

Guidelines for Preparing and Formatting APA  
Essays and Research Papers  
for  
B.M.C. Durfee High School

Sample APA Formatted Research Paper Included

Prepared by:  
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## APA for Research Papers and Essays

This is a guide to use when you are writing a research paper or essay using APA format. Information was gathered from:

Degelman, D., & Harris, M. (2006). *APA style essentials*. Retrieved March 1, 2006 from

[http://www.vanguard.edu/faculty/ddege.aspx?doc\\_id=796](http://www.vanguard.edu/faculty/ddege.aspx?doc_id=796).

Hacker, D. (2007) *Research and documentation online*. Retrieved March 1, 2006 from

<http://www.dianahacker.com/resdoc>.

The Write Source. (2005). *Electronic Sources APA Style*. Retrieved March 1, 2006 from

<http://thewritesource.com/APA/APA.HTM>.

The Writing Lab and owl at Purdue and Purdue University. (2007). Retrieved February 27, 2007

from <http://owl.english.purdue.edu>.

A copy of this guide can also be found on the **Keeley Library Homepage** at [www.sailsinc.org/Durfee](http://www.sailsinc.org/Durfee). Links to sites with information pertaining to citing reference sources can be found by following the link for *Course Resources* and clicking on *Useful Tips for All Classes* then *Documenting: Citing and Quoting Sources*.

**Summary:** APA (American Psychological Association) documentation is used in scientific research papers and is most commonly used to cite sources within the social sciences. This resource offers examples for the general format of APA research papers, in-text citations and the reference page.

### Paper Format:

Below are some basic guidelines for formatting a paper in APA style. Use these guidelines if your instructor does not give you specific instructions.

### General APA Guidelines

- Type your paper on a computer and print it out on standard, white 8.5 x 11 –inch paper.
- Double-space the entire paper and use a legible font like Times New Roman or Courier .
- Leave only one space after periods or other punctuation marks (unless otherwise instructed by your instructor).
- Set the margins of your document to 1 inch on all sides. Indent the first line of a paragraph one half-inch (five spaces or press Tab once) from the left margin.

- Active voice: As a general rule, use the active voice rather than the passive voice when writing. For example, use “We predicted that ...” rather than “It was predicted that ...”
- Order of Pages: **Title Page**, **Abstract**, **Body**, **References**, **Appendixes**, **Footnotes**, **Tables**, **Figure Captions**, **Figures** (Your instructor may not have you include all of these pages in your document, always follow the instructor's directions.)

Your final research paper/essay should include, in the order indicated below or in the order specified by your instructor, as many of the following sections as apply to your assignment. Each section should begin on a separate page. If your instructor does not specify the guidelines for you to follow, then follow the order listed below to the best of your ability.

**Title page:** includes a running head for publication or title.

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Guidelines for Preparing and Formatting APA Essays and Research Papers

for

B.M.C. Durfee High School

Sample APA Formatted Research Paper Included

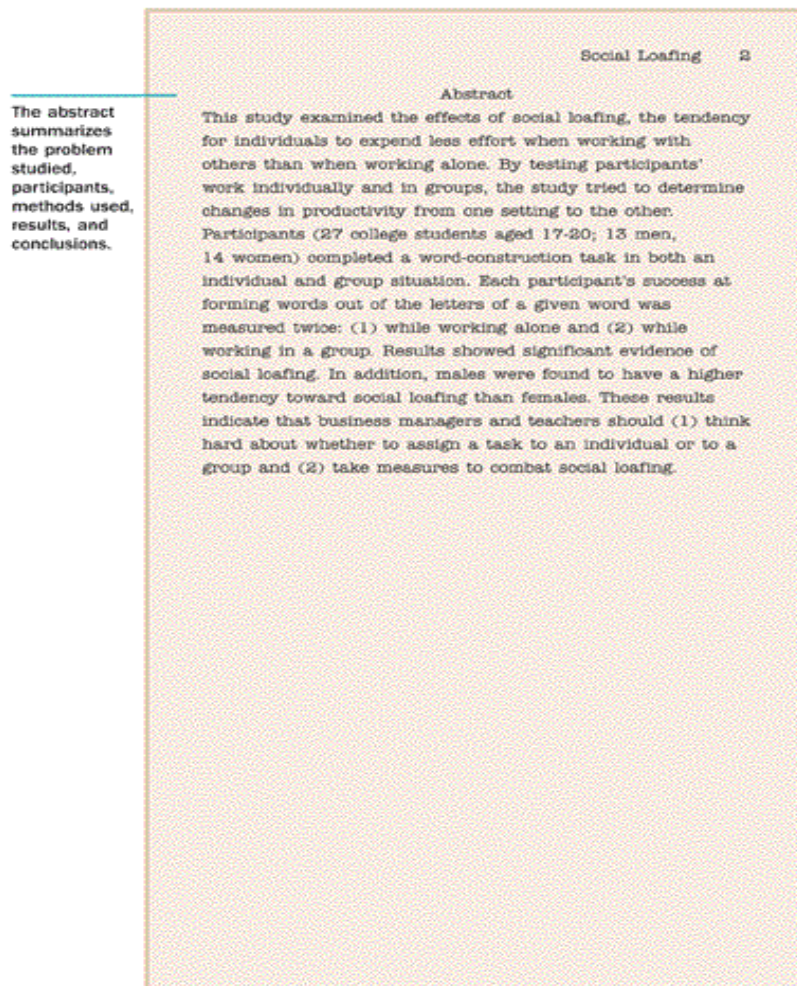
Allison Finnerty

B.M.C. Durfee High School

**Page numbers and running head:** In the upper right-hand corner of each page beginning with the title page, include a 1-3 word version of your title. Follow by five spaces and then the page number. (To create a running header click on **View**, highlight *Header and Footer* in ----box type your running header , then click on **Insert**, highlight *Page Numbers*. You want the **Position** to be *Top of page-Header*, **Alignment** will be *Right*, click OK. The page number will appear. Leave 5 spaces between the running header and the page number)

**Abstract:** An abstract is similar to an introduction to a paper. Write a 75-100 word overview of your essay/research paper. The Abstract should include the main idea and the major points of your paper. Place the abstract on its own page immediately after the title page. Center the word Abstract and then follow with the paragraph. Do not indent the first line of the paragraph.

Example of APA Abstract:



**Headings:** Although not absolutely necessary, headings can be helpful. Major headings should be centered. Capitalize every word in the heading except articles (a, the), short prepositions (in, by, for), and coordinating conjunctions (and, but, or).

**Visuals:** Visuals such as tables and figures include graphs, charts, drawings, and photographs. Keep the visuals as simple as possible and clearly label each visual with an Arabic numeral (ex: Table 1, Table 2, etc.) and include the title of the visual. The label and the title should appear on separate lines above the table, flush left.

## **Body**

- A. **Pagination:** The body of the paper begins on a new page (page 3).
- B. **Title:** The title of the paper (in uppercase and lowercase letters) is centered on the first line.
- C. **Introduction:** The introduction (which is not labeled) begins on the line following the paper title.
- D. **Headings:** Headings are used to organize the document and reflect the importance of sections. For example, in Science you may have a heading for each research section: Common name of organism, Scientific name of organism, Domain, Taxonomic hierarchy, Name and description of biome, Description of habitat, Description of physical appearance, Description of life cycle, Description of food web.
- E. **In-text Citations: The Basics.** The source of your material must be documented in the body of the paper by citing the author(s) and date(s) of the sources. **The underlying principle is that ideas and words of others must be formally acknowledged.** The reader can obtain the full source citation from the list of references that follows the body of the paper.

When using APA format, follow the author-date method of in-text citation. This means that the author's last name and the year of publication for the source should appear in the text, e.g., (Jones, 1998), and a complete reference should appear in the reference list at the end of the paper.

If you are referring to an idea from another work but **NOT** directly quoting the material, or making reference to an entire book, article or other work, you only have to make reference to the author and year of publication in your in-text reference. If you are directly quoting from the source, include the page number(s), e.g. (Fischer, 1996, p. 196).

### ***F. In-Text Citation Capitalization, Quotation Marks, and Italics***

- Always capitalize proper nouns, including author names and initials: D. Jones.
- If you refer to the title of a source within your paper, capitalize all words that are four letters long or greater within the title of a source: *Permanence and Change*. Exceptions apply to short words that are verbs, nouns, pronouns, adjectives, and adverbs: *Writing New Media, There Is Nothing Left to Lose*. (Note: in your References list, only the first word of a title will be capitalized: *Writing new media*.)

- When capitalizing titles, capitalize both words in a hyphenated compound word: *Natural-Born Cyborgs*.
- Capitalize the first word after a dash or colon: “Defining Film Rhetoric: The Case of Hitchcock's *Vertigo*.”
- Italicize the titles of longer works such as books, edited collections, movies, television series, documentaries, or albums: *The Closing of the American Mind*; *The Wizard of Oz*; *Friends*.
- Put quotation marks around the titles of shorter works such as journal articles, articles from edited collections, television series episodes, and song titles: “Multimedia Narration: Constructing Possible World,” “The One Where Chandler Can't Cry.”

### G. *Short Quotations*

If you are directly quoting from a work, you will need to include the author, year of publication, and the page number for the reference (preceded by "p."). Introduce the quotation with a signal phrase that includes the author's last name followed by the date of publication in parentheses.

*Examples:*

According to Jones (1998), “Students often had difficulty using APA style, especially when it was their first time” (p. 199).

Jones (1998) found that “students often had difficulty using APA style” (p. 199); what implications does this have for teachers?

If the author is not named in a signal phrase, place the author's last name, the year of publication, and the page number in parentheses after the quotation.

*Examples:*

She stated, “Students often had difficulty using APA style,” (Jones, 1998, p. 199), but she did not offer an explanation as to why.

### H. *Long Quotations*

Place direct quotations longer than 40 words in a free-standing block of typewritten lines, and omit quotation marks. Start the quotation on a new line, indented five spaces from the left margin. Type the entire quotation on the new margin, and indent the first line of any subsequent paragraph within the quotation five spaces from the new margin. Maintain double-spacing throughout. The parenthetical citation should come after closing punctuation mark. Example:

Jones's (1998) study found the following:

Students often had difficulty using APA style, especially when it was their first time citing sources. This difficulty could be attributed to the fact that many students failed to ask their teacher for help or check the link on the Keeley Library Webpage. Many helpful sources are listed under Course Resources > Useful Links > Documenting.

### I. *Summary or Paraphrase*

If you are paraphrasing an idea from another work, you only have to make reference to the author and year of publication in your in-text reference, but APA guidelines encourage you to also provide the page number (although it is not required.) Example:

According to Jones (1998), APA style is a difficult citation format for first-time learners.

APA style is a difficult citation format for first-time learners (Jones, 1998, p. 199).

- A. When the names of the authors of a source are part of the formal structure of the sentence, the year of publication appears in parentheses following the identification of the authors. Consider the following example:

Wirth and Mitchell (1994) found that although there was a reduction in insulin dosage over a period of two weeks in the treatment condition compared to the control condition, the difference was not statistically significant. [Note: *and* is used when multiple authors are identified as part of the formal structure of the sentence. Compare this to the example in the following section.]

- B. When the authors of a source are *not* part of the formal structure of the sentence, both the authors and year of publication appear in parentheses.

Consider the following example:

Reviews of research on religion and health have concluded that at least some types of religious behaviors are related to higher levels of physical and mental health (Gartner, Larson, & Allen, 1991; Koenig, 1990; Levin & Vanderpool, 1991; Maton & Pargament, 1987; Paloma &

Pendleton, 1991; Payne, Bergin, Bielema, & Jenkins, 1991). [Note: & is used when multiple authors are identified in parenthetical material. Note also that when several sources are cited parenthetically, they are ordered alphabetically by first authors' surnames and separated by semicolons.]

- C. When a source that has two authors is cited, both authors are included every time the source is cited.
- D. To cite a Web document, use the author-date format. If no author is identified, use the first few words of the title in place of the author. If no date is provided, use "n.d." in place of the date. Consider the following examples:

Degelman and Harris (2000) provide guidelines for the use of APA writing style.

Changes in Americans' views of gender status differences have been documented (*Gender and Society*, n.d.).

I. **Quotations:** When a direct quotation is used, always include the author, year, and page number as part of the citation.

- A. A quotation of fewer than 40 words should be enclosed in double quotation marks and should be incorporated into the formal structure of the sentence. Example:

Patients receiving prayer had “less congestive heart failure, required less diuretic and antibiotic therapy, had fewer episodes of pneumonia, had fewer cardiac arrests, and were less frequently intubated and ventilated” (Byrd, 1988, p. 829).

- B. A lengthier quotation of 40 or more words should appear (without quotation marks) apart from the surrounding text, in block format, with each line indented five spaces from the left margin.



## Reference List: Basic Rules

Your reference list should appear at the end of your paper. It provides the information necessary for a reader to locate and retrieve any source you cite in the body of the paper. Each source you cite in the paper must appear in your reference list; likewise, each entry in the reference list must be cited somewhere in your text.

Your references should begin on a new page separate from the text of the essay/research paper. Label this page References (with no quotation marks, underlining, etc.), centered at the top of the page. It should be double-spaced just like the rest of your essay/research paper.

### Basic Rules

- All lines after the first line of each entry in your reference list should be indented one-half inch from the left margin. This is called hanging indentation.
- Authors' names are inverted (last name first); give the last name and initials for all authors of a particular work unless the work has more than six authors. If the work has more than six authors, list the first six authors and then use “et al.” after the sixth author's name to indicate the rest of the authors.
- Reference list entries should be alphabetized by the last name of the first author of each work.
- If you have more than one article by the same author, single-author references, or multiple-author references with the exact same authors in the exact same order, they are listed in order by the year of publication, starting with the earliest.
- When referring to any work that is NOT a journal, such as a book, article, or Web page, capitalize only the first letter of the first word of a title and subtitle, the first word after a colon or a dash in the title, and proper nouns. Do not capitalize the first letter of the second word in a hyphenated compound word.
- Capitalize all major words in journal titles.
- Italicize titles of longer works such as books and journals.
- Do not italicize, underline, or put quotes around the titles of shorter works such as journal articles or essays in edited collections.

### Reference List: Author/Authors

The following rules for handling works by a single author or multiple authors apply to all APA-style references in your reference list, regardless of the type of work (book, article, electronic resource, etc.)

#### Single Author

Last name first, followed by author initials.

Berndt, T. J. (2002). Friendship quality and social development. *Current Directions in Psychological Science*, 11, 7-10.

## Two Authors

List the authors by their last names and initials. Use the "&" instead of "and."

Wegener, D. T., & Petty, R. E. (1994). Mood management across affective states: The hedonic contingency hypothesis. *Journal of Personality & Social Psychology*, 66, 1034-1048.

## Organization as Author

American Psychological Association. (2003).

## Unknown Author

*Merriam-Webster's collegiate dictionary* (10th ed.).(1993). Springfield, MA: Merriam-Webster.

**NOTE:** When your essay/research paper includes parenthetical citations of sources with no author named, use a shortened version of the source's title instead of an author's name. Use quotation marks and italics as appropriate. For example, parenthetical citation of the source above would appear as follows: (*Merriam-Webster's*, 1993).

## Two or More Works by the Same Author

Use the author's name for all entries and list the entries by the year (earliest comes first).

Berndt, T.J. (1981).....

Berndt, T.J. (1999).....

When an author appears both as a sole author and, in another citation, as the first author of a group, list the one-author entries first.

Berndt, T. J. (1999). Friends' influence on students' adjustment to school. *Educational Psychologist*, 34, 15-28.

Berndt, T. J., & Keefe, K. (1995). Friends' influence on adolescents' adjustment to school. *Child Development*, 66, 1312-1329.

References that have the same first author and different second and/or third authors are arranged alphabetically by the last name of the second author, or the last name of the third if the first and second authors are the same.

Wegener, D. T., Kerr, N. L., Fleming, M. A., & Petty, R. E. (2000). Flexible corrections of juror judgments: Implications for jury instructions. *Psychology, Public Policy, & Law*, 6, 629-654.

Wegener, D. T., Petty, R. E., & Klein, D. J. (1994). Effects of mood on high elaboration attitude change: The mediating role of likelihood judgments. *European Journal of Social Psychology*, 24, 25-43.

### **Two or More Works by the Same Author in the Same Year**

If you are using more than one reference by the same author (or the same group of authors listed in the same order) published in the same year, organize them in the reference list alphabetically by the title of the article or chapter. Then assign letter suffixes to the year. Refer to these sources in your essay as they appear in your reference list, e.g.: “Berndt (1981a) makes similar claims...”

Berndt, T. J. (1981a). Age changes and changes over time in prosocial intentions and behavior between friends. *Developmental Psychology*, 17, 408-416.

Berndt, T. J. (1981b). Effects of friendship on prosocial intentions and behavior. *Child Development*, 52, 636-643.

Bergen, D. (2002, Spring). The role of pretend play in children's cognitive development. *Early Childhood Research & Practice*, 4(1). Retrieved February 1, 2004, from <http://ecrp.uiuc.edu/v4n1/bergen.html>

### **Reference List: Articles in Periodicals**

#### **Basic Form**

APA style dictates that authors are named last name followed by initials; publication year goes between parentheses, followed by a period. The title of the article is in sentence-case, meaning only the first word and proper nouns in the title are capitalized. The periodical title is typed in title case, and is followed by the volume number which, with the title, is also italicized or underlined.

Author, A. A., Author, B. B., & Author, C. C. (Year). Title of article. *Title of Periodical*, volume number(issue number), pages.

### **Article in Journal Paginated by Volume**

Journals that are paginated by volume begin with page one in issue one, and continue numbering issue two where issue one ended, etc.

Harlow, H. F. (1983). Fundamentals for preparing psychology journal articles. *Journal of Comparative and Physiological Psychology*, 55, 893-896.

### **Article in Journal Paginated by Issue**

Journals paginated by issue begin with page one every issue; therefore, the issue number gets indicated in parentheses after the volume. The parentheses and issue number are not italicized or underlined.

Scruton, R. (1996). The eclipse of listening. *The New Criterion*, 15(30), 5-13.

### **Article in a Magazine**

Henry, W. A., III. (1990, April 9). Making the grade in today's schools. *Time*, 135, 28-31.

### **Review**

Baumeister, R. F. (1993). Exposing the self-knowledge myth [Review of the book *The self-knower: A hero under control*]. *Contemporary Psychology*, 38, 466-467.

## **Reference List: Books**

### **Basic Format for Books**

Author, A. A. (Year of publication). *Title of work: Capital letter also for subtitle*. Location: Publisher.

**NOTE:** For "Location," you should always list the city, but you should also include the state if the city is unfamiliar or if the city could be confused with one in another state.

Calfee, R. C., & Valencia, R. R. (1991). *APA guide to preparing manuscripts for journal publication*. Washington, DC: American Psychological Association.

### **Edited Book, No Author**

Duncan, G.J., & Brooks-Gunn, J. (Eds.). (1997). *Consequences of growing up poor*. New York: Russell Sage Foundation.

### **Edited Book with an Author or Authors**

Plath, S. (2000). *The unabridged journals* (K.V. Kukil, Ed.). New York: Anchor.

### **Edition Other Than the First**

Helfer, M.E., Keme, R.S., & Drugman, R.D. (1997). *The battered child* (5th ed.). Chicago: University of Chicago Press.

### **Article or Chapter in an Edited Book**

Author, A. A., & Author, B. B. (Year of publication). Title of chapter. In A. Editor & B. Editor (Eds.), *Title of book* (pages of chapter). Location: Publisher.

**NOTE:** When you list the pages of the chapter or essay in parentheses after the book title, use “pp.” before the numbers: (pp. 1-21). This abbreviation, however, does not appear before the page numbers in periodical references, except for newspapers.

O'Neil, J. M., & Egan, J. (1992). Men's and women's gender role journeys: Metaphor for healing, transition, and transformation. In B. R. Wainrib (Ed.), *Gender issues across the life cycle* (pp. 107-123). New York: Springer.

### **Multivolume Work**

Wiener, P. (Ed.). (1973). *Dictionary of the history of ideas* (Vols. 1-4). New York: Scribner's.

## **Reference List: Other Print Sources**

### **An Entry in an Encyclopedia**

Bergmann, P. G. (1993). Relativity. In *The new encyclopedia britannica* (Vol. 26, pp. 501-508). Chicago: Encyclopedia Britannica.

### **Government Document**

National Institute of Mental Health. (1990). *Clinical training in serious mental illness* (DHHS Publication No. ADM 90-1679). Washington, DC: U.S. Government Printing Office.

### **Report From a Private Organization**

American Psychiatric Association. (2000). *Practice guidelines for the treatment of patients with eating disorders* (2nd ed.). Washington, D.C.: Author.

### **Conference Proceedings**

Schnase, J.L., & Cunniss, E.L. (Eds.). (1995). Proceedings from CSCL '95: *The First International Conference on Computer Support for Collaborative Learning*. Mahwah, NJ: Erlbaum.

## **Reference List: Electronic Sources**

### **Article from an Online Periodical**

Online articles follow the same guidelines for printed articles. Include all information the online host makes available, including an issue number in parentheses.

Author, A. A., & Author, B. B. (Date of publication). Title of article. *Title of Online Periodical*, volume number(issue number if available). Retrieved month day, year, from <http://www.someaddress.com/full/url/>

Bernstein, M. (2002). 10 tips on writing the living Web. *A List Apart: For People Who Make Websites*, 149. Retrieved May 2, 2006, from <http://www.alistapart.com/articles/writeliving>

### **Online Scholarly Journal Article**

Author, A. A., & Author, B. B. (Date of publication). Title of article. *Title of Journal*, volume number. Retrieved month day, year, from <http://www.someaddress.com/full/url/>

Kenneth, I. A. (2000). A Buddhist response to the nature of human rights. *Journal of Buddhist Ethics*, 8. Retrieved February 20, 2001, from <http://www.cac.psu.edu/jbe/twocont.html>

If the article appears as a printed version as well, the URL is not required. Use “Electronic version” in brackets after the article's title.

Whitmeyer, J.M. (2000). Power through appointment [Electronic version]. *Social Science Research*, 29, 535-555.

### **Article from a Database**

When referring to material obtained from an online database (such as a database in the library), provide appropriate print citation information (formatted just like a “normal” print citation would be for that type of work). Then add information that gives the date of retrieval and the proper name of the database. This will allow people to retrieve the print version if they do not have access to the database from which you retrieved the article. You can also include the item number or accession number in parentheses at the end, but the APA manual says that this is not required.

Smyth, A. M., Parker, A. L., & Pease, D. L. (2002). A study of enjoyment of peas. *Journal of Abnormal Eating*, 8(3). Retrieved February 20, 2003, from PsycARTICLES database.

### **Web Page**

List as much of the following information as possible (you sometimes have to hunt around to find the information; do not be lazy. If there is a page like <http://www.somesite.com/somepage.htm>, and [somepage.htm](http://www.somesite.com/somepage.htm) does not have the information you are looking for, move up the URL to <http://www.somesite.com/>):

Author, A. A., & Author, B. B. (Date of publication). *Title of document*. Retrieved month date, year, from <http://Web address>.

**NOTE:** When an Internet document is more than one Web page, provide a URL that links to the home page or entry page for the document. Also, if there is no date available for the document use (n.d.) for no date.

### **Online Forum or Discussion Board Posting**

Message posted to an online newsgroup, forum, or discussion group. Include the title of the message, and the URL of the newsgroup or discussion board.

Frook, B. D. (1999, July 23). New inventions in the cyberworld of toylandia [Msg 25]. Message posted to <http://groups.earthlink.com/forum/messages/00025.html>

**NOTE:** If only the screen name is available for the author, then use the screen name; however, if the author provides a real name, use their real name instead. Be sure to provide the exact date of the posting. Follow the date with the subject line, the thread of the message (not in italics). Provide any identifiers in brackets after the title, as in other types of references.

### **Reference List: Other Non-Print Sources**

#### **Music Recording**

Songwriter, W. W. (Date of copyright). Title of song [Recorded by artist if different from song writer]. On *Title of album* [Medium of recording]. Location: Label. (Recording date if different from copyright date).

Taupin, B. (1975). Someone saved my life tonight [Recorded by Elton John]. On *Captain fantastic and the brown dirt cowboy* [CD]. London: Big Pig Music Limited.



# Sample APA Research Paper

## Sample Title Page

Place manuscript page headers one-half inch from the top. Put five spaces between the page header and the page number.

Running on Empty 1

Full title, authors, and school name are centered on the page, typed in uppercase and lowercase.

Running on Empty:  
The Effects of Food Deprivation on  
Concentration and Perseverance  
Thomas Delancy and Adam Solberg  
Dordt College

## Sample Abstract

### Abstract

This study examined the effects of short-term food deprivation on two cognitive abilities—concentration and perseverance. Undergraduate students (N=51) were tested on both a concentration task and a perseverance task after one of three levels of food deprivation: none, 12 hours, or 24 hours. We predicted that food deprivation would impair both concentration scores and perseverance time. Food deprivation had no significant effect on concentration scores, which is consistent with recent research on the effects of food deprivation (Green et al., 1995; Green et al., 1997). However, participants in the 12-hour deprivation group spent significantly less time on the perseverance task than those in both the control and 24-hour deprivation groups, suggesting that short-term deprivation may affect some aspects of cognition and not others.

**The abstract summarizes the problem, participants, hypotheses, methods used, results, and conclusions.**

## An APA Research Paper Model

Thomas Delancy and Adam Solberg wrote the following research paper for a psychology class. As you review their paper, read the side notes and examine the following:

- The use and documentation of their numerous sources.
- The background they provide before getting into their own study results.
- The scientific language used when reporting their results.

Center the title one inch from the top. Double-space throughout.

The introduction states the topic and the main questions to be explored.

The researchers supply background information by discussing past research on the topic.

Extensive referencing establishes support for the discussion.

### Running on Empty: The Effects of Food Deprivation on Concentration and Perseverance

Many things interrupt people's ability to focus on a task: distractions, headaches, noisy environments, and even psychological disorders. To some extent, people can control the environmental factors that make it difficult to focus. However, what about internal factors, such as an empty stomach? Can people increase their ability to focus simply by eating regularly?

One theory that prompted research on how food intake affects the average person was the glucostatic theory. Several researchers in the 1940s and 1950s suggested that the brain regulates food intake in order to maintain a blood-glucose set point. The idea was that people become hungry when their blood-glucose levels drop significantly below their set point and that they become satisfied after eating, when their blood-glucose levels return to that set point. This theory seemed logical because glucose is the brain's primary fuel (Pinel, 2000). The earliest investigation of the general effects of food deprivation found that long-term food deprivation (36 hours and longer) was associated with sluggishness, depression, irritability, reduced heart rate, and inability to concentrate (Keys, Brozek, Henschel, Mickelsen, & Taylor, 1950). Another study found that fasting for several days produced muscular weakness, irritability, and apathy or depression (Kollar, Slater, Palmer, Docter, & Mandell, 1964). Since that time, research has focused mainly on how nutrition affects cognition. However, as Green, Elliman, and Rogers (1995) point out, the effects of food deprivation on cognition have received comparatively less attention in recent years.

The relatively sparse research on food deprivation has left room for further research. First, much of the research has focused either on chronic starvation at one end of the continuum or on missing a single meal at the other end (Green et al., 1995). Second, some of the findings have been contradictory. One study found that skipping breakfast impairs certain aspects of cognition, such as problem-solving abilities (Pollitt, Lewis, Garza, & Shulman, 1983). However, other research by M. W. Green, N. A. Elliman, and P. J. Rogers (1995, 1997) has found that food deprivation ranging from missing a single meal to 24 hours without eating does not significantly impair cognition. Third, not all groups of people have been sufficiently studied. Studies have been done on 9–11 year-olds (Pollitt et al., 1983), obese subjects (Crumpton, Wine, & Drenick, 1966), college-age men and women (Green et al., 1995, 1996, 1997), and middle-age males (Kollar et al., 1964). Fourth, not all cognitive aspects have been studied. In 1995 Green, Elliman, and Rogers studied sustained attention, simple reaction time, and immediate memory; in 1996 they studied attentional bias; and in 1997 they studied simple reaction time, two-finger tapping, recognition memory, and free recall. In 1983, another study focused on reaction time and accuracy, intelligence quotient, and problem solving (Pollitt et al.).

According to some researchers, most of the results so far indicate that cognitive function is not affected significantly by short-term fasting (Green et al., 1995, p. 246). However, this conclusion seems premature due to the relative lack of research on cognitive functions such as concentration and perseverance. To date, no study has tested perseverance, despite its importance in cognitive functioning. In fact, perseverance may be a better indicator than achievement tests in assessing growth in learning and thinking abilities, as perseverance helps in solving complex problems (Costa, 1984). Another study also recognized that perseverance, better learning techniques, and effort are cognitions worth studying (D'Agostino, 1996). Testing as many aspects of cognition as possible is key because the nature of the task is important when interpreting the link between food deprivation and cognitive performance (Smith & Kendrick, 1992).

**The researchers explain how their study will add to past research on the topic.**

**Clear transitions guide readers through the researchers' reasoning.**

**The researchers support their decision to focus on concentration and perseverance.**

The researchers state their initial hypotheses.

Therefore, the current study helps us understand how short-term food deprivation affects concentration on and perseverance with a difficult task. Specifically, participants deprived of food for 24 hours were expected to perform worse on a concentration test and a perseverance task than those deprived for 12 hours, who in turn were predicted to perform worse than those who were not deprived of food.

Headings and subheadings show the paper's organization.

## Method

### *Participants*

Participants included 51 undergraduate-student volunteers (32 females, 19 males), some of whom received a small amount of extra credit in a college course. The mean college grade point average (GPA) was 3.19. Potential participants were excluded if they were dieting, menstruating, or taking special medication. Those who were struggling with or had struggled with an eating disorder were excluded, as were potential participants addicted to nicotine or caffeine.

The experiment's method is described, using the terms and acronyms of the discipline.

### *Materials*

Concentration speed and accuracy were measured using an online numbers-matching test ([www.psychtests.com/tests/iq/concentration.html](http://www.psychtests.com/tests/iq/concentration.html)) that consisted of 26 lines of 25 numbers each. In 6 minutes, participants were required to find pairs of numbers in each line that added up to 10. Scores were calculated as the percentage of correctly identified pairs out of a possible 120. Perseverance was measured with a puzzle that contained five octagons—each of which included a stencil of a specific object (such as an animal or a flower). The octagons were to be placed on top of each other in a specific way to make the silhouette of a rabbit. However, three of the shapes were slightly altered so that the task was impossible. Perseverance scores were calculated as the number of minutes that a participant spent on the puzzle task before giving up.

Passive voice is used to emphasize the experiment, not the researchers; otherwise, active voice is used.

### *Procedure*

At an initial meeting, participants gave informed consent. Each consent form contained an assigned identification number and requested the participant's GPA. Students were then informed that they would be notified by e-mail and telephone about their assignment to one of the

The experiment is laid out step by step, with time transitions like “then” and “next.”

three experimental groups. Next, students were given an instruction sheet. These written instructions, which we also read aloud, explained the experimental conditions, clarified guidelines for the food deprivation period, and specified the time and location of testing.

Participants were randomly assigned to one of these conditions using a matched-triplets design based on the GPAs collected at the initial meeting. This design was used to control individual differences in cognitive ability. Two days after the initial meeting, participants were informed of their group assignment and its condition and reminded that, if they were in a food-deprived group, they should not eat anything after 10 a.m. the next day. Participants from the control group were tested at 7:30 p.m. in a designated computer lab on the day the deprivation started. Those in the 12-hour group were tested at 10 p.m. on that same day. Those in the 24-hour group were tested at 10:40 a.m. on the following day.

Attention is shown to the control features.

At their assigned time, participants arrived at a computer lab for testing. Each participant was given written testing instructions, which were also read aloud. The online concentration test had already been loaded on the computers for participants before they arrived for testing, so shortly after they arrived they proceeded to complete the test. Immediately after all participants had completed the test and their scores were recorded, participants were each given the silhouette puzzle and instructed how to proceed. In addition, they were told that (1) they would have an unlimited amount of time to complete the task, and (2) they were not to tell any other participant whether they had completed the puzzle or simply given up. This procedure was followed to prevent the group influence of some participants seeing others give up. Any participant still working on the puzzle after 40 minutes was stopped to keep the time of the study manageable. Immediately after each participant stopped working on the puzzle, he/she gave demographic information and completed a few manipulation-check items. We then debriefed and dismissed each participant outside of the lab.

## Results

The writers summarize their findings, including problems encountered.

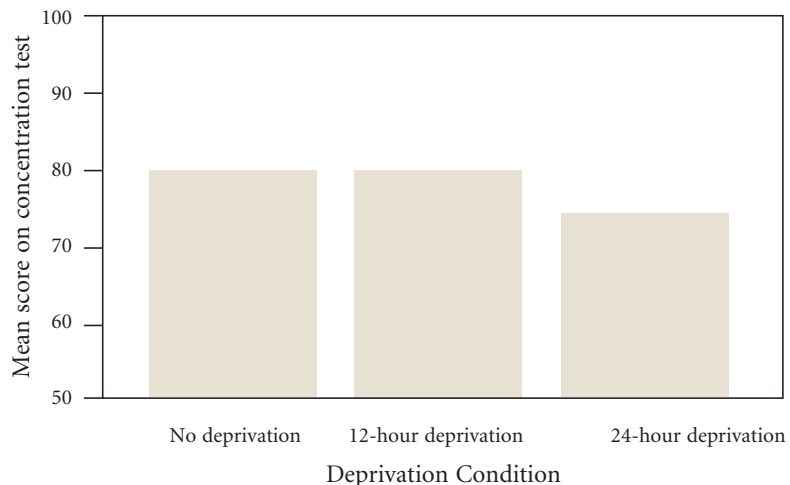
Perseverance data from one control-group participant were eliminated because she had to leave the session early. Concentration data from another control-group participant were dropped because he did not complete the test correctly. Three manipulation-check questions indicated that each participant correctly perceived his or her deprivation condition and had followed the rules for it. The average concentration score was 77.78 (SD = 14.21), which was very good considering that anything over 50 percent is labeled “good” or “above average.” The average time spent on the puzzle was 24.00 minutes (SD = 10.16), with a maximum of 40 minutes allowed.

“See Figure 1” sends readers to a figure (graph, photograph, chart, or drawing) contained in the paper.

We predicted that participants in the 24-hour deprivation group would perform worse on the concentration test and the perseverance task than those in the 12-hour group, who in turn would perform worse than those in the control group. A one-way analysis of variance (ANOVA) showed no significant effect of deprivation condition on concentration,  $F(2,46) = 1.06, p = .36$  (see Figure 1). Another one-way ANOVA indicated

All figures and illustrations (other than tables) are numbered in the order that they are first mentioned in the text.

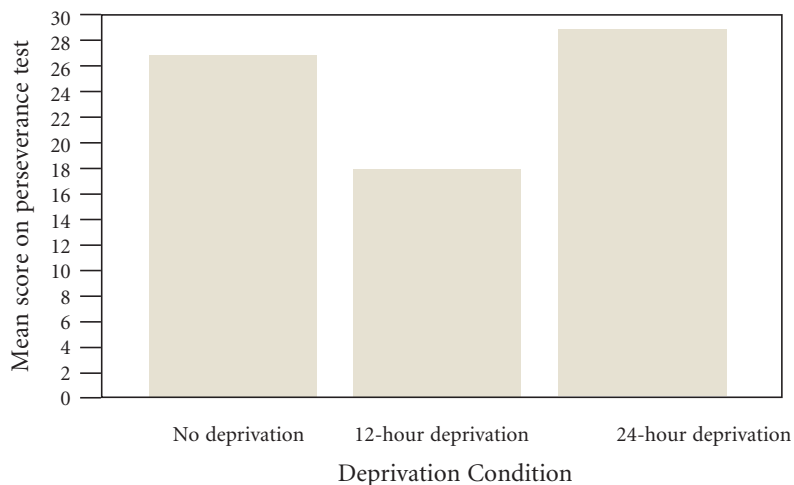
Figure 1.



The researchers restate their hypotheses and the results, and go on to interpret those results.

a significant effect of deprivation condition on perseverance time,  $F(2,47) = 7.41, p < .05$ . Post-hoc Tukey tests indicated that the 12-hour deprivation group ( $M = 17.79, SD = 7.84$ ) spent significantly less time on the perseverance task than either the control group ( $M = 26.80, SD = 6.20$ ) or the 24-hour group ( $M = 28.75, SD = 12.11$ ), with no significant difference between the latter two groups (see Figure 2). No significant effect was found for gender either generally or with specific deprivation conditions,  $F_s < 1.00$ . Unexpectedly, food deprivation had no significant effect on concentration scores. Overall, we found support for our hypothesis that 12 hours of food deprivation would significantly impair perseverance when compared to no deprivation. Unexpectedly, 24 hours of food deprivation did not significantly affect perseverance relative to the control group. Also unexpectedly, food deprivation did not significantly affect concentration scores.

Figure 2.



#### Discussion

The purpose of this study was to test how different levels of food deprivation affect concentration on and perseverance with difficult tasks.



We predicted that the longer people had been deprived of food, the lower they would score on the concentration task, and the less time they would spend on the perseverance task. In this study, those deprived of food did give up more quickly on the puzzle, but only in the 12-hour group. Thus, the hypothesis was partially supported for the perseverance task. However, concentration was found to be unaffected by food deprivation, and thus the hypothesis was not supported for that task.

The writers speculate on possible explanations for the unexpected results.

The findings of this study are consistent with those of Green et al. (1995), where short-term food deprivation did not affect some aspects of cognition, including attentional focus. Taken together, these findings suggest that concentration is not significantly impaired by short-term food deprivation. The findings on perseverance, however, are not as easily explained. We surmise that the participants in the 12-hour group gave up more quickly on the perseverance task because of their hunger produced by the food deprivation. But why, then, did those in the 24-hour group fail to yield the same effect? We postulate that this result can be explained by the concept of “learned industriousness,” wherein participants who perform one difficult task do better on a subsequent task than the participants who never took the initial task (Eisenberger & Leonard, 1980; Hickman, Stromme, & Lippman, 1998). Because participants had successfully completed 24 hours of fasting already, their tendency to persevere had already been increased, if only temporarily. Another possible explanation is that the motivational state of a participant may be a significant determinant of behavior under testing (Saugstad, 1967). This idea may also explain the short perseverance times in the 12-hour group: because these participants took the tests at 10 p.m., a prime time of the night for conducting business and socializing on a college campus, they may have been less motivated to take the time to work on the puzzle.

Research on food deprivation and cognition could continue in several directions. First, other aspects of cognition may be affected by short-term food deprivation, such as reading comprehension or motivation. With respect to this latter topic, some students in this study reported decreased motivation to complete the tasks because of a desire to eat immediately

after the testing. In addition, the time of day when the respective groups took the tests may have influenced the results: those in the 24-hour group took the tests in the morning and may have been fresher and more relaxed than those in the 12-hour group, who took the tests at night. Perhaps, then, the motivation level of food-deprived participants could be effectively tested. Second, longer-term food deprivation periods, such as those experienced by people fasting for religious reasons, could be explored. It is possible that cognitive function fluctuates over the duration of deprivation. Studies could ask how long a person can remain focused despite a lack of nutrition. Third, and perhaps most fascinating, studies could explore how food deprivation affects learned industriousness. As stated above, one possible explanation for the better perseverance times in the 24-hour group could be that they spontaneously improved their perseverance faculties by simply forcing themselves not to eat for 24 hours. Therefore, research could study how food deprivation affects the acquisition of perseverance.

**The conclusion summarizes the outcomes, stresses the experiment's value, and anticipates further advances on the topic.**

In conclusion, the results of this study provide some fascinating insights into the cognitive and physiological effects of skipping meals. Contrary to what we predicted, a person may indeed be very capable of concentrating after not eating for many hours. On the other hand, if one is taking a long test or working long hours at a tedious task that requires perseverance, one may be hindered by not eating for a short time, as shown by the 12-hour group's performance on the perseverance task. Many people—students, working mothers, and those interested in fasting, to mention a few—have to deal with short-term food deprivation, intentional or unintentional. This research and other research to follow will contribute to knowledge of the disadvantages—and possible advantages—of skipping meals. The mixed results of this study suggest that we have much more to learn about short-term food deprivation.

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