

Advanced Methods in Developmental Psychology (PSYC 302) – Spring 2026

Workshop 3 – Sociometric Measurement, Quantification, and Classification

- **Background reading:** Cillessen, A.H.N., & Bukowski, W.M. (2018). Sociometric perspectives. In W.M. Bukowski, B. Laursen, & K.H. Rubin (Eds.), *Handbook of Peer Interactions, Relationships, and Groups* (pp. 64-83). New York, NY: The Guilford Press.
- **Due date:** Sunday, March 8, at 11:59 pm ET, via Blackboard.

Overview: The focus of this workshop is to examine the characteristics of sociometric measurements of children’s social functioning at school. We’ll examine a data set involving children in grades 1, 3, and 5. The data include teacher reports of children’s classroom behavior and sociometric measurements of children’s sociometric status.

In the table below, I describe the study variables that appear in the data set, along with their variable names as indicated in the SPSS data file. Additional information for each variable appears in the “variable view”.

Variable Name	Variable Label
StudentID	Student ID
Class	Classroom ID
Participation	Whether or not the student participated in the study
Sex	Teacher-reported sex
Race	Teacher-reported race
Grade	Grade level
Aggressive	Aggressive behavior (teacher-report)
Disruptive	Disruptive behavior (teacher-report)
Prosocial	Prosocial behavior (teacher-report)
AcadComp	Academic competence (teacher-report)
CloseTchr	Closeness to teacher (teacher-report)
Friendship	friend nominations received from classmates (proportion)
Acceptance	like MOST nominations received from classmates (proportion)
Rejection	like LEAST nominations received from classmates (proportion)

PART 1

1. Create a table (title this “Table 1”) in which you report demographic information for study participants (gender and race only). Your table should be formatted in APA style. Use Table 1 from Workshop 2 as a guide.

2. Did the gender distribution differ reliably by grade level? Provide relevant statistical test information and your conclusion in the note below Table 1.

3. Did the racial distribution differ reliably by grade level? Provide relevant statistical test information and your conclusion in the note below Table 1.

Table 1

Demographic Characteristics of Study Participants

	Grade 1	Grade 3	Grade 5	Total	<i>Note. A</i>
Gender					
Boys	72 (56.3%)	100 (49.5%)	59 (42.1%)	231	
Girls	56 (43.8%)	102 (50.5%)	81 (57.9%)	239	
Race					
African American	10 (7.8%)	21 (10.3%)	20 (14.3%)	51	
Latino/Hispanic	6 (4.7%)	16 (7.9%)	7 (5%)	29	
Asian	1 (0.78%)	2 (0.99%)	4 (2.9%)	7	
European American	95 (74.2%)	143 (70.8%)	95 (67.9%)	333	
Multi-Racial	16 (12.5%)	18 (8.9%)	13 (9.3%)	47	
Other	0 (0%)	2 (0.99%)	1 (0.71%)	3	
Total	128	202	140	470	

Chi-squared test for independence was run to determine if the gender distribution differed between grade level. There was no significant difference in gender distribution by grade level, $\chi^2(2, 470) = 5.34$, $p = .069$. A Chi-squared test for independence was run to determine if the racial distribution differed between grade level. There was no significant difference in racial distribution by grade level, $\chi^2(10, 470) = 9.66$, $p = .471$.

PART 2: Creating relevant dimensional and status type variables.

1. Your data are completely raw. They are the original variables and have not been transformed in any manner. Keep these original variables and create the following new DIMENSION variables:
 - a) SocialPreference: Acceptance – Rejection
 - b) SocialImpact: Acceptance + Rejection
 - c) Zacceptance: Acceptance score standardized **within classroom** (a z-score)
 - d) Zrejection: Rejection score standardized **within classroom** (a z-score)
 - e) ZSocialPreference: Social preference score standardized **within classroom** (a z-score)
 - f) ZSocialImpact: Social impact score standardized **within classroom** (a z-score)
2. Create a variable called StatusType, according to the following criteria:
 - a) Popular = above the mean in acceptance, below the mean in rejection
 - b) Rejected = above the mean in rejection, below the mean in acceptance
 - c) Controversial = above the mean in acceptance and rejection
 - d) Neglected = below the mean in acceptance and rejection

* Note. We are NOT creating an “Average” group for this workshop.

PART 3: Examining concurrent validity of DIMENSION variables. Assessing the validity of our sociometric measures will include two steps. First, we will determine the linear associations between our sociometric dimensional variables (i.e., acceptance, rejection, social preference, and social impact) and teacher-reported behaviors. Second, we'll compare our findings to prior findings in the literature, as reported in chapter 4 of the handbook (Cillessen & Bukowski, 2018). You do not need to report your results in APA format. Just complete the tables below.

Correlations between **peer acceptance** and teacher-reported behaviors

	<i>N</i>	<i>r</i>	<i>p</i>
Aggressive behavior	470	0.047	-0.218
Prosocial behavior	470	0.102	0.319
Academic competence	470	0.070	0.265
Are your findings consistent with prior findings, as reported in chapter 4 of the handbook? Explain. Chapter four of the handbook found that peer acceptance was correlated with prosocial behaviors. Our findings align with this finding because the correlation between peer acceptance and prosocial behaviors is quite strong. The handbook also found that academic achievers were more likely to understand the social dynamics of the classroom, which aligns with our findings as well.			

Correlations between **peer rejection** and teacher-reported behaviors

	<i>N</i>	<i>r</i>	<i>p</i>
Aggressive behavior	470	0.105	0.324

Prosocial behavior	470	0.113	-0.336
Academic competence	470	0.046	-0.214
Are your findings consistent with prior findings, as reported in chapter 4 of the handbook? Explain. The findings in the handbook align with our data because a child with higher levels of aggression is more likely to be rejected. We found that rejection also correlates with lower prosocial behavior and academic competence. However, the handbook stated that popularity was associated with both prosocial and antisocial characteristics.			

Correlations between **social preference** and teacher-reported behaviors

	<i>N</i>	<i>r</i>	<i>p</i>
Aggressive behavior	470	-0.311**	< .001
Prosocial behavior	470	0.375**	< .001
Academic competence	470	0.274**	< .001
Are your findings consistent with prior findings, as reported in chapter 4 of the handbook? Explain. These findings are very consistent with chapter four of the handbook. Chapter four explained that acceptance (or sociometric popularity) is an indicator of social competence. Because the SocialPreference variable was computed by subtracting rejection nominations from acceptance nominations, we can see that children who received a greater number of acceptance nominations performed better socially and academically (receiving low reports of aggression, high reports of prosocial behavior, and high reports of academic competence).			

Correlations between **social impact** and teacher-reported behaviors

	<i>N</i>	<i>r</i>	<i>p</i>
Aggressive behavior	470	0.116*	.012
Prosocial behavior	470	-0.025	.582
Academic competence	470	0.046	.319
Are your findings consistent with prior findings, as reported in chapter 4 of the handbook? Explain. These findings are pretty consistent with prior findings, as reported in chapter 4 of the handbook, in that, they are not consistent. The handbook reported social impact as a notoriously unstable variable compared to social preference, because while social preference largely relies on group consensus, social impact can be more of an individualized rating. Therefore, it makes sense that there isn't as much of a linear similarity between aggressive, prosocial, and academic competence correlations for social impact as there is for social preference.			

PART 4: Examining concurrent validity of the STATUS TYPE variable. Assessing the validity of our status types (i.e., sociometric status groups) will include two steps. First, we will determine whether there are significant differences between sociometric groups in teacher-reported behaviors. Second, we'll compare our findings to prior findings in the literature, as reported in chapter 4 of the handbook (Cillessen & Bukowski, 2018). You do not need to report your results in APA format. Just complete the tables below.

1. How many students (and %) are there of each status type within each grade level? Complete Table 1.

Table 1

Cross-tabulation of Status Group Membership by Grade Level

	Grade 1	Grade 3	Grade 5	Overall
Popular	42 (32.8%)	86 (42.6%)	57 (40.7%)	185 (39.4%)
Rejected	40 (31.3%)	73 (36.1%)	42 (30.0%)	155 (33.0%)
Neglected	23 (18.0%)	23 (11.4%)	27 (19.3%)	73 (15.5%)
Controversial	23 (18.0%)	20 (9.9%)	14 (10.0%)	57 (12.1%)
Total	128	202	140	470

Note. Percentages reported are column percentages (e.g., percentage of students in grade 1 who are categorized as popular, rejected, neglected, and controversial).

2. Does the distribution of STATUS TYPES differ reliably by grade level? (a) Conduct the appropriate analysis to address this question. Write your results and conclusion below in APA format. (b) Are these findings consistent with the literature, as reported in the chapter by Cillessen and Bukowski? Explain. (If you believe the authors did not provide the relevant information to answer this question, please say so.)

A Chi-squared test for independence was run to test if the distribution of status types differed by grade level. The distribution of status types did not significantly differ by grade level, $\chi^2(6, 470) = 12.04, p = .061$. According to Cillessen and Bukowski's chapter in the handbook, peer status varies year by year due to factors such as developmental factors or structural factors. Therefore the changes in grade size can affect a child's status type.

3. Do the 4 **status types** differ from each other with respect to teacher-reported prosocial behavior, aggressive behavior, or academic competence? Complete the table below. For each variable, conduct the appropriate analysis of variance to test the null hypothesis that the means for the 4 status types are equivalent. Use Tukey's HSD post hoc test to assess pairwise differences between status types. In each row, provide subscripts below the group means such that any two means that do not share a subscript differ significantly from each other.

- A One Way ANOVA with a Tukey post hoc test showed significant variance between the four status types. Rejected students showed more aggressive behavior than popular students. Popular students exhibited significantly different amounts of prosocial behaviors than all three other status types. Popular students also exhibited higher academic competence levels than rejected and neglected students.

Table 2

Descriptive Statistics of Teacher-reported Variables by Status Type

	Popular	Rejected	Neglected	Controversial	
	Mean (<i>sd</i>)	Mean (<i>sd</i>)	Mean (<i>sd</i>)	Mean (<i>sd</i>)	<i>F</i> -statistic
Aggressive behavior	1.37 ^a (0.61)	1.87 ^b (0.96)	1.60 ^{ab} (0.92)	1.65 ^{ab} (1.02)	f(3, 466)= 9.996
Prosocial behavior	4.32 ^a (0.64)	3.66 ^b (0.90)	3.87 ^b (0.97)	3.90 ^b (0.94)	f(3, 466)= 19.177
Academic competence	3.95 ^a (0.97)	3.34 ^b (1.15)	3.55 ^b (0.88)	3.62 ^{ab} (1.17)	f(3, 462)= 10.04

Note.

Tukey's HSD post hoc test was used to make pairwise comparisons. Values that do not share a subscript differ significantly from each other (< .05).

p* < .05. *p* < .01.

PART 5: Creating STATUS TYPES with CLUSTER ANALYSIS.

1. Use cluster analysis to create 4 groups from the acceptance and rejection items (standardized within classroom). Analyze □ Classify □ K-means cluster □ Specify 4 clusters □ Select “Zacceptance” & “Zrejection” variables □ Save cluster membership. How many students are there of each status type? (Record in table below.)

Table 3

Cross-tabulation of Status Group Membership by Grade Level

	Grade 1	Grade 3	Grade 5	Overall
Low Rejection/Very Low	39	47	35	121
Acceptance	(30.5%)	(23.3%)	(25.0%)	(25.7%)
Medium Rejection/Low	29	41	30	100
Acceptance	(22.7%)	(20.3%)	(21.4%)	(21.3%)
Low Rejection/High	24	43	27	94
Acceptance	(18.8%)	(21.3%)	(19.3%)	(20.0%)
Very Low Rejection/High	36	71	48	155
Acceptance	(28.1%)	(35.1%)	(34.3%)	(33.0%)
Total	128	202	140	470

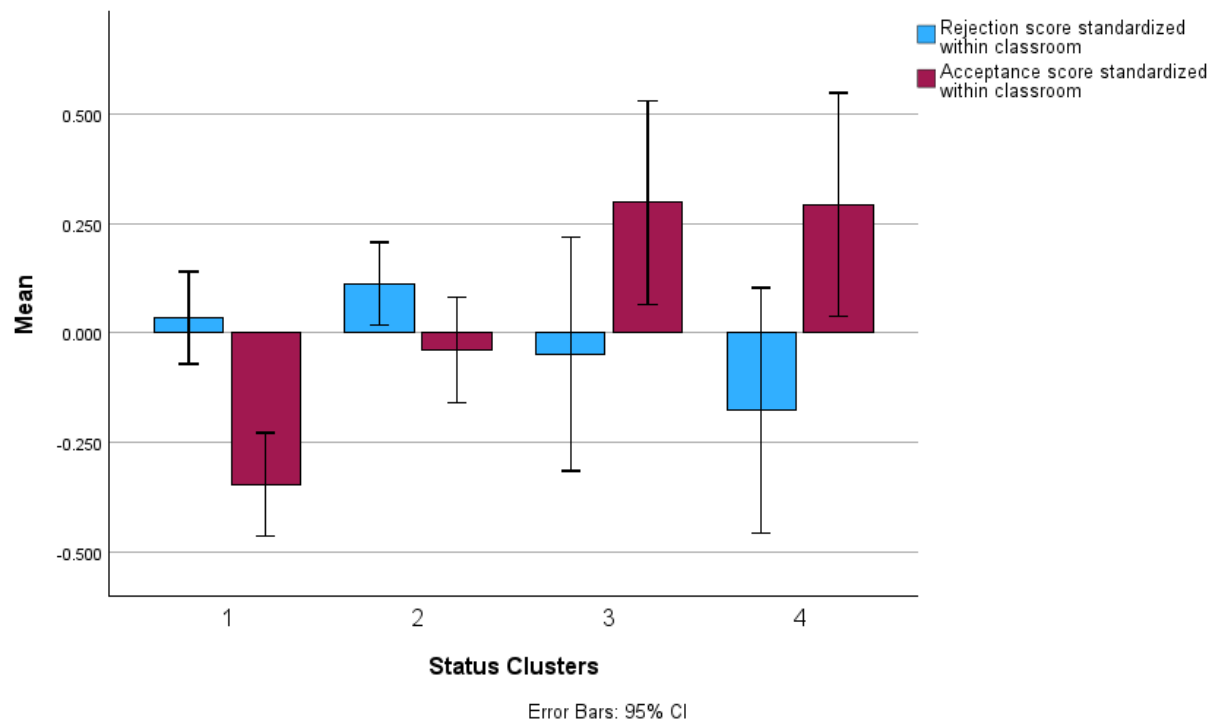
2. Does the distribution of STATUS CLUSTERS differ reliably by grade level? (a) Conduct the appropriate analysis to address this question. Write your results and conclusion below in APA format. (b) Are these findings consistent with the literature, as reported in the chapter by Cillessen and Bukowski? Explain. (If you believe the authors did not provide the relevant information to answer this question, please say so.)

- A Chi-squared test for independence was run to determine if the distribution of status clusters differed by grade level. There was not a significant difference in distribution of status clusters by grade level, $\chi^2(6, 470) = 3.407, p = .756$. These findings are consistent with

Cillessen and Bukowski's chapter in the handbook because they stated that "Peer status is not carved in stone from one school year to the next" (pg. 75), indicating that the distribution in cluster status changes in every grade every school year.

3. Examine your 4 clusters in terms of their relative levels of acceptance and rejection scores. To do so, create a bar graph with (1) the cluster variable on the x-axis and (2) both acceptance and rejection on the y-axis. [Go to Graphs □ Chart builder □ Bar graph. Include error bars.]

- (a) Copy and paste your output below. Based on your visual inspection of the graph, provide a semantic label for each cluster. Use these semantic labels to rename your clusters in Table 3.



- 1: Low Rejection/Very Low Acceptance (LRVLA)
- 2: Medium Rejection/Low Acceptance (MRLA)
- 3: Low Rejection/High Acceptance (LRHA)
- 4: Very Low Rejection/High Acceptance (VLRHA)

- (b) Do your 4 clusters seem to reasonably align with the 4 predetermined clusters you created in Part 3 (popular, neglected, controversial, rejected)? Explain.

The four clusters seem to roughly align with the predetermined clusters from part 3. Cluster 1, Low rejection/Very Low Acceptance, somewhat correlates with kids in the rejected group receiving the fewest “like most” nominations and the most “like least” nominations, though we would have expected much higher rejection levels. The rejected cluster from part 3 had 155 kids and the LRVHA cluster had 121 kids, the number of kids in these groups seem to correspond. Cluster 2 correlates with the neglected group, the neglected group had 73 kids and the MRLA had 100 kids. Cluster 3 correlates with the controversial group, the controversial group had 57 kids and the LRHA cluster had 94 kids. Lastly, the popular group correlated with cluster 4, the popular group had 185 kids and the VLRHA cluster had 155 kids. While the number of kids in each group and cluster didn’t match up exactly, they were all somewhat close.

Cluster 1 → Very Low Rejection/Very Low Acceptance → Rejected
 Cluster 2 → Medium Rejection/Low Acceptance → Neglected
 Cluster 3 → Low Rejection/High Acceptance → Controversial
 Cluster 4 → Very Low Rejection/Very High Acceptance → Popular

4. Do the 4 **status clusters** differ from each other with respect to teacher-reported prosocial behavior, aggressive behavior, or academic competence? Complete the table below. For each variable, conduct the appropriate analysis of variance to test the null hypothesis that the means for the 4 status types are equivalent. Use Tukey’s HSD post hoc test to assess pairwise differences between status types. In each row, provide subscripts below the group means such that any two means that do not share a subscript differ significantly from each other.

- The four status types do not differ significantly from each other with respect to the teacher reported behaviors. To determine this, we ran a one way ANOVA with a Tukey post hoc test using the Status Type, Aggressive, Prosocial, and Academic Competence variables.

Table 4

Descriptive Statistics of Teacher-reported Variables by Status Cluster

	Popular	Rejected	Neglected	Controversial	
	Mean (<i>sd</i>)	Mean (<i>sd</i>)	Mean (<i>sd</i>)	Mean (<i>sd</i>)	F-statistic
Aggressive behavior	1. 63 ^a (0.84)	1. 61 ^a (0.88)	1. 55 ^a (0.83)	1. 63 ^a (0.92)	f(3, 466)= .230
Prosocial behavior	3. 99 ^a (0.92)	3. 97 ^a (0.86)	3. 97 ^a (0.81)	4. 01 ^a (0.93)	f(3, 466)= .052

Academic competence	3.75 ^a (1.04)	3.54 ^a (1.02)	3.59 ^a (1.05)	3.80 ^a (1.20)	$f(3, 462) = 1.605$
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PART 6: Comparing theory-derived groups and empirically-derived groups

The objective of this workshop was to compare two methods of deriving children's sociometric status groups. In the first method, which was theoretically driven, you used predetermined thresholds (or cut-off values) to determine group membership. In the second method, which was data driven, you used cluster analysis to determine group membership. In 200-250 words, tell a “sticky” story of your data analysis and findings. *The reader should leave with an understanding of why the choice of method matters.* Consider the following:

- How did the results of these two approaches differ? How were they similar?
- End your narrative with a recommendation to the reader. Given your findings, along with ideas from the reading by Cillessen and Bukowski, do you recommend that researchers use one method or the other? Why?
- Your story should be a written narrative, akin to an abstract. Write in full prose. Do not use bullet points.

In this workshop we used a theoretically driven and data driven method to analyze children's sociometric status groups. In the theoretically driven method, we used z-scores to categorize children into status groups by analyzing if they were above or below the mean in “like most” and “like least” nominations. Using predetermined thresholds for each category made grouping the children straightforward. In the data driven method, we created four clusters in SPSS that grouped children with similar standardized acceptance and rejection scores. There were no thresholds in the cluster analysis, which meant some children were categorized in different groups than they were with cutoff values. Cluster analysis allowed us to group patterns in the data that were less rigid, creating categories centered around the specific children in the study. Meanwhile the theoretically driven approach provided categories that were consistent and comparable with previous sociometric studies using the same method. While both methods can assume a child's sociometric status, a data driven approach would allow a researcher more room in interpreting the data. A child's sociometric status may change over time, and Cillessen and Bukowski stated that “instability is part of a developmental process.” (Cillessen & Bukowski, 2018, p. 75) Additionally, determining sociometric status is complicated and may not be clearly expressed in definite categories.

PART 7: Conceptual questions

These data were drawn from a cross-sectional study and not a longitudinal study. Imagine that the authors of the present study had adopted not a cross-sectional study but a **single-cohort longitudinal design**, whereby they measured one cohort of students at 3 time points: grade 1, grade 3, and grade 5. (i) Using Little (2013) as a reference, what knowledge would be gleaned from such a study that is not gleaned from a cross-sectional study? Explain. (ii) Again using Little (2013) as a reference, what would be the limitations of a single-cohort longitudinal study?

With a single-cohort longitudinal design, we would have been able to observe the change in popularity and behavior over time. This could have shown us how a change in popularity over time affected individual children's behavior in school, more nuanced developmental trajectories of behavior and social skills, and highlighted developmental patterns in individuals. The limitations of using a single-cohort longitudinal design would mainly be found in generalizability and stability. A single-cohort longitudinal design would make it more difficult to generalize findings onto different cohorts, as well as to separate the effects of different variables and environmental factors. It would also add variables like stability of teacher ratings and increased desirability bias as the children age and become familiar with the study's procedures. In using a single-cohort longitudinal design, we would also have to account for the additional funding and access required to stretch the study for several years.