al. (2001). Dietary fat intake and prevention of cardiovascular disease. A systematic review. *BMJ*, *322*, 757–763.
- Kumanyika, S. K., Van Horn, L., Bowen, D., Perri, M. G., Rolls, B. J., Czajkowski, S. M., et al. (2000). Maintenance of dietary behavior change. *Health Psychology*, *19* ((Suppl. 1)), 42–56.
- Liu, H. R. (2003). Health benefits of fruit and vegetables are from additive and synergistic combinations of phytochemicals. *Am J Clin Nutr* 2003;78(suppl):517S–20S.
- Mayer, J. D., & Gaschke, Y. N. (1988). The experience and metaexperience of mood. *Journal of Personality and Social Psychology*, *55*, 102–111.

- O'Brien, G., & Davies, M. (2007). Nutrition knowledge and body mass index. *Health Education Research*, 22, 571–575.
- Pan, H. H., & Chiou, C. P. (2004). [Hopelessness: a concept analysis]. *Hu li za zhi. The journal of nursing*, 51(1), 85–90.
- Parks-Stamm, E. J., Gollwitzer, P. M., & Oettingen, G. (2007). Action control by implementation intentions. Effective cue detection and efficient response initiation. *Social Cognition*, 25, 248–266.
- Toli, A., Webb, T.L., Hardy, G.E. (2015). Does forming implementation intentions help people with mental health problems to achieve goals? A meta-analysis of experimental studies with clinical and analogue samples. *British Journal of Clinical Psychology*, 55, 69–90.
- Webb, L., Gallo, I. S., Miles, E., Gollwitzer, P.M., Sheeran, P. (2012). Effective regulation of affect: An action control perspective on emotion regulation. *European Review of Social Psychology*, 23, 143–186.
- Webb, T.L. & Sheeran, P. (2003). Can implementation intentions help to overcome ego-depletion? *Journal of Experimental Social Psychology* 39, 279–286.
- Webb, T.L. & Sheeran, P. (2008). Mechanisms of implementation intention effects: The role of intention, self-efficacy, and accessibility of plan components. *British Journal of Social Psychology*, 47(3), 373–395.