

APA-Style Citations Can Create a Roadblock to Textbook Comprehension for Less Skilled Readers

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Jennifer J. Stiegler-Balfour¹, Krisztina V. Jakobsen²,
Michael J. Stroud³, and David B. Daniel²

Abstract

We examined the effect of in-text American Psychological Association (APA)-style citations on quiz performance as a function of structure building ability, measured by the Multi-Media Comprehension Battery. Participants were randomly assigned to either APA or no citation conditions and asked to read an expository text followed by a comprehension quiz. Less skilled structure builders performed significantly lower on a comprehension quiz and read faster in the APA citation compared to the no citation condition. In contrast, skilled structure builders performed equally well on the comprehension quiz but had to reduce their reading speed in the APA citation condition. The results challenge the utility of in-text APA citations in textbooks targeted at general populations of students, particularly for moderate to poor comprehenders.

Keywords

expository text comprehension, structure building ability, APA-style citations, comprehension quiz, college students

The *Publication Manual of the American Psychological Association* (APA) is published as a style and format guide for scientific and scholarly writing in behavioral and social science publications (APA, 2010). Developed as an aid for scientific communication, and journals in particular, APA style has been adopted by most psychology textbooks, journals, and other academic writing outlets, including those that are not aimed specifically at psychology majors. Of particular interest, introductory psychology textbooks for courses that primarily serve as general education courses are replete with APA-style citations. While designed to aid scholars as they consume and edit scientific writing, it is not clear that in-text APA-style citations are appropriate for a more general audience with different goals.

In the introductory psychology market, it is not uncommon to find a significant percentage of textbook sentences devoted to citations, some of which are placed mid-sentence. It is quite possible that in-text parenthetical APA-style citations may add a level of challenge and interruption to the reading of expository material that disadvantages readers who are less proficient at automatizing, skipping, or skimming over such citations; their placement is difficult to predict and their presence may add hurdles to fluid reading. Recognizing where sentences resume may additionally be challenging to some readers and add a level of cognitive load (CL) that may inhibit a fluid and comprehensible understanding of the narrative explanation (Sweller, 1988; van Merriënboer, & Sweller, 2005).

Despite the possibility that APA-style citations may inhibit learning, the vast majority of the educators who adopt introductory texts (e.g., “the market”) are committed to them (Worth Publishers, 2011). Marketing materials for textbooks often infer that the number of citations is a strength of a textbook’s revision. Further, publishers who periodically query the market regarding this issue report strong objections by the market to the suggestion that APA-style in-text citations be replaced with other citation formats that may better facilitate learning (Worth Publishers, 2011).

Ostensibly, the primary purpose of introductory textbooks is to present course content to a general audience of students in a manner that promotes learning and retention. Successful comprehension requires individuals to connect what they are reading with information previously referenced in text and to connect ideas from the text to background information in long-term memory (O’Brien & Myers, 1999; van den Broek & Kendeou, 2008). Beyond simple reading ability, the reader must develop cognitive structures that mentally organize and make

¹ University of New England, Biddeford, ME, USA

² James Madison University, Harrisonburg, VA, USA

³ Merrimack College, North Andover, MA, USA

Corresponding Author:

Jennifer J. Stiegler-Balfour, University of New England, 11 Hills Beach Road, Biddeford, ME 04005, USA.

Email: jstiegler@une.edu

meaning of the reading in a manner that facilitates learning and recall (Gernsbacher, 1997). Compared to measures of reading ability (e.g., the Nelson-Denny Reading Test; Brown et al., 1973), structure building, as measured by the Multi-Media Comprehension Battery (MMCB; Gernsbacher & Varner, 1988), emerges as a separate factor associated with learning (R. H. Maki et al., 1994). To demonstrate validity of the MMCB, Gernsbacher et al. (1990) demonstrated that written MMCB scores correlated with verbal Scholastic Aptitude Test (SAT) scores at $R = .64$. Structure building consists of a three-step process including forming mental structures of read information, mapping new incoming information onto existing mental structures, and shifting to a new structure or substructure when incoming information is less coherent or does not fit with previously read information (Gernsbacher et al., 1990). This structure building process should result in a mental representation of the text that highlights important aspects of the text and suppresses less important aspects of the text.

Students differ in their ability to develop adequate structures, with lower structure building ability associated with lower performance in many tasks, including performance in an introductory psychology course (Maki & Maki, 2002). Further, when compared with higher structure builders, students lower in structure building have been found to perform less well on recognition (multiple-choice) and recall (short answer) items after reading a textbook chapter (Callender & McDaniel, 2007).

A key component in structure building is the ability to suppress irrelevant information (Gernsbacher, 1997; Pimperton & Nation, 2010). Students who have difficulty suppressing distracting or irrelevant information are typically less adept at developing these structures because their working memory becomes overwhelmed with irrelevant information, leaving little room for effective mapping of new information on existing structures. For students less skilled in structure building, the presence of APA-style references may not be easily suppressed, thus encouraging less effective structures for learning and retention.

To date, we know of no study that has examined the effect of APA-style in-text referencing on learning and comprehension. Our primary research question addressed whether using APA-style in-text citations within expository text influenced participants' comprehension of text as evidenced by their ability to answer questions about key details about the stories. Furthermore, we examined whether a participants' ability to build a coherent representation—as evidenced by the MMCB—moderates their ability to read and comprehend expository text that included APA citations. We hypothesized that the in-text citations would hinder the learning of low structure builders.

Method

Participants

We collected data from 270 undergraduate students at three different institutions (two small private universities [$n = 177$

and $n = 29$] in the northeastern region of the United States and one large public university [$n = 64$] located in the southeastern region of the United States). Students received either course credit or a US\$10 gift card for their involvement in the study. All participants spoke English as their first language and had little or no background knowledge on the topic discussed in the readings (see below). In our sample, 79.3% identified as female, 20% identified as male, and less than 1% preferred not to answer the question. The sample primarily identified as Caucasian (74.7%), with a minority identifying as African American (18.6%), Latino/a/Hispanic (3.3%), Asian/Pacific Islander (2.2%), and 1.1% of participants electing not to report racial/ethnic background. The majority of the participants were college-aged (95.5% were between the ages of 18 and 21, 4.5% were 22 or older); 33% of participants were first year students, 17.8% were sophomores, 31.9% were juniors, 7% were seniors, and 10% were in their fifth year in college. Most participants had taken either one or two psychology courses (84.9%). A total of 314 participants were tested to yield the 270 who met the criteria outlined above and who completed all of the measures included in the study.

Materials

MMCB. Students' general structure building ability of text was measured using the written version of the MMCB (also see Arnold et al., 2016; Bui & McDaniel, 2015; Callender & McDaniel, 2007; Martin et al., 2016 for studies using the written version of the MMCB). We chose the MMCB because it is a measure of general comprehension skill of written materials. Participants read four passages ranging in length from 538 to 958 words. Immediately following the reading of each passage, participants answered 12 multiple-choice questions about the details of the passage, for a total of 48 questions across passages. Scores could range from 0 to 48, with higher scores indicating higher proficiency in forming coherent mental structures of the text. Previous research has either used a median split method to categorize participants as high- or low-structure builders based on the scores of the MMCB test (e.g., O'Reilly & McNamara, 2007; Ozuru et al., 2009; Stiegler-Balfour & Benassi, 2015) or used structure building ability as a continuous variable (Barnes & Kim, 2016; Grant et al., 2012). While the median split method allows for creating two sufficiently distinct groups of participants that differ in terms of their reading skill, the median split technique may have drawbacks such as artificially creating an experimental variable (also see Cohen, 1983, for a discussion of the effectiveness of the median split). Thus, this study utilized the structure building variable as a continuous variable for the analyses (the results using structure building ability as a categorical variable produced the same pattern of results and are noted¹).

Expository texts. To examine participants' ability to read and comprehend expository text including either APA-style in-text citations or no citations, we adapted a story from *Science Magazine* titled "Of snakes and robots: How can snakes and

Table 1. Breakdown of Number of Participants, Multi-Media Comprehension Battery (MMCB) Scores [$M(SD)$], and Conditions Across the Three Institutions.

School	N	Control	APA Citation	No Citation	MMCB
Institution A	177	22	79	76	29.68 (7.28)
Institution B	29	5	14	10	25.62 (7.31)
Institution C	64	13	22	29	27.86 (7.33)
Total	270	40	115	115	

robots move up sandy slopes?" (Greenemeier, 2014), which was about the development of a robot that can emulate a snake's sidewinding movements. The story consisted of 1,063 words with a Flesch-Kincaid Grade level rating of 13.7. For the APA citation condition, we adapted the passage to include 21 APA-style citations occurring mid-sentence, at the beginning or end of the sentence, ranging from one to six author names per citation. To assess participants' understanding of the passage, we used 19 multiple-choice questions about key details of the expository text, which students answered without access to the story. Scores could range from 0 to 19 correct responses. Because the majority of the participants included in this study came from introductory psychology courses, we opted to use expository text that was not taken from a psychology textbook to minimize the possibility that participants would already be familiar with the concepts.

Design and Procedure

Before beginning the study, participants were instructed by a research assistant to ensure that they were thoroughly familiarized with and understood the procedure. Each participant was tested individually in a session lasting approximately 60 min. All materials were presented on a computer screen using Qualtrics Survey software (Qualtrics, Provo, UT).

Participants at all three institutions were randomly assigned to one of three conditions: APA citation condition ($n = 115$), no citation condition ($n = 115$), or control condition ($n = 40$; also see Table 1 for the distribution of participants across the institutions and structure building levels). Participants in the control condition answered the multiple-choice questions without reading the expository passage beforehand. Because the goal of the control condition was to demonstrate that the comprehension quiz assessed comprehension of the passage rather than general world knowledge, we ceased data collection once we reached 40 participants but continued data collection in the experimental conditions. Participants in the experimental conditions were presented with material sets consisting of one expository story presented with either APA-style in-text citations or no citations. Participants were instructed to read the story at their own pace followed by 2 min of solving multiplication problems to ensure the information from the story was no longer in working memory prior to answering 19 multiple-choice questions pertaining to key details about the story.

Subsequently, all participants completed the MMCB to determine their ability to construct coherent presentations of the text. Last, participants completed a short demographic survey.

Results

Statistical Analysis Strategy

To test our hypotheses, we conducted several multiple regression analyses to test whether reading times and performance on a comprehension quiz were impacted by either structure building ability (as evidenced by the MMCB scores) or using APA in-text citations to present an expository text. Next, we used multiple regression analyses and the Sobel method to determine whether reading speed mediated the effect of the structure building ability and citation condition interaction predicting performance on the comprehension quiz.

Initial analysis. To ensure that participants relied on their comprehension of the passages rather than their general world knowledge, we compared the results of the comprehension quiz of the control condition (participants answered questions without seeing the passages) and the two experimental conditions (APA citations or no citations) and found that comprehension quiz scores were significantly different across conditions, $F(2, 267) = 47.59, p < .001, \eta_p^2 = 0.27$. Post hoc comparisons using Tukey's honestly significant difference (HSD) test indicated that the mean score for the control condition ($M = 8.3, SD = 1.75$) was significantly lower than both the APA condition ($M = 12.26, SD = 2.61$) and the no citation condition ($M = 12.65, SD = 2.50$). Because performance on the test in the control condition was significantly lower than either of the experimental conditions, we were confident that the performance on the comprehension quiz was obtained based on the participants' understanding of the readings rather than their own background knowledge of the topic. Thus, all subsequent analyses were conducted with the experimental conditions only (i.e., APA and no citations).

Reading time analysis. We conducted multiple regression analyses using centered structure building ability scores, citation condition ($1 = \text{APA citation condition}, 0 = \text{no APA citation condition}$), and the two-way interaction between citation condition and structure building ability (continuous MMCB scores) as predictors for reading times. The results revealed a significant main effect for citation condition (APA vs. no citations), $b = -24.97, t = -2.01, SE = 12.44, 95\% \text{ confidence interval [CI]} = [-0.46, -49.48], p = .04, R = -.12$. This main effect was qualified by a significant citation condition and structure building ability interaction, $b = 10.78, t = 6.22, SE = 1.73, 95\% \text{ CI} = [7.37, 14.20], p < .001, R = .37$.

They explore the nature of the significant citation condition and structure building ability interaction; we followed the guidelines of Aiken and West (1991) to test the simple slope of the continuous variable (structure building ability) at each

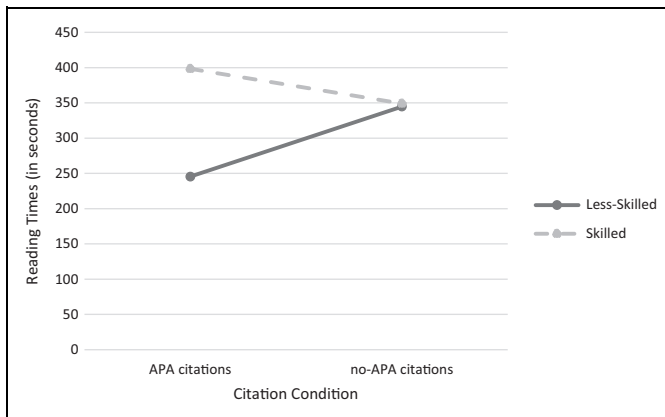


Figure 1. Multiple regression results for citation condition and structure building ability predicting reading times (in seconds).

level of the dichotomous variable (citation condition; see Figure 1). Our results revealed that in the APA citation condition, structure building ability had a significant effect on reading times, $b = 10.48$, $t = 9.06$, $SE = 1.16$, 95% CI = [8.19, 12.77], $p < .001$, $R = .65$, showing that participants with higher structure building ability slowed down their reading pace in the APA citation condition and lower structure builders adopted a faster reading pace compared to when they read in the no APA citation condition. In contrast, in the no citation condition, structure building ability had no significant impact ($p = .81$) on reading speed, indicating that readers of all skill levels used the same reading pace to read the passage. Further, the analysis showed that for lower structure building ability participants, the citation condition (APA vs. no citation) had a significant effect, $b = -103.56$, $t = -5.79$, $SE = 17.89$, 95% CI = [-68.81, -138.81], $p < .001$, $R = -.34$, indicating they read faster in the APA condition compared to the no citation condition. On the other hand, for higher structure building ability participants, the citation condition also had a significant effect, $b = 53.62$, $t = 5.79$, $SE = 17.57$, 95% CI = [19.01, 88.24], $p < .001$, $R = .18$, indicating that they read slower in the APA citation condition compared to the no citation condition.

Comprehension analysis. Next, we conducted multiple regression analyses using structure building ability, citation condition, and the two-way interaction between citation condition and structure building ability as predictors for comprehension quiz performance. The results revealed a significant main effect for citation condition, $b = -0.75$, $t = -2.80$, $SE = 0.27$, 95% CI = [-0.22, -1.28], $p = 0.01$, $R = -.15$, suggesting that participants in the APA citation condition had significantly lower scores than participants in the no citation condition. The analysis also showed a significant main effect for structure building ability, $b = 0.17$, $t = 7.00$, $SE = 0.02$, 95% CI = [0.12, 0.22], $p < .001$, $R = .36$, indicating that participants with higher structure building ability performed better on the comprehension quiz than participants who had lower structure building ability scores. The main effects were qualified by a

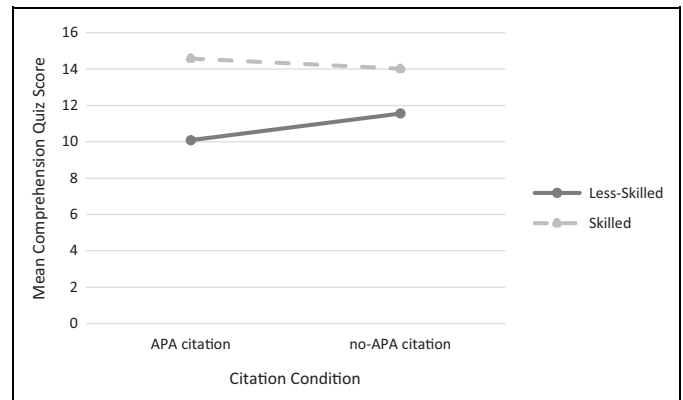


Figure 2. Multiple regression results for citation condition and structure building ability predicting mean comprehension quiz performance.

significant interaction between structure building ability and citation condition, $b = 0.10$, $t = 2.66$, $SE = 0.04$, 95% CI = [0.03, 0.17], $p = .01$, $R = .14$.²

The simple slope of structure building ability was tested in the no citation and APA citation conditions following the guidelines of Aiken and West (1991; see Figure 2). Our results revealed that in the no citation condition, structure building ability had a significant effect on comprehension quiz performance, $b = 0.17$, $t = 6.63$, $SE = 0.03$, 95% CI = [0.12, 0.22], $p < .001$, $R = .53$, showing that students with lower structure building ability earned lower scores than their higher structure building ability counterparts on the comprehension quiz but the magnitude of this effect was even stronger in the APA citation condition, which showed that structure building ability had a significant effect on comprehension quiz performance, $b = 0.27$, $t = 9.93$, $SE = 0.03$, 95% CI = [0.22, 0.32], $p < .001$, $R = .68$, indicating that including APA citations disrupts especially lower structure building ability readers' ability to comprehend the text. This was also evident in the finding that for participants who scored lower on the structure building ability assessment, the citation condition had a significant effect on their performance on the comprehension quiz, $b = -1.48$, $t = -3.82$, $SE = 0.39$, 95% CI = [-0.72, -2.24], $p < .001$, $R = -.20$, whereas for participants who scored higher on the structure building ability measure, the citation condition had no significant effect ($p = .95$; see Note 1).

Mediated moderation. To test whether reading time (i.e., the reading pace that participant adopted when reading the passage) was a potential mediator, we conducted a regression analysis to determine whether reading time predicts performance on the comprehension quiz. The results showed that reading times significantly predicted comprehension quiz scores ($b = 0.01$, $t = 4.64$, $SE = 0.00$, $p < .001$). Because reading times were significantly related to performance on the comprehension quiz, we explored whether reading times mediated the structure building ability and citation condition interaction effect on comprehension quiz scores. To do this, we

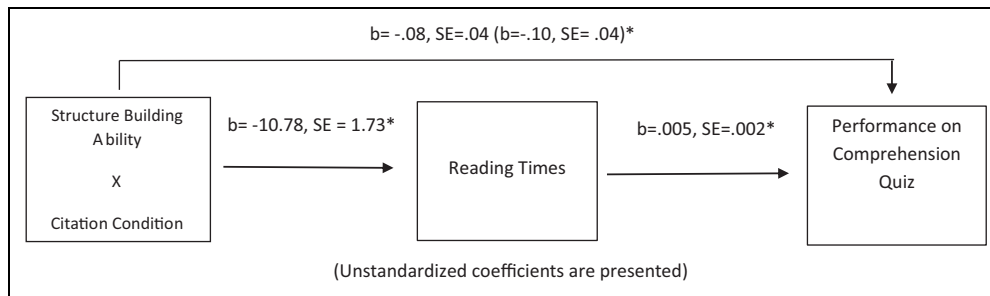


Figure 3. The role of reading times in mediating the Structure Building Ability \times Citation Condition interaction.

reran the regression analysis predicting quiz performance while controlling for reading times. The main effects for structure building ability and citation condition as well as the structure building ability and citation condition interaction remained significant with reading times included in the model. Reading times as a predictor in this model did not reach significance ($p = .16$). To further explore this relationship, we tested the significance of the indirect path using the Sobel method to determine whether there was a significant decrease in the regression coefficient when reading time was included in the regression equation as a mediator variable. The indirect path between structure building ability and citation condition interaction and comprehension quiz performance through reading times was significant, $z = -2.32$, $SE = 0.02$, $p = .02$, indicating that reading times mediated the structure building ability and citation condition interaction effect (see Figure 3). This suggests that higher skilled structure builders performed better on the comprehension quiz because they slowed their reading pace compared to lower skilled structure builders performing poorer because they sped up their reading pace.

Discussion

This study examined whether in-text citations presented in APA format impact learning for lower and higher structure builders based on a representative comprehension quiz. The results indicate that APA citations may negatively affect comprehension depending upon an individual's proficiency at cognitive structure building. Higher skilled structure builders slowed their reading speed for passages with APA citations compared to passages without citations and performed equally well on a comprehension quiz, regardless of the presence of APA citations. Ergo, higher skilled structure builders' comprehension did not suffer; however, their efficiency decreased because maintaining a high level of comprehension required more time to read using APA references. In contrast, less skilled structure builders showed lower levels of comprehension for passages including APA in-text citations, possibly because they failed to slow their reading speed (i.e., they sped up their reading pace compared to when reading text without APA citations) in order to adapt to the higher demands that distracting information such as in-text citations can place on working memory. These results are consistent with previous

research, which suggests that skilled structure builders monitor their comprehension of text, whereas less skilled structure builders often lack this ability (O'Reilly et al., 2004), which could explain the difference in reading times we observed.

Our findings also fit nicely with Gernsbacher's proposal that less skilled structure builders have difficulty suppressing contextually irrelevant information which inhibits learning because less relevant information may take up limited space in working memory (Gernsbacher, 1997; Gernsbacher et al., 1990). On the other hand, higher skilled structure builders are able to better suppress or inhibit irrelevant information, thereby leaving more cognitive resources for processing relevant information (e.g., Rosen & Engle, 1998). This inhibition seems to come at the cost of efficiency in this study.

Few studies to date have examined the relationship between reading speed and comprehension. While there are currently no studies indicating that a slower reading pace is associated with higher comprehension levels, many studies have shown that encountering challenges in a text such as inconsistencies triggers a slowdown in reading for skilled but not less skilled readers (e.g., Smith & O'Brien, 2016; Stiegler & O'Brien, 2009cf). Similarly, it is reasonable that introducing distracting information such as in-text APA citations would also require a similar decrease in reading pace in order to maintain higher comprehension. Reading text with parenthetical in-text citations requires attention to not only processing the text but also skipping or suppressing irrelevant information (i.e., the APA in-text citations), which may overwhelm less skilled structure builders due to the high concurrent processing requirements (Griffin et al., 2008). As a result, metacomprehension monitoring of less skilled structure builders may decrease, leading them to misjudge the ease of reading of the passage (Thiede et al., 2009), thereby adopting a less careful reading method for the entire passage when APA citations are present.

These findings corroborate that the relation between reading speed and comprehension is curvilinear and that changes in the text or different reading purposes (e.g., narrative versus expository text) require different reading speeds in order to maintain a high level of comprehension (e.g., Stiegler-Balfour & Leighton, 2018cf). Thus, it seems reasonable that text placing a higher demand on cognitive resources (e.g., APA citations) would require a slower reading pace when compared to instances in which text contains no distractions. This was

evidenced by our results showing that higher skilled structure builders scored higher on the comprehension quiz as a result of reducing their reading pace in the APA citation condition compared to their less skilled counterparts who read faster and performed lower on the quiz. While our results show that reducing reading pace is what directly led to better comprehension for higher skilled structure builders, we believe stronger comprehension is not solely about reading time but also what occurs during the added time engaging with the text that leads to higher comprehension levels. Future studies could use eye-tracking technology to further investigate how higher ability structure builders spend the extra time in the APA citation condition compared to the no citation condition in order to explain how slower reading paces help support better comprehension.

What we can confidently argue is that the presence of in-text parenthetical citations in introductory-level textbooks provide added complexity and potential hurdles for student readers. In a typical introductory-level textbook, the beginning and end of the in-text APA-style references are difficult to predict. They may occur almost anywhere within a given paragraph, even mid-sentence, and can vary in length from one name and a year to a long string of authors and studies that may span one or more lines of text. Thus, it may be difficult for readers to automatize skimming them, increasing CL, and perhaps even working memory requirements to maintain the continuity of a sentence or paragraph that they “interrupt” (e.g., Gernsbacher et al., 2004). In other words, APA citations likely negatively affect the flow of the narrative and interfere with prioritizing core content and overall reading strategies.

CL theory suggests learners can absorb and retain information effectively only if it is presented in such a way that does not overload mental capacities (Sweller, 2010). Increasing CL can prove to be especially difficult for struggling readers as research has revealed some important differences between how high- and low-ability readers comprehend text. For example, one theory is that differences in comprehension skill are determined by differences in working memory capacity, with high ability readers having more working memory capacity (Dane-man & Carpenter, 1980; Just & Carpenter, 1992; McVay & Kane, 2012). According to this account, high ability readers are able to hold more information from the discourse in working memory, thus making it more likely that they will make necessary inferences and fully understand the text (Dixon et al., 1988).

Even though efforts are underway to teach less skilled comprehenders crucial reading strategies that would enhance their ability to self-monitor their comprehension and adjust their strategies if needed (Carretti et al., 2014; Magliano, Trabasso, & Graesser, 1999; McNamara et al., 2007), it is well-documented that many struggling readers either do not know or do not spontaneously use such metacognitive reading strategies (McNamara & Scott, 2001). Additionally, research has shown that individuals who have lower comprehension ability also often have less background knowledge, thus leading to even lower comprehension of text for which they have little

background knowledge (McNamara & McDaniel, 2004). Likewise, having high background knowledge on a topic can sometimes compensate for low comprehension ability because it allows the reader to more effectively use their knowledge to make inferences and engage in more active processing (McNamara, 2004). Taken together, this calls into question the use of APA-style citations in introductory textbooks and other educational writing designed for students who are subject matter novices and typically display varying levels of comprehension ability.

This caution is more pronounced for teachers whose student demographics may include lower skilled readers and structure builders. While our sample included a range of structure building abilities, we did not have many very low structure builders. However, the trend was clear: Lower MMCB scores were associated with lower scores on the comprehension quiz. Thus, it is quite plausible that this effect may be even more pronounced in individuals with even lower MMCB scores. Overall, these findings challenge the utility of APA-style citations in textbooks with respect to student learning of primary content, especially textbooks designed for general (e.g., nonmajor) use and adopted for use with students of varying skill levels. Our findings urge sensitivity to this issue for those who currently teach in contexts that may include a variety of skill levels and we encourage further research with this potentially vulnerable population in the future.

Strong instructor preference for APA-style citations tends to revolve around goals related to socialization into the major or providing a structure that encourages students to understand that certain statements and findings are based upon previous research rather than simply being author opinion (e.g., to show that psychology is a science; Worth Publishers, 2011). We do not, however, know if the presence of such citations actually encourages progress toward these goals, both of which may be ancillary to the goal of mastering course content. This is an area in need of further exploration. It is important to understand that many pedagogical interventions may have side effects that may themselves subvert learning in different ways and should be carefully implemented (Daniel, 2012). Such costs need to be explored and weighed before committing to particular strategies. This study argues that the pursuit of the goals of major socialization and scientific credibility, whether or not actually achieved, may subvert the goal of content mastery, especially for students who are not skilled structure builders, and efficiency in more skilled structure builders.

It is plausible that training students in strategies to skip parenthetical citations, or simply offering practice skipping them, can ameliorate the differences found in this study. Because this is the first study of which we are aware examining the potential costs of parenthetical references on comprehension and knowledge building, such studies are yet to be done, but strongly encouraged. It is also worth noting that APA style is but one style of referencing. It is likely that other forms of referencing, especially numerical citations that are easily recognizable as being distinct from the text to be read (e.g., Chicago), may reduce CL and/or fluency issues, thus removing

Table 2. Means and Standard Deviations for Recognition Quiz Scores in Both Citation Conditions as a Function of the Number of Psychology Courses Previously Taken.

Citation Condition	Number of Psychology Courses Taken							
	1		2		3		4	
	N	M (SD)	N	M (SD)	N	M (SD)	N	M (SD)
APA	51	12.25 (2.82)	43	12.07 (2.46)	11	12.09 (2.30)	10	13.30 (2.58)
No APA	75	12.88 (2.54)	25	12.92 (2.00)	13	11.54 (2.33)	2	8.00 (2.83)

the hurdles presented with parenthetical references demonstrated in the present study.

Other possible solutions to the issue of reference styles and their impact on learning that immediately seem plausible may be to create an electronic textbook where APA citations (and other distracting information) could easily be hidden (or turned off) to provide readers with just the text while preserving the convention of writing in APA style. However, while this format might be useful for lab-based studies, we should strongly note that the use of electronic textbooks in introductory psychology courses comes with its own potential liabilities (Daniel & Woody, 2013; Gurung, 2017) and we do not, at present, recommend this option for the classroom without further study. Potential fixes to the issues presented in this study, including electronic formats, training, or alternate citation formats, may themselves subvert learning in different ways and should be carefully implemented (Daniel, 2012).

APA-style references are in textbooks because the market (instructors) wants them there (Worth Publishers, 2011). Yet, there are costs to comprehension and reading fluency. The desire to move toward a reference style that does not negatively impact learning and fluency will only come when the market (instructors) so desires. This study questions the wisdom of our traditional preferences and learning goals with regard to textbook format, especially for courses that include large percentages of non-majors and those serving less skilled readers.

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Notes

1. All analyses presented were also conducted using a factorial analysis of variance with structure building ability coded as a

categorical variable using a median split for skilled and less skilled structure builders (e.g., O'Reilly & McNamara, 2007; Ozuru et al., 2009; Stiegler-Balfour & Benassi, 2015), showing an identical pattern of results.

2. The multiple regression analysis presented was also conducted including the number of psychology courses taken and years in college as predictor variables. Neither variable was a significant predictor of comprehension quiz performance and did not change the overall pattern of results. See Table 2 for means and standard deviations for recognition quiz scores in both citation conditions as a function of the number of psychology courses previously taken.

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