

**Title** : The Effects of Punishment and Reward Sensitivity on Intervention Efficacy for Procrastination in University Students with ADHD Tendencies: Single-Case Experimental Design Series (156/200)

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**Abstract body** :

### **Hypothesis/Objective**

University students with ADHD diagnosis have some academic problems in their daily life. One of their problems is procrastination, which is irrational delay even though recognizing the delay causes negative consequences (Steel, 2007). Procrastination increases mental problems, such as depression moods, low self-efficacy. However, there are few studies to examine the procrastination intervention for ADHD students. Therefore, this study aims to clarify the effect of procrastination intervention, and the influences of reward and punishments sensitivity to intervention effects. (78)

### **Method**

Twenty-four university students who have ADHD tendencies, ages ranging from 19 to 25, completed the study (Female = 16, Male = 8, Average of age = 20.42, *SD* = 1.50). Single-Case Experimental Design consisted of two phases, about three weeks baseline and six weeks intervention. Participants completed measurements of procrastination (GPS, PPS), depression (PHQ, CESD), and reward/punishment sensitivity (BIS/BAS, EROS) pre and post of study. And they also answered the GPS and PPS twice weekly, in baseline and intervention phases. (80)

### **Results**

As a result, procrastination scores decreased from pre- to post-intervention. The amount of changes in procrastination is positively related to the changes in depression symptoms. However, the BIS/BAS was not significantly related to all variables. On the other hand, the increasing EROS was negatively related to the change in procrastination and depressive symptoms. (53)

### **Conclusions**

The procrastination intervention has the effect of improving procrastination and depression among university students with ADHD tendencies. However, the reward and punishment did not

influence procrastination intervention. This study revealed decreasing procrastination, which means increasing the action needed, making perceived rewards cause decreasing depression.

(27)

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**Acknowledgement of Funding \***

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# The Effects of Punishment and Reward Sensitivity on Intervention Efficacy for Procrastination in University Students with ADHD Tendencies: Single-Case Experimental Design Series.

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## INTRODUCTION

- University students with ADHD often encounter academic difficulties.
- One such issue is procrastination, which refers to the irrational postponing of tasks despite recognizing negative consequences (Steel, 2007).
- Procrastination increases mental health issues (Johansson et al., 2023).
- However, there have been few studies conducted on interventions for procrastination in ADHD students.

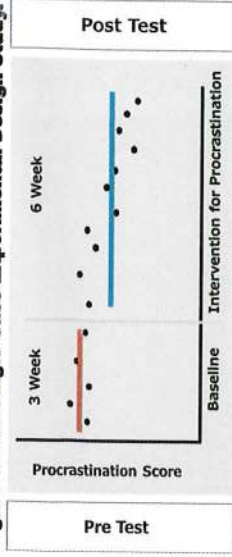
▶ **The Aim of this study** is to determine the impact of procrastination interventions and how sensitivity to rewards and punishments may affect the effectiveness of these interventions.

## METHOD

**Participants:** Twenty-four university students with ADHD tendencies were included in the analysis (The Average of age = 20.42, SD = 1.50, Female = 16).  
**Procedure:** Single-Case Experimental Design consisted of two phases, about three weeks baseline and six weeks intervention (Fig. 1).

**Intervention:** Once a week, a 60-minute procrastination program (Rozenal & Carbring, 2013) was conducted online.

## Figure 1. The Single-Case Experimental Design Study.



## Measurements

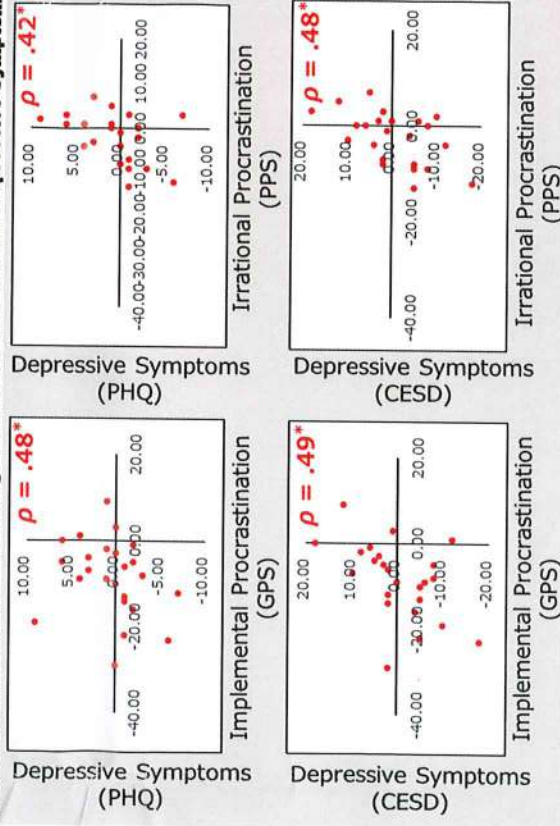
**ADHD Screening:** The Part A of Adult ADHD Self-Report Scale-v1.1 (ASRS; Kessler et al., 2005) was used to screening the participants. **Procrastination:** The Pure Procrastination Scale (PPS; Steel, 2010) and General Procrastination Scale (GPS; Lay, 1986) was used. **Depression:** The Center for Epidemiologic Studies Depression Scale (CESD; Steel, 1977) and Patient Health Questionnaire (PHQ; Kroenke et al., 2001) was used to measure participants' depressive symptoms. **Punishment/Reward Sensitivity:** The Behavioral Inhibition/Activation System (BIS/BAS; Carver & White, 1994) was used. **Reward Observation:** The Environmental Reward Observation Scale (EROS; Armento & Hopko, 2007) measure changes in reward perception in the environment.

## RESULTS

**Table 1.**  
The Change in Scores Pre and Post the Intervention for Procrastination.

	Pre		Post		r	p
	Mean	SD	Mean	SD		
General Procrastination (GPS)	52.38	7.84	43.88	11.12	-.74	<.01
Irrational Procrastination (PPS)	24.42	5.70	22.17	7.50	-.35	.09
Depressive Symptoms (PHQ)	11.58	8.22	11.33	6.61	-.05	.81
Depressive Symptoms (EROS)	3.13	3.25	3.63	3.20	-.11	.60
Reward Observation (EROS)	27.63	5.39	28.50	4.04	-.12	.57

**Figure 2.**  
The Correlation between the Changes in Procrastination and Depressive Symptoms.



**Table 2.**  
The Change in Scores Pre and Post the Intervention for Procrastination.

	The Changes of Score (Post - Pre)				
	GPS	PPS	EROS	CESD	PHQ
BIS (Pre Test)	-.09	-.29	.20	-.08	-.07
BAS (Pre Test)	.04	-.18	-.07	-.02	.09

**Table 3.**

The Baseline to Intervention Phase Changes by Standardized Mean Difference (SMD).

	GPS	PPS	Subfactor of PPS	
			Decisional Procrastination	Untimeliness
Mean	0.67	0.63	0.21	0.71
SD	1.82	1.82	1.54	1.57
Min.	-2.31	-2.14	-1.56	-1.00
Max.	6.08	5.86	5.61	6.68

**Figure 3.**

The Percentage of Participants showing Improvement in procrastination from baseline (red = improvement).



These results suggest that

- Procrastination intervention for college students with ADHD tendency was effective only for procrastination.
- Participants who improved their procrastination also tended to improve their depressive symptoms. Therefore, intervention for procrastination might also lead to decreasing depressive symptoms.
- The higher the reward observation (EROS), the more improvement was observed in procrastination ( $\rho = -.44, p < .05$ ) and depressive symptoms ( $\rho = -.61, p < .05$ ).
- However, the punishment and reward sensitivity before the intervention did not show any association with the intervention effects of procrastination.

## ACKNOWLEDGEMENTS

The part of this study's data were presented in the 48th Annual Meeting of the Japanese Association for Cognitive and Behavioral Therapy.

**Conflict of Interest Disclosure :**

The authors have declared that they have no competing or potential conflicts of interest. **Funding :** JSPS KAKENHI grant Number 202023103 to the first author.

**Ethical considerations :** All procedures performed in this study were approved by the assessment of the Ethics Review Committee on Research with Human Subjects of Waseda University. Application Number : 2021-177

## オンライン学会参加体験記

### 【大会概要】

2023年1月12日から1月15日にかけてアメリカで開催された、ADHDの専門国際学会であるAmerican Professional Society of ADHD and Related Disorders (APSARD) Conferenceに参加した。昨年度までは新型コロナウイルス感染症の影響によりオンライン開催の形式をとっていたが、2022年度はOrlando Floridaにて対面開催となった。2023年度のAPSARDのテーマは、「Navigating the New Normal: ADHD Etiology, Course, and Treatments」であった。

### 【発表内容の概要】

” The Effects of Punishment and Reward Sensitivity on Intervention Efficacy for Procrastination in University Students with ADHD Tendencies: Single-Case Experimental Design Series.” という演題で、ポスター発表を行った。

本研究は、成人期ADHD傾向者に対する先延ばし介入の効果と、報酬や罰の感受性が介入効果に及ぼす影響の検討を目的としていた。先延ばしに困り感を示しており、ADHD傾向のある大学生を対象に、6回の先延ばし介入を実施した。介入前に約3週間（ベースライン期）、介入中から介入後にかけて（介入期）、先延ばし測定を行うシングルケースデザインにより、参加者ごとの介入効果を検討した。

### 【学会体験記】

ポスター発表では、1時間30分の発表時間が設けられた。これまでの対面での経験を活かし、遠くからでも見やすい形式でポスターを作成したほか、補足資料として介入内容などの詳細を資料としてまとめ、iPadで提示することができるよう準備を行った。その結果、発表時に臨床経験が豊富な専門家から、介入内容について質問を受け、内容について議論を深めることが可能となった。さらに、修士2年時に同学会でポスター発表を行った際の参加者が、その時の記憶から再度ポスター発表を聞きに来てくださるといった、懐かしい再会も経験することができた。また、自身の研究において重要な論文を発表した研究者とも議論を行うなど対面開催ならではの、積極的なコミュニケーションをとることができた。

今回のポスター発表について、APSARDから学部生や院生を対象としたTravel Awardを受賞するに至った。その影響もあり、多様な研究領域の研究者とのコミュニケーションをとり、その後も継続的に連絡を取らせていただくなど、実感を持って国際的なネットワークの構築を経験することができた。今回の学会参加で得られた臨床および研究など、多様な領域における学びを、今後の活動に反映させるべく、研鑽を積んでいきたいと考えている。

採用された方については、ウェブページ等で内容が公開される予定です。