

There is influence on Self-control from Restrained Eating

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ABSTRACT

The purpose of this experiment was to explore the self-control ability of subjects in restrictive diet. The collocation scores of subjects in daily eating were measured by test, and the data were analyzed by SPSS statistical method. Based on reviewing the previous studies, this paper carries out experiments, pointing out that the self-control ability of different types of food eaters can be studied from the perspective of picture stimulation food temptation. Through horizontal comparison, the influence of weight loss psychology on personal control can be proved finally. It is hoped that we can find out the problems and provide reference information for solving the problem of obesity and losing weight.

KEYWORDS

Self-control; Restrained eating; Weight loss psychology; Dietary behavior; SPSS analysis

1. INTRODUCTION

With the continuous development of the global economy, the improvement of people's material living standards, coupled with the impact of social culture and environment, obesity has gradually become a global problem affecting personal health and psychological condition. So how to lose the weight successfully becomes a hot topic and there are more and more restrained eaters. Restrained eating refers to the tendency to restrict eating in order to control weight (reduce or maintain) (Herman & Mack, 1975). To keep or pursue slim figure, restrained eaters always have to control their food intake. The purpose of this paper is to analyze the ability of self-control among restrained eaters, namely the influence of psychological weight loss on control power. To investigate the question, various definitions will be provided and a range of related researches will be presented. The questionnaire will be designed to examine the control ability through the bases of picture stimulus, which produce a suppositional scene full of food temptation. And then SPSS(Statistical Product and Service Solutions) will be applied to analyze the data resource. To study the self-control ability of different types of eaters, the paper will do horizontal comparisons, and finally explore that weight loss psychology has an impact on personal control. And hope to find problems from it, providing reference information for weight loss and slimming.

2. 2 LITERATURE REVIEW

After the analysis of different and extraordinary ideas, most researchers' focuses are on finding the reasons why restrained eaters always fail to keep on a diet and leading to overeating.

There are three similar theories can be quoted to explain the reasons of dieting failure according to different studies from several writers.

The goal conflict model (Stroebe, Van Koningsbruggen, Papies, & Aarts, 2013) considers that restrictive dieters have two conflicting goals: diet goal and hedonic goal. Dieting goal refers to the long-term goal of maintaining or losing weight by refusing to eat in the face of food temptation, while hedonic goal refers to the short-term goal of enjoying and satisfying eating in the face of food temptation. Both conflicting goals are what restrictive dieters want. When dietary goals dominate, individuals successfully resist food temptation and achieve dietary goals. When hedonic goals dominate, individuals overeat, leading to diet failure (Stroebe et al., 2013). The goal conflict model of eating explains that delicious food disrupts dieting intentions and ultimately inhibits the self-regulation ability of dieters, suggesting that the reward characteristics of food play a very important role in overeating of restrictive dieters (Ashleigh, Eva, Robyn, & Philip, 2014). According to Temptation-elicited Goal Activation, temptation food cues lead to the activation of weight control goals, and the relationship between them is regulated by perceived success in self-regulation, which means that among successful self-regulators, temptation cues are more likely to trigger the primary goal (Fishbach Friedman, & Kruglanski, 2003).

Based on previous studies and related theoretical models of restrained diet, this study proposes the use of lateral inhibition paradigm to investigate the self-control ability of restrictive dieters inducing resistance to interference stimuli.

3. METHODOLOGY

3.1. Research Design

The hypothesis about this study is that there is influence on self-control form losing weight psychology.

Dietary questionnaire (original design) was used in this experiment. The total score of the questionnaire reflects the level of control.

The questionnaire is a set of questions about how to choose different food (there are pictures in the questionnaire) as three meals and snacks a day, as well as relevant personal information. Choosing different food reflects the influence of weight loss psychology on control. And every subjects' questionnaire will be scored, which is based on whether they choose healthy food (low oil, low salt, low fat, low sugar) or not

The designing of questionnaire is based on previous studies and related theoretical models of restrictive diet(the goal conflict model of eating, Temptation-elicited Goal Activation), this study uses the lateral inhibition paradigm to investigate the self-control ability of restrictive dieters by inducing resistance to interference stimuli.

The independent variables are different ways of choosing food, the type of fat and thin and the willingness to lose weight, and the dependent variable is the control ability of the subjects (reflected by the final score of the questionnaire).

The data will be collected through the internet and analyzed by SPSS.

3.2. Subjects or Participants

85 students (37 men, 48 women) of Southwest University, who received monetary compensation. And their age is distributed between 18-25 years old. This paper will use random sampling method through the way of randomly issuing questionnaires on the internet. And besides age, other characteristics of the sample will be surveyed, like different willingness of lose weight, fat type (according to BMI), and whether subjects eat midnight snack.

The data of every subjects are acquired on the internet. The procedure of collection is that the questionnaire is released in different SWU university online chat group through different chatting software like QQ and WeChat.

And the weakness of the sampling procedure is that the age distribution of subjects is too centralized because they are both university students, which results in the lack of age difference analysis.

In the experiment, subjects' data is privileged information and won't be shared with the general public. The data is only known and restored by our experiment team members.

Subjects' participation is voluntary and they can choose to withdraw from the study at any time. In the final, the result of the experiment will be sent to those subjects who want to know and have left their contact way.

3.3. Apparatus and Materials

Self-designed questionnaire and networking equipment is used in the experiment because the questionnaire is released through the network. The recording device is an online website (<https://www.wjx.cn>) which can design, reclaim the questionnaire and record the data. There is no test setting in this experiment because all subjects can do the test on the internet. Also, the instruments have some weakness that is the environment of subjects can't be controlled when they are doing questionnaires. This may impact the study result.

Instrument #1 – Dietary questionnaire- The questionnaire about self-control test used in the research is original design and its reliability is high (according to SPSS, its reliability is 0.777 and its validity is 0.481). The questionnaire's content is to let subjects choose different food pictures to match three meals and there are different types of food (healthy or unhealthy).

The principle of questionnaire design is the lateral inhibition paradigm which examine the self-control ability of restrictive dieters through resistance to induced interference stimuli.

In addition, according to Temptation-elicited Goal Activation, temptation food cues lead to the activation of weight control goals, and the relationship between them is regulated by perceived success in self-regulation, which means that among successful self-regulators, temptation cues are more likely to trigger the primary goal. (Fish Bach, Friedman, & Kruglanski, 2003).

The following is a sample of the original questionnaire. 'Please match your breakfast with your first feeling when you see the following pictures 'and then there are various food pictures can be chosen in the test. Those food pictures can be categorized into two kinds: healthy and unhealthy. If subjects choose healthy food pictures, their final test score will be increased, and the unhealthy food pictures were processed in the opposite way.

Instrument #2 – Networking Devices-Devices like mobile phones, laptops, iPad. etc. are used to do the questionnaire as long as they can be connected to the internet and receive the questionnaires.

Instrument #3 – Online Website (<https://www.wjx.cn>) - It is used to collect data of subjects. It can not only preliminarily process data (like histogram, average score of each question, and so on), but also provide detailed data information on each question of the questionnaire, such as the score of every option of each question, every subjects' total score, the time of submitting questionnaire, etc.

3.4. Procedure

The whole experiment took about two months, including following stages.

Stage 1 Select experiment topic; (about 1 week)

Stage 2 Collect related information and articles; (about 1 week)

Stage 3 Do the thesis proposal; (about 1 week)

Stage 4 Design the questionnaire; (about 1 week)

Stage 5 Do the preparatory experiment and improve the questionnaire; (about 1 week)

Stage 6 Do the formal experiment; (about 3 weeks)

The following is the detailed steps of the formal experiment (The purpose of preparatory experiment is to improve the original design of questionnaire in terms of the first data collection. The specific steps are same as the formal experiment):

The first step is to prepare the color test paper in advance. This is a blinding experiment; the subjects do not know the real purpose of the experiment. The experimental instructions are as follows: "Please read the following questions carefully, fill in the basic information, and choose the most realistic answer. The purpose of this paper is to understand your dietary habits and dietary control. Please answer as much as possible". The food content of the three meals has been given on the test paper, with color pictures (color pictures can stimulate the subjects' imagination of taste and achieve the purpose of checking their control power). Food can be categorized into healthy and unhealthy but delicious types (such as heavy oil, heavy salt, fried, barbecue, etc.).

The second step is to classify the subjects into two groups: those who are losing weight and those who are planning to lose weight and those who are not.

The third step is to give the same test papers to the subjects online. After they had answered all questions, participants were paid, and thanked online (based on online payment).

The fourth step is to reclaim the test paper and score it. In this step, data are collected through the online website and then analyzed by SPSS software.

In the experiment, the independent variables are the result of food match, the type of fat and thin, and the willingness to lose weight. The dependent variable is the control ability of the subjects.

The total statistical methodology used in this study is descriptive statistics, variance analysis, t- test, cross analysis, correlation test, reliability and validity analysis and various histogram.

The descriptive statistics shows the average score of all subjects. The histogram shows which type of weight loss groups' score is highest. The variance analysis is used to test whether different categories (about Gender, willingness to lose weight, type of fat and thin) exists significant differences. The cross analysis is used to test which groups' score is much higher and whether its score distribution has statistical significance. The correlation test is used to test whether the correlation is significant between the total score and whether subjects eat snacks at night. Reliability and validity are used to test whether questionnaires can be used for experiments.

The Statistical hypotheses is that the group of losing weight has lowest score which means that they have lower control power because they suffer the depressant effect. That is to say, to inhibit eating behavior and produce anti-regulation phenomenon. Because restrictive dieters are highly sensitive to the goal of eating pleasure, the exposure of delicious food will lead to the activation of the goal of eating pleasure, and because the goal of eating pleasure is in conflict with the goal of weight control, the activation of the goal of eating pleasure will lead to the inhibition of the goal of weight control, and ultimately lead to diet violation and unhealthy diet (Stroebe et al., 2008).

4. RESULT

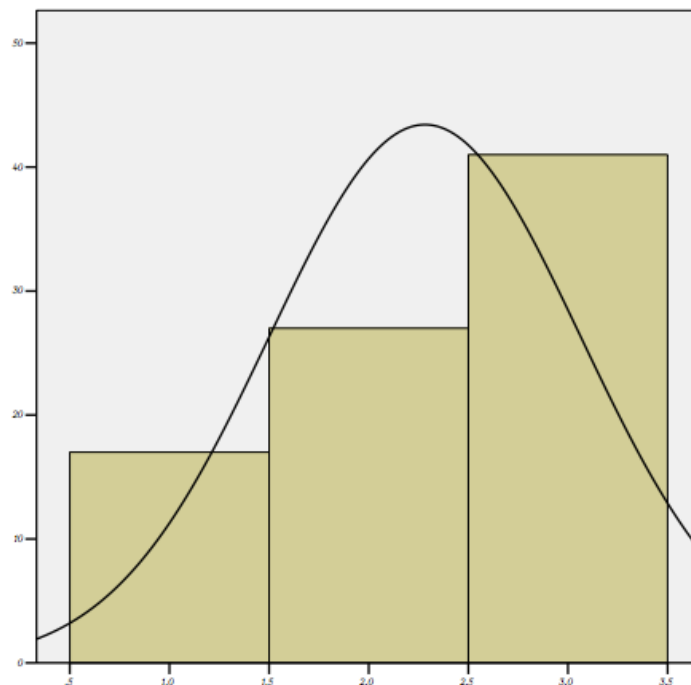
4.1. Descriptive Statistical Analysis

Table 1. Descriptive Statistics of Total Control Scores

	Number	Minimum	Maximum	Average	Sd
Total score	85	-6.0	21.0	7.435	5.7060
Effective N (in columns)	85				

According to the data in the table, the total distance of the control test score is 27, which shows that there is a big gap in the control level of the subjects, and the average score is 7.435, indicating that the overall control level is in the middle.

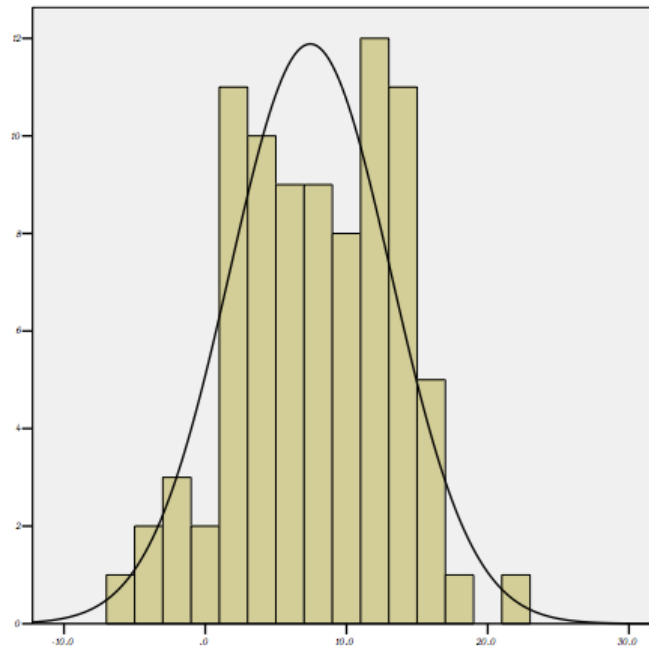
4.2. Frequency Distribution



The score of different wills to lose weight lose

Figure 1. Total Scores Across Different Weight Loss Intentions

Fig. 1 shows that the subjects are losing weight, 2 indicates that they intend to lose weight, and 3 indicates that they are not losing weight. The overall negative bias shows that the average total score of the subjects who do not lose weight is higher.



Total score distribution

Figure 2. Frequency Distribution of Total Scores

Figure 2 is the frequency histogram of the total score of the test. The overall distribution is normal and most total score is distributed in the middle fractional segment

4.3. Differences Were Tested for Gender, Willingness to Lose Weight, Type of Fat and Thin, Whether to Eat Supper Or Not.

Table 2. ANOVA Results for Gender, Midnight Snack Behavior, Weight Loss Intention, and Fatness Type

ANOVA						
		Sum of squares	df	Mean squares	F	Significance
Gender	Between groups	5.311	23	.231	.904	.593
	In groups	15.583	61	.255		
	total	20.894	84			
Whether eat midnight snacks	Between groups	8.419	23	.366	1.790	.037
	In groups	12.475	61	.205		
	total	20.894	84			
Willingness to lose weight	Between groups	17.840	23	.776	1.417	.140
	In groups	33.383	61	.547		
	total	51.224	84			
Fat and thin type	Between groups	11.336	23	.493	.705	.822
	In groups	42.617	61	.699		
	total	53.953	84			

From Table 2, we can see that gender, weight loss intention and obesity type have no significant effect on the total score, only whether eating supper or not has significant effect on the total score ($F = 1.79$, $P = 0.037$).

4.4. Comparing the Scores of Weights Loss and Non-Weight Loss (Cross-Tabulation, Chi-Square Test)

Table 3. Cross-tabulation of Weight Loss Intention and Body Type

Types of fat and thin * Cross-tabulation of willingness to lose weight					
		Willingness to lose weight			Total
		No weight loss	Plan to lose weight	Losing weight	
Fat and thin type	standard	24	16	9	49
	fatter	3	10	6	19
	thinner	14	1	2	17
Total		41	27	17	85

Table 3 shows that the total score of the group planning to lose weight is higher than that of the group not losing weight.

Table 4. Chi square test

	Numerical value	df	Asymptotically significant (2 ends)
Pearson Chi-square	16.372 ^a	4	.003
likelihood ratio	18.447	4	.001
Number of Effective Observation Values	85		

Table 4 shows that the probability is very significant ($P = 0.003$ and $P = 0.001$), and the sample accords with the expected distribution.

4.5. Relevance Test: Gender, Willingness To Lose Weight, Type of Fat and Thin, Whether to Eat Supper Or Not

Table 5. Correlation Between Midnight Snacking and Total Score

Relevance			
		Total score	Whether have midnight snacks
Total score	Pearson correlation	1	.356**
	Significance (double tail)		.001
	N	85	85
Whether have midnight snacks	Pearson correlation	.356**	1
	Significance (double tail)	.001	
	N	85	85

When the confidence level (double test) was 0.01, the correlation between whether to eat supper or not and the total score was significant, and the correlation coefficient was 0.356. This experiment also tested the correlation between gender, weight loss intention, type of obesity and total score. The results showed that there was no significant difference.

4.6. Reliability and Validity Analysis of Questionnaires

Table 6. Reliability Statistics of the Questionnaire

Reliability statistics	
Cronbach's alpha	Item number
.777	54

The internal consistency coefficient is 0.777, the reliability is good, and the difference is significant, which has statistical significance.

Table 7. KMO and Bartlett's Test of Questionnaire Validity

KMO and Bartlett test		
The suitability of KMO sampling.		.481
		.481
Bartlett's sphericity test	Chi Square Readed Last Time	2176.725
	df	1378
	significance	.000

The validity coefficient is 0.481, which is low and unsuitable for factor analysis.

5. DISCUSSIONS

5.1. Reasons for Lower Total Score of Dieters

The results show that the scores of people who lose weight are generally lower than those who plan to lose weight and those who do not lose weight. This is not consistent with our group's initial hypothesis that the scores of people who lose weight are higher, and also deviates from our preliminary experimental results.

Since the total score is directly related to the level of control power (lateral inhibition paradigm), and the total score is determined by the number of healthy foods selected and the health of dietary habits, our group believes that the total score of people who lose weight, i.e. restrictive dieters, should be higher because they have the habit of restricting diet for the purpose of weight control and have a clearer understanding of whether healthy food is available. But the final result is not in line with expectations. I think there are the following reasons:

Firstly, the possible reason why the pre-experiment conforms to our initial hypothesis is that the number of subjects is too small and the characteristics of the subjects are in line with our group's experimental expectations, so the results are not universal.

Secondly, the possible reason why the total score of weight loss population is lower is that restrictive dieters are more likely to produce the de-inhibition effect, that is, to inhibit eating behavior and produce counter-regulation phenomenon. Because restrictive dieters are highly sensitive to the goal of eating pleasure, the exposure of delicious food will lead to the activation of the goal of eating pleasure, and because the goal of eating pleasure is in conflict with the goal of weight control, the activation of the goal of eating pleasure will lead to the inhibition of the goal of weight control, and ultimately lead to diet violation and unhealthy diet (Stroebe et al., 2008). In this experiment, the subjects were exposed to delicious food for a long time (delicious food is often unhealthy, representing high calories), so the restrictive dieters are prone to lose self-control under the influence of weight loss psychology, thus choosing delicious high-calorie food and getting low score in our test.

A large number of studies on restrictive diet have shown that compared with normal dieters, restrictive dieters have weaker inhibition control ability (e.g. Dong et al., 2014). Especially in recent years, brain imaging studies have found that in resting state, restrictive dieters have weaker activity in brain regions (such as dorsolateral prefrontal lobe) involved in inhibition control function, and their gray matter volume is smaller (Dong et al., 2014; Van de L. R Laan et al., 2016), which may also explain why restrictive dieters are more difficult to control their eating than normal people.

5.2. The Difference and Correlation Between Gender, Weight Loss Intention, Type of Obesity and Total Score Are Not Significant

The experimental results show that the scores of restrictive dieters are lower, which is in line with previous studies, and also shows that this study has practical significance. However, the difference was not significant because the subjects were asked to choose food pictures based on their first sensation, which could reflect the direct influence of temptation stimulus. However, due to the uncontrolled experimental environment, which is in the form of questionnaires released through the Internet, the experimental time may be uncontrollable. Some subjects think too long, or they are in the state of eating when they are doing the questionnaires, and the role of picture stimulation is weakened, which will lead to the deviation of the results. Another reason may be that the experimental data show that the number of people who do not intend to lose weight is the highest, which more or less affects the results of this experiment, because the purpose of this experiment is to study the effect of weight loss psychology on control.

5.3. Analysis of the Significant Difference and Relevance between People Who Eat Night Food or Not

In all the data analysis, it was found that whether to eat supper or not had a very high difference and significance. According to the experimental data, people who do not eat supper have a higher total score, indicating that they have stronger control. And people who do not eat supper have a higher total score, whether they lose weight, plan to lose weight or not. According to the theory model of goal contradiction, any operation that can increase the possibility of eating pleasure goal will lead to overeating in an environment where delicious food is available everywhere. Our questionnaire simulates such an environment where delicious food is available everywhere. Therefore, people who choose not to eat supper in such an environment have obviously higher control power, which I think is very valuable. It is of reference significance to continue to study one aspect in the future.

5.4. Reasons for Low Validity

The reliability of the questionnaire is good, that is to say, the accuracy of the items to be measured in this experiment can be steadily measured.

However, the structural validity is low, and there are many factors affecting the validity, such as evaluation tools, evaluation process and evaluator factors, the status of the evaluators, criteria factors and reliability factors. From the data analysis above, we can see that the correlation of the experimental data is relatively low, which can also explain the low validity. At the same time, the experimental environment is not controlled, that is to say, the state of the subject cannot be controlled. Secondly, the experimental data show that the number of non-weight-loss population is the largest, which affects the results of the overall experiment. As the questionnaire is originally created by the experimental group, the theoretical structure is not perfect, and it still needs to be improved. These may be the reasons for the low validity of the structure.

6. RECOMMENDATIONS

6.1. Reflections on Experiments and Their Deficiencies

Because the experimental materials are pictures rather than words, the ecological validity of the experiment is further improved.

At the same time, the experimental task of this study is to determine whether the food in the target picture is suitable for three meals a day. Because there are a lot of food advertisements in real life, people have to make choices, so this task is more credible.

However, there are still many deficiencies in the experiment.

Firstly, the experiment did not control the experimental environment of the subjects, which would have a certain impact on the experimental results.

Secondly, after the analysis of the experiment, it is found that some of the reasons for the part of insignificant data should also be attributed to the fact that this experiment did not classify the people who lost weight successfully or failed because of the psychology of losing weight. This experiment only classified the willingness to lose weight and the type of fat and thin. The concept of weight loss psychology should also include an explanation of the results of successful weight loss.

Previous studies have shown that among successful weight loss individuals, successful people have a stronger ability to suppress and control food cues than unsuccessful weight loss individuals (McCaffery et al., 2009). So improving self-restraint control is the key to improving individuals' choice of unhealthy food (van den Akker, Stewart, Antoniou, Palmberg, & Jansen, 2014). Inhibition control is one of the core components of executive function. Individuals can suppress the dominant response and reduce the impact of interference information on current information processing by inhibition control, so as to flexibly adapt to changing situations (Diamond, 2013). This may also explain why the total score of the people who want to lose weight in this experiment is low, which accords with the de-inhibition effect, but the correlation and difference between some data and the total score are not significant.

6.2. Practical meaning and Future Prospect

This experiment also has some practical reference meanings. In recent years, almost 80% of the young people in China are losing weight. Most of them are suffering from eating disorders. They fall into the abyss of diet - gluttony - diet, or diet - anorexia bit by bit. In order to lose weight healthily, the eating environment is a key factor for the success of weight loss for restrictive dieters. It may be more beneficial for weight control to stay away from the high-energy food environment and create more clues about diet in daily situations.

In the future, we should continue to study the psychological control of successful and unsuccessful weight loss population, which will make the study more referential.

7. CONCLUSION

This study explored the impact of weight loss psychology on self-control among restrictive dieters. By utilizing a picture-based questionnaire and applying statistical analyses, the results indicated that individuals who are actively trying to lose weight tend to score lower on measures of dietary self-control, possibly due to the de-inhibition effect caused by prolonged exposure to tempting food cues. Additionally, a significant relationship was found between control scores and whether individuals eat midnight snacks, suggesting that habitual behavior plays a role in control ability. While gender, obesity type, and weight loss intentions showed no significant correlations, the study highlights the psychological complexity behind eating behaviors and suggests that simply desiring weight loss may

not lead to better self-regulation. These findings underline the importance of supportive environments and psychological interventions in promoting healthy dietary habits. Future research could explore differences between successful and unsuccessful weight loss attempts for a deeper understanding of behavioral self-control.

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