

Research in Psychology I  
Research Proposal Guide, Part II

Title: How to Write a Research Paper Methods, Results, Discussion, and Conclusions Without  
Developing an Overwhelming and Compulsive Urge to Kill

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I. Methods

A. Participants: Report information regarding subjects here.

1. number of subjects.

2. demographic characteristics:

- gender (number or % of each)
- ethnicity (African American, Asian Pacific Islander, Native American, Hispanic and/or Latino, Caucasian, and other),
- age range
- average age
- Class rank if college students are used.
- relationship status if applicable ( single, dating, engaged, married, separated, divorced).

3. describe where from, how selected, how assigned to groups (if applicable), and incentives for participation (e.g., payment or course credit).

For Example: (note that this should be double spaced)

Methods

*Participants*

Participants were 120 undergraduate college students attending a medium sized Southeastern university who were given course credit for their participation. Participants ranged in age from 18 to 26, with a mean age of 18.94. A majority of the participants were female (70%) and 30% were male. Also, a majority of the participants was Caucasian (85.8%), 9.2% were African-American, 1% were Asian/Pacific Islander, less than 1% were Native-American, less than 1% were Hispanic, and 2.5% reported “other” ethnicity. A majority of the participants were freshmen (85.8%), 10.8% were sophomores, 1.7% were juniors, and 1.7% were seniors. The average GPA reported was 3.16 with a range of 2.30. A majority of the participants were single (92.5%), 3.3% were married, 2.5% were divorced, 1.7% were engaged.

4. If they have important characteristics, describe them, e.g., depressed or ADHD, and how determined.

5. if participants excluded, explain why and describe criteria for inclusion in the study.

Also, report final sample size.

- e.g. “Two participants were excluded from the study do to their lack of hepatic tissue (no liver) and their advanced state of death. The remaining sample consisted of 178 participants.”

B. Materials (Measures / Apparatus)

1. If you are using paper pencil tests (questionnaires) each one used should be described in detail and include examples of items, a description of how measures were computed from the questionnaires, the mean, the standard deviation, and the range. Also, for scales with multiple items, the Cronbach’s Alpha should be reported.

For Example: (Note, this should be double spaced)

*Measures*

A measure of fearful animal attitudes was obtained using Aspelmeier’s (2002) Radford Avoidant Beast Interaction Test (RABIT) which assesses the degree of participant’s negative attitudes regarding small furry animals and their perceived likelihood of avoiding interactions with small furry animals. Participants rated 12 items on a seven point numerical rating scale as to how descriptive they were of

them (1 = very un-descriptive of me, 7= very descriptive of me). For items one through six, ratings were scored and summed such that a higher score indicated more negative attitudes toward small furry animals (NATSFA) , with  $M = 4.55$ ,  $SD = 2.12$ , and range = 6.99. Cronbach's Alpha (an estimate of internal consistency) was .89. Examples of the NATSFA scale items are: 1) "The Easter Bunny makes me sweat" and 2) "I often feel that vicious rabbits are lurking in the shadows." For items seven through 12, ratings were scored and summed such that a higher score indicated a greater perceived likelihood that one would avoid interactions with small furry animals (AISFA), with  $M = 3.89$ ,  $SD = 2.57$ , and range = 6.85. Cronbach's Alpha was .88. Examples of the AISFA scale items are: 1) "I would probably never go to a park that did not implement squirrel control techniques" and 2) "I would never wear a baby seal fur coat for fear of being attacked by it."

3. If you are using some kind of equipment or computer software to test participants then describe the equipment fully. (Note: sometimes this can be embedded in the procedures especially if your IV depends on how the equipment is set up, e.g. group 1 gets set up A and group 2 gets set up B).

For Example:

### *Apparatus*

A second measure of small furry animal phobia was obtained by using an armpit emissions assessment. A standard 400 mhz PC was programed to present various photographs of inanimate objects and a variety of photographs and cartoon caricatures of small woodland creatures. Participants arm pits were fitted with electronic moisture collection cups (Model Number THX-1138, Lafayette Instrument Co., Lafayette, IN). These cups records the amount of sweat produced in each armpit in milliliters (ml). The sweat emissions from each pit were averaged. It should be noted that it was requested that participants avoid use of anti-perspirants for at least three days prior to testing. Scores were taken before and after exposure to the stimulus and a difference score was calculated according to the formula (Post Test - Pre Test), such that a higher score indicated that participants sweat production increased after exposure to the test stimulus. The average amount of sweat production across all types of photographs was  $M = 1.56$ ,  $SD = 12.54$ , range = 64.85. A majority of the participants (62%) had no increase in sweat production for any of the pictures.

### C. Procedure

1. Include a complete description of what happened to a typical subject, in chronological order, from beginning to end. If appropriate, include any unexpected additions to the study.
2. Include the description of the design (experimental, quasi-experimental, longitudinal, etc).
3. Provide an operational definition of the IV (this definition should be the most descriptive one given in the paper).
4. Provide an operational definition of the DV (this def. Should be the most descriptive one given in the paper). Describe how changes in the DV will be observed and recorded.

For Example:

### *Procedures*

Participants initially agreed to spend two consecutive nights in the Radford Animal Avoidance Research-Center (RAAR), After receiving informed consent, a catheter was surgically inserted into the participant's gal-bladder. Over the first night of testing, hepatic secretions were measured. The average rate of bile production was recorded in milliliters per hour,  $M = 3.2$ ,  $SD = 1.8$ , range = 13.5. After the first night, the catheter was removed and participants were allowed to continue with their daily routine until 9:30 pm at which time they returned to the lab for further testing. During the second night of testing, pancreatic secretions were measured. Participants' blood sugar levels were measured every hour, in order to establish each individual's rate of insulin production measured in micrograms per hour,  $M = 12.5$ ,  $SD = 7.2$ , range = 50. After the second night of testing, participants were given both the RABIT and the Pit Sweat measures of small furry animal phobia. After completing the measures participants were thanked for

their participation and asked if they had any questions or concerns.

It should be noted that during the second night of testing, it was discovered that several participants (33) were not secreting insulin due to diabetes. It was decided not to exclude these participants in that it would be useful to compare these participants with non-diabetic participants with respect to small furry animal phobia.”

- II. Results (note: on your paper, the results title will be centered and will not have a roman numeral beside it)
  - A. This section contains all of the results, but no conclusions.
    - 1. order: Descriptive statistics first, Tests with Demographic Variables second, and Inferential statistics second.
  - B. *Descriptive Data*: Here we present either the group frequencies (for Discrete variables) or means, standard deviations, and ranges (for Continuous variables) for all variables, unless already provided in the Methods section (as was done here).
  - C. *Demographic Analyses*: The purpose of these analyses is to establish that your demographic variables are not contributing to (or confounding) the associations we find between the Main Vars. (i.e, IV's and DV's). For this paper, the demographic analyses will be the first part of the results section.
    - a. Tell the reader what variables were tested and which analyses were significant, if any  
Example 1: If no Significant Associations were found....

#### Results

##### *Demographic Analyses*

In order to identify associations between demographic variables (age, GPA, sex, ethnicity, and class rank) and the main variables of interest (bile production rate, insulin production rate, diabetics vs. non-diabetics, Pit Sweat volume change, Pit sweat increase vs. no pit sweat increase, NATSFA, and AISFA), a series of preliminary analyses were conducted. None of the preliminary analyses were significant. The demographic variables were excluded from further analyses.

- b. When you have significant associations, tell the reader what variables were associated and report the statistic. Also, explain to the reader what the statistics mean by referring to people and their behavior.

Example 2: If significant Associations were found...

#### Results

##### *Demographic Analyses*

In order to identify associations between demographic variables (age, GPA, sex, ethnicity, and class rank) and the main variables of interest (bile production rate, insulin production rate, diabetics vs. non-diabetics, pit sweat volume change, pit sweat increase vs. no pit sweat increase, NATSFA, and AISFA), a series of preliminary analyses were conducted. A significant positive correlation was found between GPA and pit sweat volume change,  $r(118) = .56, p < .001$ . Participants with higher grade point averages tend to show higher levels of armpit perspiration following exposure to photos of small woodland creatures. Also, participants who showed an increase in armpit perspiration following exposure to photos had significantly higher GPA's, compared to participants who did not show an increase in armpit perspiration,  $t(118) = 3.45, p = .006$ . Means (Standard Deviations) for the pit sweat increase group and the no pit sweat increase group were, 3.22 (.3235) and 2.88 (.3756), respectively. Finally, there was a significant association between sex and pit sweat increase vs. no pit sweat increase,  $X^2(1, N = 120) = 51.85, p < .001$ . Specifically, females tended not to show a pit sweat increase after exposure to photographs, while males were much more likely to show an increase in armpit sweating during the procedure (See Table 1 for crosstabulations). None of the remaining analyses were significant.

- D. *Main Analyses*: Here we restate the hypotheses between the main variables (describe your hypotheses with respect to the relationships between variables and scores), tell what statistics were used to test this hypothesis, and then give the results of the test, and describe the behavior.

Example.

### Main Analysis

To test the hypothesis that hepatic secretions would be associated with self reports of small furry animal phobia, a series of correlations between Bile Production and scores on the RABIT self report were computed. Bile Production was significantly positively associated with the NATSFA subscale and the AISFA subscale,  $r(176) = .49, p < .001$ ;  $r(176) = .67, p < .001$ , respectively. Participants who produced greater amounts of bile reported more negative attitudes toward small furry animals and that they were more likely to avoid interactions with small furry animals.

Also, It was hypothesized that higher scores on the self report NATSFA subscale of the RABIT would be associated with greater amounts of pit sweating, but only when the visual stimulus depicted a small woodland creature. To this end, the pit sweating volume change of participants scoring above the mean on the NATSFA was compared with that of participants scoring below the mean (60 participants were included in each group) across the 3 stimulus conditions (Inanimate Objects, Animal Pictures, and Animal Caricatures). To test this hypothesis, One-way Anova's were computed, first for the total sample (irrespective of NATSFA score) and then separately for the participants scoring above and below the mean on the NATSFA. For the total sample, there was a significant effect for the stimulus condition,  $F(2, 174) = 6.67, p < .001$ . Results of Fisher LSD post-hoc tests revealed that photographs and caricatures of small animals elicited more pit sweating than inanimate objects, with means and standard deviations of 20.00 (5.34), 19.5 (5.13), and -3.00 (5.22), respectively. Also, participants with high NATSFA scores showed more pit sweating in the caricature and photo conditions than in the inanimate object condition (See Table 2). Further, participants scoring low on the NATSFA did not differ in pit sweating across the 3 conditions. Figure 1 displays group means graphically.

– Note that the preceding paragraphs are both examples where the test statistics are reported in the text and examples where the test statistics are reported in a table and figure. When you have several statistical tests that are very similar it is often preferable to put the data in a table. You can do either, but the stats must be reported somewhere. Further, even if you put the stats in a table, you must describe/explain the results in the text. Remember that your explanations should focus on people and their behaviors, rather than variables and scores.

– Also, for the more advanced statistical users, you may have noticed that the hypothesis tested in paragraph two of the example above would really best be tested using a Two-way Anova (Factorial Anova) rather than a series of One-way Anovas. See the Appendix of this handout for an example of how to report the same results tested with a Two-way Anova.

### Example Continued:

With respect to hepatic secretions, it was hypothesized that bile production would be associated with behavioral measures of animal attraction. Bile production was significantly positively correlated with pit sweat volume change,  $r(176) = .39, p < .001$ . Also, Participants who showed an increase in pit sweat volume, when pictures of small woodland creatures were displayed, produced significantly more bile than non-pit sweat increasing participants,  $t(176) = 3.67, p < .001$ . Means and standard deviations (in parentheses) for pit sweat and no-pit sweat groups were 6.45 (1.51) and 2.15 (.5995), respectively.

With respect to pancreatic secretions, it was hypothesized that insulin production would be associated with self report measures of animal attraction. Contrary to the expected results, no significant associations were found between insulin production rate and the NATSFA or AISFA measures,  $r(118) = .14, p = .23, ns$ , and  $r(118) = .11, p = .58, ns$ , respectively.

- You will notice that not all the possible hypotheses are tested in this handout. These are omitted to conserve space in the handout. However, your paper should report all the statistics for all of the hypotheses tested. Regardless of whether they are significant or not.

## II. Discussion:

A. This section contains the conclusions that can be drawn from the results of your data analysis.

1. Start by once again restating the studies hypothesis. It should be more general than the description you gave in the previous sections. Talk about people and behaviors (or subjects and behavior).
2. Highlight the hypotheses that were supported.
3. Suggest reasons as to why some hypotheses were not supported (if relevant).
4. Discuss the strengths and limitations of the study you report.
  - Focus on Measurement Validity, Internal Validity and the Various components of External Validity (Generalizability to the population, Mundane Realism, and Ecological / Experimental Realism)
5. Discuss how your results inform the psychological community with respect to the topic of research.
6. Discuss suggestions for future research
7. Final statement needs to address how the present study affects our understanding of the universe and/or the condition of humans in the universe.

Example: (the numbers in parentheses in the text below are for your benefit, and should not be included in the text of your manuscript)

#### Discussion

(1)The present study tested the hypothesis that people who have greater hepatic and pancreatic secretion output would report more negative attitudes toward small furry animals and be more likely to demonstrate phobic responses to small furry animals. (2)Results support the hypothesis that hepatic secretions are associated with small furry animal phobia. However, little support was obtained for the hypothesis that pancreatic secretions are associated with furry related phobias.

(3) This unexpected result can be interpreted in several ways. It may be that there truly is no link between insulin production and fear of small furry animals. Alternately, it may be that there is an association but the present study's design was not sensitive enough to identify the association due a variety of potential factors. First, these findings may reflect sample problems. That is, the present study's focus on a college population severely limits the generalizability of the results. It may be that other, more stratified samples would show the predicted insulin - furry phobia link. Also, it has been noted that unique eating and drinking habits of college students can influence measures of insulin production (Budweiser, Miller, & Daniels, 1990). Second, the present study's use of nocturnal pancreatic emissions may not have been appropriate. It has been noted that metabolization of sugar is lowest during the sleeping hours (Hershey & Nestle, 1952). Use of daytime pancreatic secretions would be needed to adequately test this hypothesis. Third, neither the RABIT nor the Pit Sweat paradigm have been validated using other measures of small animal phobias. While they appear to have face validity, it may be that these measures only tap select aspects of furry phobia. This is important to the present study in that several researchers have noted that some animal phobics tend to show erratic and inconsistent phobic responses to the same stimulus (Sylvester, Granny, & Tweety, 1967). Such periodicity in phobic behavior may reflect the periodicity of pancreatic secretions. The design of the present study does not allow for the testing of this hypothesis.

(4) Though this study does suggest that hepatic secretions may be associated with animal phobia, causal links can not be established. An uncontrolled third variable may be confounding these results. For example, spleen size was not measured and controlled for in these analyses. Further, it may be that more psychological factors may be influencing these processes studied here, especially considering that several psychologists and biologists have commented on the connection between mind and body (Pebody & Sherman, 1968; Flinstone & Rubble, 1962; Mephisto & Kevin, 1999).

In conclusion, (5) the present study is important, in that it provides support that small furry animal phobia has its roots in organic tissues outside of the spleen, an idea that was pure speculation prior to these findings. (6) Future research should direct attention to both psychological and biological factors that influence small furry animal phobia. Also, future research may want to test more experimental designs. For example, regulating hepatic and insulin output through the use of randomly assigned treatment conditions. Such a line of research may make it possible to treat individuals who suffer from maladaptive levels of romantic animal phobia. (7) This line of research is crucial to developing our understanding of the dynamics of small furry animal phobia and developing public and mental health policies aimed at

protecting our citizens from cute woodland creatures, which pose numerous threats to our culture and ecosystem.

– Note that the references would be included next, but are not presented in this guide.

## Appendix

### Example: Reporting the Results of a Two-way Anova

Also, It was hypothesized that higher self reports on the NATSFA subscale of the RABIT would be associated with greater amounts of pit sweating, but only when the visual stimulus depicted a small woodland creature. To this end, the pit sweating volume change of participants scoring above the mean on the NATSFA was compared with that of participants scoring below the mean (each group consisted of 60 participants) across the 3 stimulus conditions (Inanimate Objects, Animal Pictures, and Animal Caricatures). A 2 (High vs. Low NATSFA score) x 3 (Stimulus Condition) mixed Anova design was computed. There was a significant main effect for both NATSFA score,  $F(1, 174) = 5.58, p < .001$ . Participants with high NATSFA scores showed more pit sweating than low scoring participants, with means and standard deviations of 25.33 (5.23) and -3.00 (5.01), respectively. Also, there was a significant main effect for the stimulus condition,  $F(2, 174) = 6.67, p < .001$ . Results of Fisher LSD post-hoc tests revealed that photographs and caricatures of small animals elicited more pit sweating than inanimate objects, with means and standard deviations of 20.00 (5.34), 19.5 (5.13), and -3.00 (5.22), respectively.

Finally, a significant interaction was found between the NATSFA score group and the stimulus type,  $F(2, 174) = 20.20, p < .001$ . Results of tests of simple effects revealed that participants with high NATSFA scores showed more pit sweating in the caricature and photo conditions than in the inanimate object condition (See Table 3). Also, participants scoring low on the NATSFA did not differ in pit sweating across the 3 conditions. Further, Participants exposed to either the caricature or the photos with High NATSFA scores demonstrated more pit sweating than participants reporting Low NATSFA score. Finally, participants exposed to the inanimate objects who reported high NATSFA did not differ from participants reporting low NATSFA. Figure 1 displays group means graphically.

Table 1

*Crosstabulation of Sex and Pit Sweat Increase vs. No-Pit Sweat Increase Groups*

Classification	Pit Sweat Group		$\chi^2$	df	V
	Increase	No Increase			
Males	25.83% (2.36)	4.17% (-2.36)	51.85***	1	.65
	11.67% (-3.36)	58.33% (3.36)			

*Note.* \*\*\* =  $p < .001$ . Standardized Expected Residuals appear in parentheses below means

Table 2.

Mean Pit Sweat Volume for Participants with High NATSFA Scores and Participants with Low NATSFA Scores, Separate for Each Stimulus Condition.

	Stimulus Type			<i>F</i>
	Caricature	Picture	Inanimate Object	
High NATSFA	37.00 <sub>b</sub> (5.41)	36.00 <sub>b</sub> (5.22)	-3.00 <sub>a</sub> (5.00)	10.04**
Low NATSFA	-3.00 <sub>a</sub> (5.38)	-3.00 <sub>a</sub> (4.99)	-3.00 <sub>a</sub> (5.01)	0.01

*Note.*  $df = (2, 57)$  for both analyses. (\*\* =  $p \leq .01$ ). Means within rows with differing subscripts are significantly different at least  $p \leq .05$  with respect to Fisher's LSD post hoc analyses.

Table 3.

Mean Pit Sweat Volume for Participants with High NATSFA Scores and Participants with Low NATSFA Scores, Separate for Each Stimulus Condition (example of a Two-Way Interaction).

	Stimulus Type			<i>F</i>
	Caricature	Picture	Inanimate Object	
High NATSFA	37.00 <sub>b</sub> (5.41)	36.00 <sub>b</sub> (5.22)	-3.00 <sub>a</sub> (5.00)	10.04***
Low NATSFA	-3.00 <sub>a</sub> (5.38)	-3.00 <sub>a</sub> (4.99)	-3.00 <sub>a</sub> (5.01)	0.01
<i>F</i>	20.03***	18.02***	0.03	

*Note.* *df* for Stimulus Type simple effect = 2, 174. *df* for NATSFA simple effects = (1, 174). (\*\* =  $p \leq .01$ , \*\*\* =  $p \leq .001$ ). Means within rows with differing subscripts are significantly different at least  $p \leq .05$  with respect to Fisher's LSD post hoc analyses. Post Hoc results for simple effects in columns are not displayed.

Figure 1. Mean tongue licking for participants with high NATSFA scores and participants with low NATSFA scores, separate for each stimulus condition. (Note that in APA manuscripts the figure caption would be on it's own page)

