



Participation of Women in Behavior Analysis Research: Some Recent and Relevant Data

Anita Li¹  · Hugo Curiel¹ · Josh Pritchard² · Alan Poling¹

Published online: 7 February 2018
© Association for Behavior Analysis International 2018

Abstract

An examination of article authorship and editorial board membership for 7 behavior–analytic journals from 2014 to 2017 revealed that, compared to findings from prior years, women’s participation has increased substantially. This finding is heartening and shows the value of persistent efforts to ensure that everyone has the opportunity to succeed in, and be served by, behavior analysis.

Keywords Gender issues · Authorship · Bibliometric analysis · Publications · Editorship · Women · Men

In 1978, the Association for Behavior Analysis conference committee (under Elsie Pinkston’s leadership) decided to move the conference from the city initially chosen, Chicago, Illinois, to Dearborn, Michigan. The decision was based on the fact that Michigan, but not Illinois, had ratified the Equal Rights Amendment (Malott, 2012), a proposed amendment to the United States Constitution designed to guarantee equal rights for women. Clearly, behavior analysts took women seriously. Nonetheless, men appeared to dominate the field at the time, although no relevant data were available. In 1983, Poling et al. provided some. They reported that, for each year from the inception of the *Journal of the Experimental Analysis of Behavior (JEAB)* and the *Journal of Applied Behavior Analysis (JABA)* through 1981, men appeared as authors far more often than women, although the difference was larger for *JEAB*. There was an upward trend across years in the proportion of *JEAB* authors who were women, but not for *JABA* authors. Based in part on these findings, Poling et al. suggested that women were underrepresented in important areas of behavior analysis and that this had changed little across time. They offered several suggestions for increasing women’s participation and enjoined readers to take action,

noting that “there is no sure and simple way to increase women’s involvement in behavior analysis, but this is no excuse for ignoring the problem” (p. 151).

The role of women in behavior analysis has been the topic of several articles (e.g., Laties, 1987; Myers, 1993; Neef, 1993; Simon, Morris, & Smith, 2007). Although it is clear that over time women’s participation in the discipline as authors has grown substantially, findings through 1997 indicated that fewer women than men published articles in *JABA* and *JEAB* (McSweeney, Donahoe, & Swindell, 2000; McSweeney & Swindell, 1998). These data, coupled with data reflecting women’s participation as journal editors, led McSweeney et al. (2000) to conclude that “a ‘glass ceiling’ reduces the participation of women at the highest levels of applied behavior analysis and related fields” (p. 267).

Women in behavior analysis have made substantial progress since McSweeney et al. (2000) posited a “glass ceiling.” This progress is clearly evident in the accomplishments of Judy Favell (2015), Linda LeBlanc (2015), Frances McSweeney (2015), Anna Petursdottir (2015), Carol Pilgrim (2015), Beth Sulzer-Azaroff (2015), and Bridget Taylor (2015), whose accomplishments were celebrated in a special section of *The Behavior Analyst* devoted to women in the discipline. Collectively, they have published 682 journal articles, books, and book chapters (Nosik & Grow, 2015).

Although laudable, the success of these exceptional individuals is not an adequate index of the current involvement of women in behavioral research. To provide additional relevant information, we examined the recent (2014–2017) participation of women as authors of articles published in seven behavior–analytic journals, as well as their participation as members

✉ Anita Li
anita.li@wmich.edu

¹ Department of Psychology, Western Michigan University, Kalamazoo, MI 49008, USA

² Rehabilitation Institute, Southern Illinois University, Carbondale, IL, USA

of the editorial boards of these journals. Interest in women's participation in behavior analysis is currently high, as indicated, for example, by the first Women in Behavior Analysis (WIBA) Conference in 2017.

Method

Each issue of *The Analysis of Verbal Behavior (TAVB)*, *Behavior Analysis in Practice (BAP)*, *Behavior Analysis: Research and Practice (BAP)*, *The Behavior Analyst (TBA)*, *JABA*, *JEAB*, and *The Psychological Record (TPR)* published from 2014 to mid-2017 was examined. The years 2014 to 2017 were chosen to index recent publication and editorship practices. These seven journals were selected because each is devoted to behavior analysis. Data similar to those recorded in the present study have been reported for earlier years for two of the journals (*JABA*, *JEAB*), but not for the other five.

One person reviewed each article and recorded whether the first author was a woman or a man, whether the last author was a woman or a man, and the total number of authors who were women and who were men. Members of the editorial boards of each journal at the beginning of 2017 were also categorized as women or men. Authors and editors were designated as women or men on the basis of their first names, following the procedure described by McSweeney and Swindell (1998). When this procedure did not allow an author to be classified, a Google search was conducted using the person's full name in sources such as university web pages, company web pages, invited speaker biographies, and social media (e.g., LinkedIn, ResearchGate). These procedures allowed all but 16 authors (0.7% of the total) and all editors to be categorized. Data are not reported for individuals who could not be categorized. A second rater independently scored 145 of the 882 total articles (16%), selected at random. Interobserver agreement for the four dependent variables averaged 95.1% (ranging from 93.1% to 97.2% across categories).

Results

Figure 1 depicts authorship data for each journal individually and mean values for the seven journals combined. The percentage of articles with a woman as first author varied substantially across journals, from 27.2 for *TBA* to 57.6 for *JABA*, with a mean value of 42.7. *TAVB* and *JABA* were the only journals with a higher percentage of articles with a women as first author. For each journal, the proportion of articles with at least one man as an author exceeded the proportion of articles with at least one woman as an author. The percentage of articles with at least one woman as an author ranged from 39.1 for *TBA* to 86.5 for *JABA*, with a mean across journals of

67.9. The percentage of articles with at least one man as an author ranged from 80.2 for *TAVB* to 96.9 for *JEAB*, with a mean across journals of 85.7. *JABA* and *TAVB* were the only journals where the percentage of articles with at least one woman as an author exceeded that with at least one man as an author, and this difference was small (1.8% and 2.5%, respectively). The percentage of articles with a woman as last author ranged from 25.6 for *JEAB* to 54.1 for *TAVB*, with a mean across journals of 40.5. *BAP* (52.5%), like *TAVB*, had more articles with a female than a male last author.

Table 1 shows the percentage of single-author articles by women. This value ranged from 0.4 for *JABA* to 15.2 for *TBA*, with a mean of 3.6 across journals. The percentage of single-author articles by men ranged from 1.4 for *JABA* to 44.6 for *TBA*, with a mean of 14.2 across journals. Men authored a higher percentage of articles than women for each of the seven journals. Overall, men published four times as many single-author articles (115) as women (28).

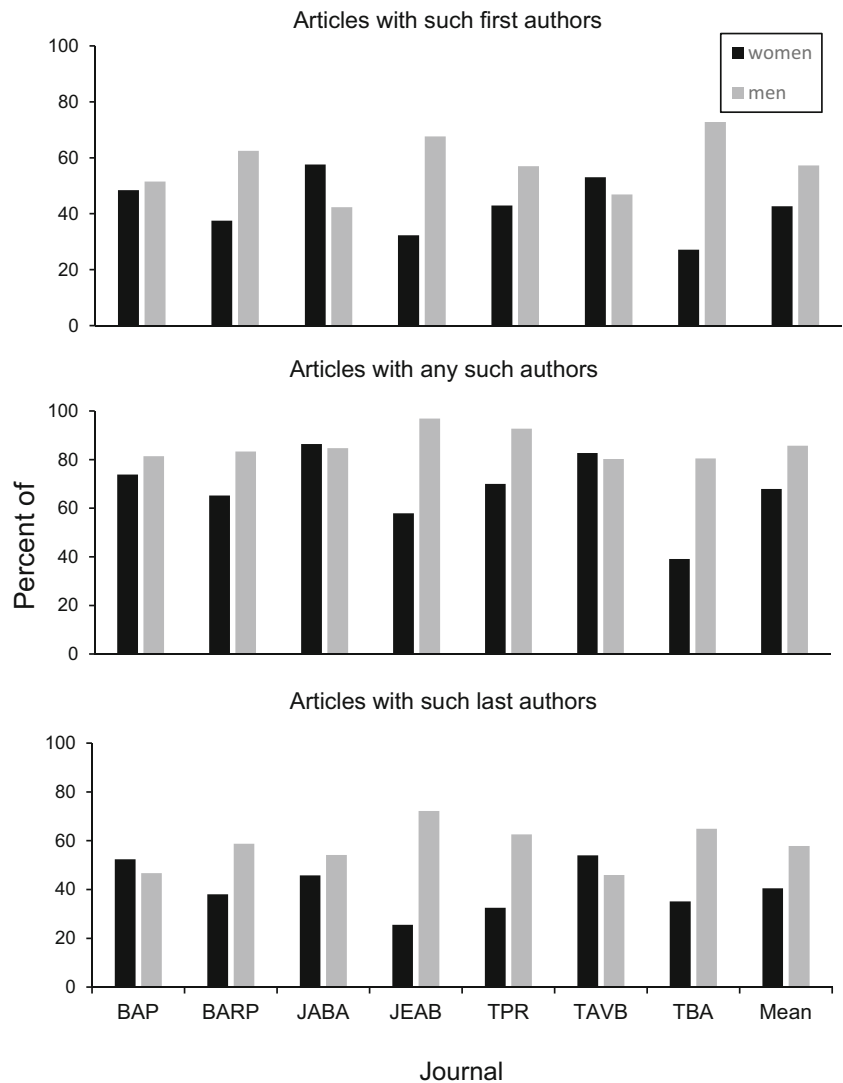
Figure 2 shows the percentage at the beginning of 2017 of female editorial board members for each journal and the mean across journals. The percentage of female editors ranged from 10.5 for *TBA* to 58.3 for *TAVB*, with a mean of 37.7. The percentage of women editors exceeded the percentage of men editors in *TAVB* (58.3), and the two values were nearly equal in *BAP* (47.4), *BARP* (48.4), and *JABA* (45.7).

Discussion

This article adds to the empirical literature concerning women's contributions to behavior-analytic journals by providing updated authorship data for journals that have been examined before (i.e., *JABA*, *JEAB*) and some that have not (i.e., *BAP*, *BARP*, *TPR*, *TAVB*, and *TBA*), as well as for single-author articles and last-author positions, which have not been previously reported. Last authorship was chosen as a metric because senior academics are often listed last to reflect seniority and prestige (Igou & van Tilburg, 2015). However, the *Publication Manual of the American Psychological Association* (2010) stipulates that author positions should be based on contribution in descending order, so last-author data should be interpreted tentatively. For example, principal investigators may opt to be listed second rather than last. Senior academics often, but not always, serve as corresponding authors, and it would certainly be worthwhile in future studies to examine what percentage of such authors are women and men.

When the current findings regarding authorship are compared to similar data from earlier reports (McSweeney et al., 2000; McSweeney & Swindell, 1998; Poling et al., 1983), two points are clear. First, women's contributions to behavior-analytic journals as authors have continued to increase. Second, in recent years women have made major contributions. For example, from 2014 to 2017, there were more women than men as first authors

Fig. 1 Percentage of articles written by women or men for each journal alone and for the group means. Data are for 2014–2017 and journal abbreviations are as in Table 1



in *JABA* and *TAVB*. Moreover, for both journals, the percentage of articles with at least one woman as author exceeded the percentage of articles with at least one man as author.

Comparing the present editorship data to earlier findings (McSweeney et al., 2000; McSweeney & Swindell, 1998) provides further evidence of women’s growing role in publication-related activities. The percentage of *JABA* and *JEAB* editors who were women in 2014 to 2017 was more than twice that

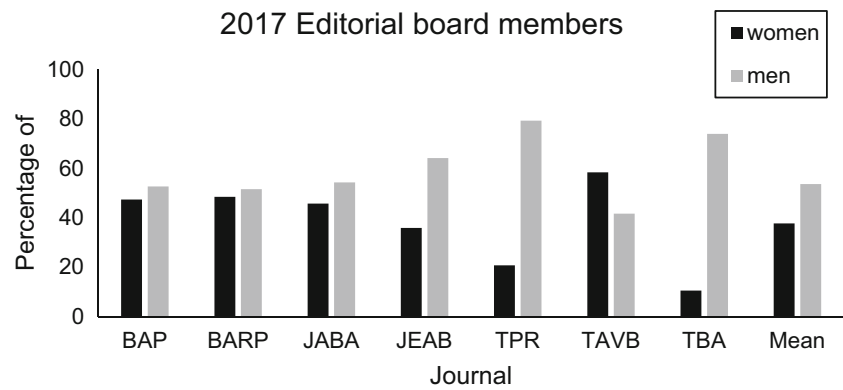
reported by McSweeney et al. (2000) in any year from each journal’s inception through 1997. Across all journals, the mean number of women editors (37.7%) was just slightly below the mean number of first authors who were women (42.7%). Both measures are important indications of achievement (McSweeney et al., 2000), and the similarity in their mean values is interesting. Values of these two measures for individual journals often differed substantially, however.

Table 1 Percentage (and number) of single-author articles

Journal								
Author	<i>BAP</i>	<i>BARP</i>	<i>JABA</i>	<i>JEAB</i>	<i>TPR</i>	<i>TAVB</i>	<i>TBA</i>	Mean
Female	5.0% (8)	1.4% (1)	0.4% (1)	0.5% (1)	0.5% (1)	2.5% (2)	15.2% (14)	3.6% (28)
Male	15.6% (25)	16.3% (10)	1.4% (4)	10.8% (21)	4.6% (9)	6.2% (5)	44.6% (41)	14.2% (115)

BAP Behavior Analysis in Practice, *BARP* Behavior Analysis: Research and Practice, *JABA* Journal of Applied Behavior Analysis, *JEAB* Journal of the Experimental Analysis of Behavior, *TPR* The Psychological Record, *TAVB* The Analysis of Verbal Behavior; *TBA* The Behavior Analyst

Fig. 2 Percentage of editorial board members for each journal alone and for the group means. Data are for 2014–2017 and journal abbreviations are as in Table 1



Single-author articles are also recognized as indicators of professional achievement (e.g., Price, 1963; Woods, 1998), and it is notable that men published substantially more such articles than women in the journals we examined. This finding is consistent with the results of a recent analysis of more than 8 million articles published across the natural sciences, social sciences, and humanities, which found that women were significantly underrepresented as authors of single-author articles (West, Facquet, King, Correll, & Bergstrom, 2013). They were also underrepresented in other authorship measures, and it is noteworthy that women’s contributions to the articles we examined were, in a statistical sense, roughly double their contributions to the articles examined by West et al. The reasons for men publishing more single-author articles, per the current article, and in general are unknown, but one possibility is that single-author articles are typically written by productive senior scientists and scholars, the current majority of whom are men. Women may also be less inclined than men to work alone or to self-promote (Rudman, 1998) and are more inclined to share credit.

There certainly is an ever-increasing number of women with the skills and status to publish single-author articles—the seven people mentioned previously are great examples—and it will be interesting to see whether more single-author behavior–analytic articles by women are published in the coming years. Of course, single-author articles are increasingly rare in many areas of science and are arguably of no particular importance in indexing professional achievements (Smart & Bayer, 1986; Wuchty, Jones, & Uzzi, 2007).

Our findings indicated that, across journals, women averaged 43% of author contributions and 38% of editor contributions. Helmer, Schottdorf, Neef, and Battaglia (2017), who examined articles published in 142 journals (focused on various hard sciences, social sciences, health fields, and humanities) from 2007 to 2015, reported that women’s contributions to authoring and editing were 37% and 26%, respectively. Although the higher percentages in behavior–analytic journals are arguably points of pride for our field, it is possible—nay, probable—that subtle and institutionalized practices that impair the ability of women and other underrepresented populations to

progress and contribute continue to operate in behavior analysis. Women substantially outnumber men in behavior analysis practice, as indicated by the fact that “82.2% of Behavior Analyst Certification Board (BACB) certificants are female, including 68.3% of those who are certified at the doctoral level (BCBA-D™)” (Nosik & Grow, 2015, p. 225). In light of BACB certificant data, women are substantially underrepresented as both authors and editors. Researchers interested in this area could examine participation of women in behavior–analytic academic roles.

The variables responsible for women’s underrepresentation in science have long generated interest among academics in general (Dubois-Shaik & Fusulier, 2017; National Research Council, 2010; Toren, 1993). Hypotheses include lifestyle choices related to work–home balance and inflexible university environments (Ceci & Williams, 2010; Mervis, 2012), and we theorize that additional factors will arise, particularly in consideration of developments in gender identity and expression. It is beyond the scope of this article to attempt to translate these factors into behavior–analytic terms or to offer suggestions for manipulating them effectively. These are, however, highly worthwhile endeavors because initiatives to further promote women’s involvement in behavior–analytic research are likely to increase the quality as well as the quantity of scientific output. Moreover, interventions might well be relatively simple, such as arranging women’s conferences or ensuring that all behavior analysis students (in both degree and certificate programs) complete research projects, such as theses or capstone courses.

In closing, it is important to emphasize that the contributions of women to behavior–analytic scholarship have increased over time and are now substantial. They are, in fact, worthy of celebration, and celebration was one of the goals of the 2017 WIBA Conference, which was intended “to empower, celebrate and mentor women behavior analysts and highlight their contributions to the field” (WIBA, 2017). Events that occurred preceding one of the first conferences devoted entirely to behavior analysis fostered our research group’s interest in women’s participation in behavior analysis (Poling et al., 1983), and the WIBA Conference rekindled that

interest. Our initial findings indicated that women were underrepresented in behavior analysis, which we construed as a problem. Comparing our current data to those findings indicates that women's participation in behavior analysis as authors and editors has increased significantly; we have clearly made progress. But now is not the time to be sanguine. Women around the world continue to face serious challenges, as do members of the LGBTQ community and many racial and ethnic groups. We behavior analysts should do our best to ensure that all of them receive the support they deserve as our colleagues, our students, our clients, and our friends. Doing so can only improve our discipline and our world.

Compliance with Ethical Standards

Conflicts of Interest The authors declare that they have no conflicts of interest.

References

- American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: Author.
- Ceci, S. J., & Williams, W. M. (2010). Understanding current causes of women's underrepresentation in science. *Proceedings of the National Academy of Sciences of the United States of America*, *108*, 3157–3162.
- Dubois-Shaik, F., & Fusulier, B. (2017). Understanding gender inequality and the role of the work/family interface in contemporary academia: an introduction. *European Educational Research Journal*, *16*, 99–105.
- Favell, J. E. (2015). A career in behavior analysis: notes from the journey. *The Behavior Analyst*, *38*, 229–236.
- Helmer, M., Schottdorf, M., Neef, A., & Battaglia, D. (2017). Gender bias in scholarly peer review. *eLife*, *217*, 1–18.
- Igou, E. R., & van Tilburg, W. A. P. (2015). Ahead of others in the authorship order: names with middle initials appear earlier in author lists of academic articles in psychology. *Frontiers in Psychology*, *6*, 469.
- Laties, V. G. (1987). Society for the experimental analysis of behavior: the first thirty years (1957–1987). *Journal of the Experimental Analysis of Behavior*, *48*, 495–512.
- LeBlanc, L. A. (2015). My mentors and their influences on my career. *The Behavior Analyst*, *38*, 237–245.
- Malott, R. M. (2012). Elsie Pinkston (1937–2012). *Inside Behavior Analysis*, *4*, 76–77.
- McSweeney, F. K. (2015). A challenging and satisfying career in basic science. *The Behavior Analyst*, *38*, 247–254.
- McSweeney, F. K., Donahoe, P., & Swindell, S. (2000). Women in behavior analysis. *The Behavior Analyst*, *23*, 267–277.
- McSweeney, F. K., & Swindell, S. (1998). Women in the experimental analysis of behavior. *The Behavior Analyst*, *21*, 183–202.
- Mervis, J. (2012). Is motherhood the biggest reason for academia's gender imbalance? *Science*, *335*, 1030–1031.
- Myers, D. L. (1993). Participation by women in behavior analysis. II: 1992. *The Behavior Analyst*, *16*, 75–86.
- National Research Council. (2010). *Gender differences at critical transitions in the careers of science, engineering, and mathematics faculty*. Washington, DC: National Academies Press.
- Neef, N. A. (1993). Response to Myers on participation of women in behavior analysis: right problem, wrong reason. *The Behavior Analyst*, *16*, 357–359.
- Nosik, M. R., & Grow, L. L. (2015). Prominent women in behavior analysis: an introduction. *The Behavior Analyst*, *38*, 225–227.
- Petersdottir, A. I. (2015). Influences on my early academic career. *The Behavior Analyst*, *38*, 255–262.
- Pilgrim, C. (2015). Opportunities and some lessons learned from a career in behavior analysis. *The Behavior Analyst*, *38*, 263–273.
- Poling, A., Grossett, D., Fulton, B., Roy, S., Beechler, S., & Wittkopp, C. (1983). Participation by women in behavior analysis. *The Behavior Analyst*, *6*, 145–152.
- Price, D. J. D. (1963). *Little science, big science*. New York: Columbia University Press.
- Rudman, L. A. (1998). Self-promotion as a risk factor for women: the costs and benefits of counterstereotypical impression management. *Journal of Personality and Social Psychology*, *74*, 629–645.
- Simon, J. L., Morris, E. K., & Smith, N. G. (2007). Trends in women's participation at the meetings of the Association for Behavior Analysis: 1975–2005. *The Behavior Analyst*, *30*, 181–196.
- Smart, J., & Bayer, A. (1986). Author collaboration and impact: a note on citation rates of single and multiple authored articles. *Scientometrics*, *10*. <https://doi.org/10.1007/BF02016776>.
- Sulzer-Azaroff, B. (2015). Joy and fulfillment as a women behavior analyst. *The Behavior Analyst*, *38*, 275–282.
- Taylor, B. A. (2015). Stereo knobs and swing sets: falling in love with the science of behavior. *The Behavior Analyst*, *38*, 283–292.
- Toren, N. (1993). The temporal dimension of gender inequality in academia. *Higher Education*, *25*, 439–455.
- West, J. D., Faquet, J., King, M. M., Correll, S. J., & Bergstrom, C. T. (2013). The role of gender in scholarly authorship. *PLoS One*, *8*. <https://doi.org/10.1371/journal.pone.0066212>.
- WIBA. (2017). Registration. Retrieved from <http://thebaca.com/wiba-registration/>
- Woods, R. H. (1998). Single vs. co-authored and multiple-authored articles: the views of CHRIE educators on their value. *Journal of Hospitality and Tourism Education*, *10*, 53–56.
- Wuchty, S., Jones, B. F., & Uzzi, B. (2007). The increasing dominance of teams in production of knowledge. *Science*, *316*, 1036–1039.