Advanced Methods in Developmental Psychology ~ Spring 2026

DP 4: Testing the bistrategic controller hypothesis

Background reading:

- Bornstein et al. (2017)
- Hartl et al. (2020)

PART 1

For this assignment, you will compare older students (grades 5 & 6) versus younger students (grades 3 & 4). To do so, you will need to create a new variable (name it what you will) that has two levels: older students and younger students.

1. Complete the table below.

2. Fill in the description note at the bottom of the table.

Demographic Characteristics of Study Participants

	Grade 3	Grade 4	Grade 5	Grade 6	Total
Gender					
Boys	84	69	75	87	315
	(48.6%)	(41.8%)	(48.1%)	(47.8%)	(100%)
Girls	89	96	81	95	361
	(51.4%)	(58.2%)	(51.9%)	(52.2%)	(100%)
Race					
1	9	8	2	5	24
	(5.2%)	(4.8%)	(1.3%)	(2.7%)	(100%)
2	142	137	144	165	588
	(82.1%)	(83.0%)	(92.3%)	(90.7%)	(100%)
3	16	8	4	6	34
	(9.2%)	(4.8%)	(2.6%)	(3.3%)	(100%)
5	6	11	5	5	27
	(3.5%)	(6.7%)	(3.2%)	(2.7%)	(100%)
6	0	1	1	1	3
	(0.0%)	(0.6%)	(0.6%)	(0.5%)	(100%)
Total	173	165	156	182	

Note. A chi-square test of independence was conducted to examine whether gender distribution differed across grade levels. The result showed that gender distribution did not significantly differ across grades, $X2(3, N= 676)= 2.024$, $p= .567$. A second chi-square test of independence was conducted to examine whether racial distribution differed across grade levels. The results showed that gender distribution did not significantly differ across grades, $X2\ (12, N= 676)= 20.445$, $p= .059$.

PART 2

As Hartl and colleagues (2020) did, you are going to create clusters of students based on their levels of aggression and prosocial behavior. First, standardize the aggressive and prosocial variables; save these variables in your data set. Using the "k means" method and specifying a 4-cluster solution, create a new variable that sorts students into one of 4 behavioral profiles as a function of two variables: standardized aggression and standardized prosocial. [i.e., Analysis Classify K means 4 clusters (save cluster group membership information)]

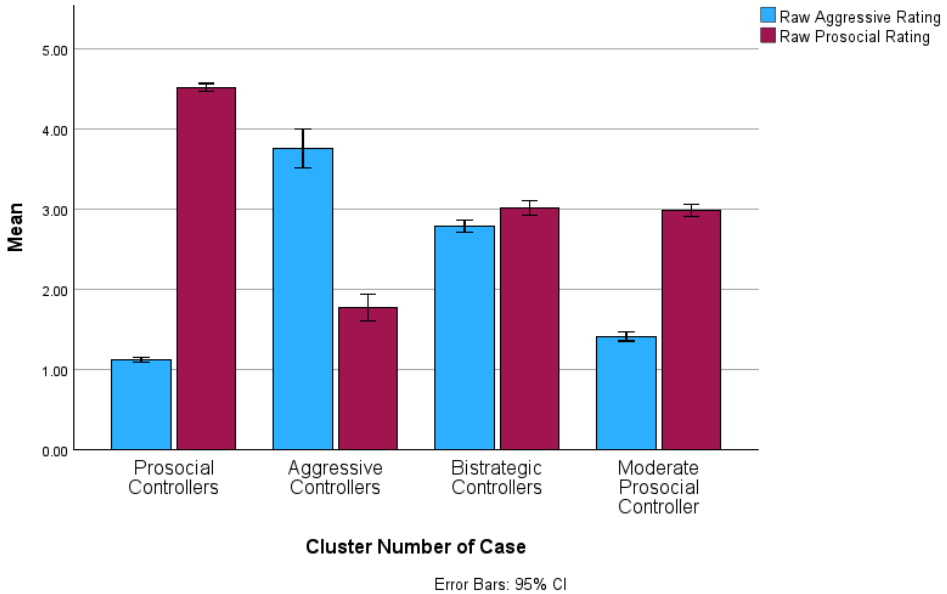
1. How many students are there in each of the four clusters?

2. What is the mean and sd of aggression and prosocial behavior for each cluster?

	Aggressive behavior			Prosocial behavior	
	M	sd		M	sd
Cluster 1 (n = 248)	1.116	0.258		4.519	0.421
Cluster 2 (n = 32)	3.760	0.679		1.771	0.464
Cluster 3 (n = 126)	2.787	0.442		3.016	0.517
Cluster 4 (n = 200)	1.408	0.397		2.984	0.530

3. Create a clustered bar chart with your behavioral clusters on the x-axis and (i) aggressive behavior and (ii) prosocial behavior on the y-axis. Edit your graph to be in accordance with APA format. Give your graph a title.

Behavior Scores by Social Cluster



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4. Do the four clusters differ significantly in aggressive behavior? Perform an appropriate analysis and provide an APA-style summary below.

A one-way ANOVA was conducted to examine whether aggressive behavior differed across the four behavioral clusters. The analysis revealed a significant effect of cluster membership on aggressive behavior, $F(3, 602) = 896.12$, $p < .001$, $\eta^2 = .817$, indicating that the clusters differed significantly in their average aggressive behavior scores. Post hoc comparisons using Tukey's HSD showed that aggressive controllers ($p < .001$), exhibited the highest levels of aggressive behavior scores, followed by bistrategic controllers ($p < .001$), then moderate prosocial controllers ($p < .001$), finally the lowest aggressive behavior scores being the prosocial controllers ($p < .001$).

5. Do the four clusters differ significantly in prosocial behavior? Perform an appropriate analysis and provide an APA-style summary below.

- A one-way ANOVA examined whether levels of prosocial behavior differed across the four k-means clusters. The analysis revealed a significant effect of cluster membership on prosocial behavior, $F(3, 602) = 622.29$, $p < .001$, $\eta^2 = .756$, indicating that the clusters differed significantly in their average prosocial behavior scores. Post hoc comparisons using Tukey's HSD showed that prosocial controllers exhibited higher levels of prosocial behavior than aggressive controllers ($p < .001$), bistrategic controllers ($p < .001$), and moderate prosocial controllers ($p < .001$). Aggressive controllers also exhibited significantly lower levels of prosocial behavior than bistrategic controllers ($p < .001$) and moderate prosocial controllers ($p < .001$).

6. Given what you found in #4 and #5, do your clusters align well with Hawley's 4-group behavioral framework that is based on median-split analysis of aggressive and prosocial behavior? Explain.

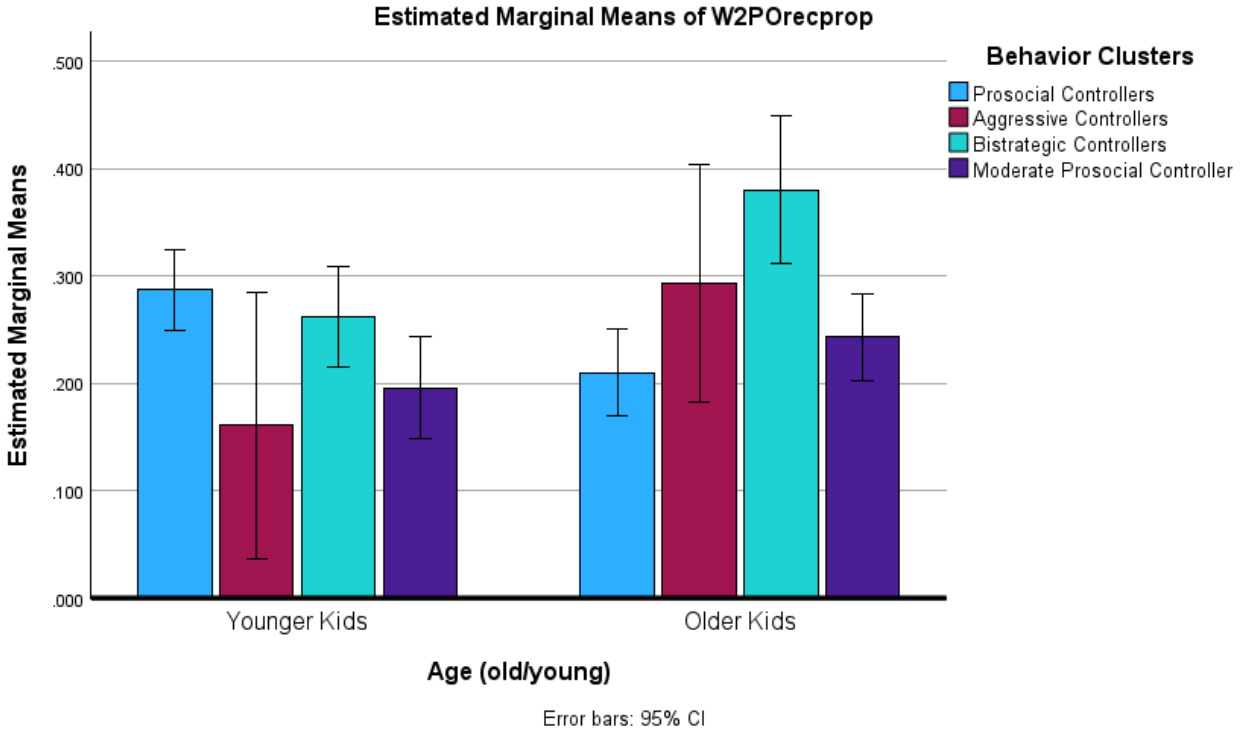
Yes, the cluster aligns well with Patricia H. Hawley's four-group behavioral framework. Hawley's model shows four behavioral profiles based on levels of aggression and prosocial behavior: prosocial controllers, aggressive controllers, bistrategic controllers, and non-controllers. In the analysis, the k-means clusters differed significantly in both aggressive behavior and prosocial behavior, indicating that the groups captured meaningful behavioral differences among students. The pattern of means also reflected the expected groups: one cluster showed high prosocial and low aggression (prosocial controllers), another showed high aggression and low prosocial behavior (aggressive controllers), a third showed high levels of both behaviors (bistrategic controllers), and the last cluster showed lower aggression with moderate prosocial behavior.

PART 3

Conduct an appropriate analysis to test Hawley's bistrategic controller hypothesis. Use spring popularity (i.e., wave 2) as your indicator of social power. Use your cluster variable as an independent variable. Use your younger/older variable as a moderator. Perform an appropriate analysis and provide an APA-style summary below. Create an appropriate graph that illustrates the age (younger/older) x cluster interaction. Edit the graph in accordance with APA format. Label this Figure 1 and provide an appropriate description below the graph, in accordance with APA format.

A moderation test was run, with behavior cluster membership as the predictor, spring popularity as the dependent, and age (old/young) as the moderator. There was a significant main effect found between behavior cluster membership and spring popularity, $F(3, 538) = 5.121$, $p = .002$, that was qualified by the age (young/old) x behavior cluster interaction, $F(3, 538) = 6.533$, $p < .001$. Post hoc tests with a Bonferroni correction were conducted to determine variance between groups. Among younger children, prosocial controllers were found to have higher popularity scores than moderate prosocial controllers ($p = .019$). Among older children, bistrategic controllers were found to have higher popularity scores than prosocial controllers ($p < .001$) and moderate prosocial controllers ($p = .004$). See Figure 1 for details.

Figure 1. Bar chart illustrating the age (young/old) x behavior cluster interaction effect on spring popularity.



Note. The X-axis depicts the separation between older (grades 5 & 6) and younger (grades 3 & 4) children. Separate, unique lines describe the average spring popularity scores (Y-axis) for each profile group in the behavior cluster variable (X-axis).

PART 4

As you did in Data Project 2, write an abstract that highlights your essential findings and tells a "sticky" story. Word limit: 350 words.

The research aimed to examine the bistrategic controller hypothesis based on Resource Control Theory, which argues that some children may attain social power through the co-occurence of aggressive and prosocial behaviors. To examine the bistrategic controller hypothesis, the research collected data from 676 elementary school students in grades 3-6 in Cleveland, Ohio. The students were grouped into clusters based on aggressive and prosocial behavior reported by teachers. The clusters were determined through k-means cluster analysis. Four clusters were identified: prosocial controllers, aggressive controllers, bistrategic controllers, and moderate prosocial controllers.

The clusters showed significant differences in aggressive and prosocial behavior. A one-way ANOVA showed differences in aggressive behavior between the clusters, $F(3, 602) = 896.12$, $p < .001$, $\eta^2 = .817$. Aggressive controllers showed the highest aggressive behavior, while prosocial controllers showed the lowest aggressive behavior. Also, the clusters showed significant differences in prosocial behavior, $F(3, 602) = 622.29$, $p < .001$, $\eta^2 = .756$. Prosocial controllers showed the highest prosocial behavior, while aggressive controllers showed the lowest prosocial behavior. The results showed a similar pattern to the four-group behavioral framework proposed by Hawley, which indicates the importance of the clusters identified in the research.

To examine the bistrategic controller hypothesis, a moderation analysis was used to assess if cluster membership was a predictor of popularity , as reported by peers, and if this relationship varied across age groups. The results indicated a significant main effect for the behavioral cluster on popularity, $F(3, 538) = 5.121$, $p = .002$. This was supported by a significant cluster by age interaction, $F(3, 538) = 6.533$, $p < .001$. For younger students, prosocial controllers were more popular than moderate prosocial controllers. However, for older students, bistrategic controllers had a higher popularity rating than both prosocial controllers and moderate prosocial controllers.

The study provided support for the bistrategic controller hypothesis. Younger children appeared to reward prosocial behaviors, while older children demonstrated greater social preference for bistrategic behaviors. The results of this study shows that as children become older, using both prosocial and aggressive strategies to achieve social status might be more effective in attaining social influence among kids.