Episodic Future Thinking and Delay Discounting in Persons with Prediabetes

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Purpose

Statistics suggest 1 in 3 U.S. adults are living with prediabetes, a condition which places them at high-risk for developing Type 2 Diabetes, and 90% of them don’t know that they have it. [1]. One of the many factors that increase risk is impulsive decision making with respect to health behaviors. For this study, Delay Discounting (DD), the bias for the smaller immediate rewards, is used as the measure for impulsivity. Research has shown that episodic future thinking (EFT), which is the mental simulation of future events [2-3], reduces discounting by reframing time perspective to place greater value in delayed outcomes [4]. In this study, 67 participants who were overweight/obese, with prediabetes, and comorbid hypertension and/or hyperlipidemia were recruited from the local Buffalo and Virginia communities and randomly assigned to one of two groups: an EFT group as well as an ERT (episodic recent thinking) control group. We predicted that through this EFT audio and visual cue generation, we could reduce discounting of the future, improve executive functions that support EFT, and reduce ad libitum energy intake in a taste test eating task. Sessions were spaced 3-4 days apart to ensure participants had time to complete additional at-home thought training with their generated cues.

Methods

Eligibility Criteria

- 18 years of age or older
- BMI ≥ 25 (self-reported, confirmed with in-lab measurements)
- HbA1c in prediabetes range (5.4% - 6.7% with PCP diagnosis/ 5.7% - 6.7% without PCP diagnosis, confirmed in lab session 1)
- Diagnosed with hypertension and/or hyperlipidemia
- Has not participated in EFT study within past 3 months/diabetes intervention within past 3 months

Study Foods:

Participants were required to have a snack-liking of 2/3 for at least 5 of 15 study foods.

Study Design

The PreScreen consisted of baseline demographic questions, medical history, and was done primarily to determine if participants were eligible for session 1.

In session 1, participants went through further screening procedures. They had their BMI and HbA1c measurements taken, and completed baseline measures of delay discounting through computer tasks. They also sampled study foods to ensure a food-liking score of ≥ 3.

In session 2, participants created and audio recorded their designated EFT/ERT cues. These cues were then played on the screen during the task, asking them to think about the cues before choosing an option. Participants were then trained on how to complete the at-home trainings with reminder texts, how to log into the website, engage with the cues, and to answer imagery questions related to the cues. They were also asked to listen to their cues before making certain health decisions (e.g. taking medications or not, when to go to bed, whether or not to exercise, etc.) and to complete a corresponding DD task.

In session 3, participants were asked to complete an ad-lib eating task in which they were free to eat as much or as little of the study foods as they’d like in the presence of their cues. They also completed a DD task in the presence of EFT/ERT cues.

EFT Cue example:

At-home thought training

Cue Generation

- EFT participants generated positive, personalized event(s) that are likely to occur in the future
- ERT participants recalled positive, personalized event(s) that occurred in the recent past

Delay Discounting

- Adjusting-Amount: the amount of the smaller reward increases or decreases depending on the preceding choice across consecutive trials until reaching an indifference amount
- Adjusting-Delay: the delay halves or doubles depending on the preceding choice across 5 trials

Ad-Lib Eating – Participants had 15 minutes to eat as much of their top food choices in the presence of their visual and audio cues

Results

Adjusted for General Adherence Factor

P = 0.24. While results in right direction (73 kcal different), failure to find significant differences may be due to use of candy as food for those with prediabetes, not using food with strong aroma, not having participants sample and handle food prior to consumption to increase craving.

This table breaks down the demographics of participants which were recruited for this study. Data is compiled between the two sites starting with UB.

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>MEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), ± SD</td>
<td>36.9 ± 11.0</td>
</tr>
<tr>
<td>Sex (Female)</td>
<td>48/52</td>
</tr>
<tr>
<td>BMI (kg/m²), ± SD</td>
<td>34.1 ± 7.6</td>
</tr>
<tr>
<td>Race/Ethnicity (% minority)</td>
<td>10.0</td>
</tr>
<tr>
<td>Education (years), ± SD</td>
<td>15.7 ± 2.1</td>
</tr>
<tr>
<td>Household Income ($), ± SD</td>
<td>84,516 ± 55,454</td>
</tr>
</tbody>
</table>

This table shows the moderate correlation between minority status and years of education with DD. It is shown minority status correlates with increased discounting while more years of education correlate with lower discounting, respectively.

N = 62 (all data) means +/- SEM adjusted for covariates

Conclusion

Results showed that in the presence of EFT cues, delay discounting was significantly reduced when compared to ERT controls. Additionally, EFT is also demonstrated to work immediately on reducing discounting in the presence of self-generated cues. We also saw that at-home thought training was significantly beneficial for those receiving EFT.

Interestingly, minority status and years of education were significantly correlated with DD. These findings suggest that EFT may be appropriate in clinical settings through its ability to reduce discounting of the future.

References


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