BRIEF REPORT

Representation of Women in Behavior Analysis:
An Empirical Analysis

Melissa R. Nosik, Molli M. Luke, and James E. Carr
Behavior Analyst Certification Board, Littleton, Colorado

As in other disciplines, women were underrepresented in behavior analysis in its early decades. Over the years, multiple articles have documented increasing trends in women’s representation in behavior analysis in areas such as contributions to the scholarly literature and participation in professional associations. The purpose of the present article was to extend this line of investigation by more comprehensively evaluating the participation of women in behavior analysis in a variety of areas and by analyzing participation by age cohort and career point to detect progress that might be masked by overall patterns. Our data indicate that substantial progress has been made in the participation of women in our discipline.

Keywords: behavior analysis, gender, leadership, editorial appointments, publication trends

There has been an increase in women’s representation in many disciplines since certain barriers to educational opportunities have been removed (National Science Foundation, 2017). One such barrier was the restriction on women’s acceptance into higher education training programs. In 1972, Title IX of the United States Education Amendments prohibited federally funded university programs from gender discrimination in their admissions process (Department of Justice, 1972). Since then, the overall percentage of women earning bachelors, masters, and doctoral degrees has, as expected, substantially increased and continues to trend upward (American Psychological Association Women’s Programs Office, 2006; Howard et al., 1986; National Science Foundation).

The representation of women in the discipline is not a new topic to behavior analysis. In 1983, Poling et al. published the first of several periodic assessments in which authors evaluated the state of women in behavior analysis. The primary data sources in these articles have included (a) women’s publications in Journal of Applied Behavior Analysis (JABA), Journal of the Experimental Analysis of Behavior (JEAB), and The Behavior Analyst (TBA; Iwata & Lent, 1984; Laties, 1987; McSweeney, Donahoe, & Swindell, 2000; McSweeney & Swindell, 1998; Myers, 1993; Neef, 1993; Poling et al., 1983) and (b) women’s participation in the Association for Behavior Analysis International (ABAI, 2017; Myers, 1993; Poling et al., 1983; Simon, Morris, & Smith, 2007).

As mentioned above, Poling et al. (1983) first evaluated women’s contributions to the scholarly literature (i.e., authorship, editorial board appointments); Latties (1987), Myers (1993), and Simon et al. (2007) published subsequent analyses. Collectively, the data from these investigations have shown increasing trends for women’s representation as authors and editorial board members for JABA, JEAB, and TBA. The greatest increases in women’s participation have been seen in JABA, a publication in which by 2005, more than 50% of the authors were women. In the basic and conceptual journals, JEAB and TBA, respectively, upward trends were modest but consistent, and by 2005, more than 25% of the authors were women.
Poling et al. (1983) also first evaluated women’s participation in various ABAI functions. The authors reported ABAI data from 1982 that included the percentage of women who were members (student and affiliate members, 50%; full members, 28%), delivered invited addresses (14%), were first authors of symposia (30%), and were first authors of posters (38%). As a follow-up, Myers (1993) reported ABAI data through 1991 that included the percentage of women who were members (student members, 60%; full members, 31%), delivered invited addresses (15%), and were invited symposia speakers (31%). Women’s representation across these categories was virtually identical from 1982 to 1991, except that an upward trend was evident in student membership. Simon et al. (2007) published the most recent analysis of ABAI data as an update and expansion of Poling et al. The authors reported upward trends in ABAI data from 1975 through 2005 for the percentage of women who were members (62%) and delivered presentations (e.g., posters, 59%, invited addresses, 35%)1, as well as their authorship status (e.g., first authors). Simon et al. further evaluated more prestigious categories of participation (e.g., invited addresses) by area of specialization (applied, basic, conceptual) and reported that women’s representation was lagging, particularly in the basic and conceptual domains.

To date, a number of authors have reported increasing trends in women’s participation in behavior analysis across all of the metrics that have been evaluated. In addition, data specific to applied behavior analysis have reflected greater progress, whereas basic and conceptual areas and overall data that capture more prestigious achievements (e.g., invited speakers, professional recognition) have reflected underrepresentation.

The purpose of the present article was to provide an updated analysis of women’s representation in behavior analysis that includes more comprehensive categories and an analysis of participation by age cohort and career point to better detect changes that might be masked in aggregate analyses. The categories of analysis include ABAI fellows, professional awards, leadership roles, invited presentation speakers, editorial board appointments to behavior-analytic journals, authorship in behavior-analytic journals, new faculty hires at ABAI-accredited training programs, and behavior-analyst certification. Each category of analysis is reported separately, followed by a comprehensive analysis anchored by career milestones, including four earlier career milestones (i.e., certification, faculty appointments, publications, earlier career awards) and four later career milestones (i.e., invited presentation speakers, editorial board appointments, leadership roles, later career awards).

Method

Gender Coding

For each category, individuals were coded as women if their first names were conventionally female (e.g., Cathleen, Linda) and as men if their first names were conventionally male (e.g., Wayne, Jim). For unconventional first names and when only first and middle initials were available, online searches were used to locate a profile or photo for gender determination. We were able to identify gender for all participants.

Categories and Data Collection

Professional recognition. Fellows of ABAI and awards presented to behavior analysts by behavior-analysis professional organizations were evaluated to determine the gender of behavior analysts who received such professional recognition. The names and gender of each fellow and award recipient were recorded for subsequent analysis.

ABAI fellows were identified between the program’s inception in 2004 through 2016 from the ABAI website (www.abainternational.org/constituents/fellows). A longer time period was used for this analysis because of the low number of fellows overall (n = 94). Awards given by behavior-analytic professional organizations to behavior analysts from 2012 to 2016 (i.e., the past 5 years) were identified through publicly available websites. To provide an accurate account of recognition of women in behavior analysis, only awards exclusively given to behavior analysts were included. The awards included in

---

1 These data represent the data point from 2005 for each category. The exact percentages were not reported by Simon et al. (2007) but were identified using a data-extraction program called Digitizelt, Braunschweig, Germany.
the analysis were the Distinguished Service Award and Scientific Translation Award by the Society for the Advancement of Behavior Analysis (SABA); the B.F. Skinner New Research Award (Basic and Applied), the Fred S. Keller Behavioral Education Award, the Nathan H. Azrin Distinguished Contribution to Applied Behavior Analysis Award, the Med Associates Distinguished Contribution to Basic Behavior Analysis Award, the Society for the Experimental Analysis of Behavior (SEAB) Don Hake Basic/Applied Research Award, the SEAB Applied Behavior Analysis Dissertation Award, and the SEAB Basic Behavior Analysis Dissertation Award by the American Psychological Association (APA) Division 25. The qualifying awards were then categorized as earlier or later career awards, depending on when one would likely receive them. Earlier career awards included the B.F. Skinner New Research Award, the SEAB Applied Behavior Analysis Dissertation Award, and the SEAB Basic Behavior Analysis Dissertation Award; the other awards were categorized as later career awards. Point-by-point interobserver agreement (IOA) was assessed by having a second, independent evaluator code the gender of all fellows and award recipients; IOA was 100%. The data from these analyses are presented as the percentage of women award recipients in each area (ABAI fellows, earlier career awards, later career awards).

Professional organization leadership. Three major behavior-analysis organizations—ABAI, the Behavior Analyst Certification Board (BACB), and the Association for Professional Behavior Analysts (APBA)—were evaluated for representation of women in leadership roles (i.e., organization presidents) from 2012 to 2016. Each organization represents one data point per year, so we included 5 years of data to provide a large enough sample size for analysis. Point-by-point IOA was assessed by having a second, independent evaluator code the gender for all of the presidents (n = 15); IOA was 100%. Data were collected using publicly available information such as websites, newsletters, and convention programs. The data from this analysis are presented as the percentage of organization presidents who were women.

Invited presentation speakers. The programs of four behavior-analysis conventions that regularly feature many invited behavior-analytic speakers were reviewed to determine the gender of those speakers. Convention programs were obtained from publicly available websites from the 2014, 2015, and 2016 annual conventions of ABAI, APBA, Berkshire Association for Behavior Analysis and Therapy (BABAT), and California Association for Behavior Analysis (CalABA). A 3-year time period was used because the sample size was large enough to provide a recent representation of speakers while still accounting for changes in organization systems that could impact speaker invitations. Invited events that were coded included keynotes, invited single-presenter events, invited tutorials, and award presentations. Invited panel sessions, invited symposia, workshops, or any invited presentation given by a nonbehavioral professional were excluded. In addition, Society for the Quantitative Analysis of Behavior tutorials were excluded from ABAI, and Organizational Behavior Management Network invited speakers were excluded from CalABA, because they constituted separate events that were colocated with a partner association. Each invited presenter was coded for his or her gender, age cohort (i.e., 25–34, 35–44, 45–54, 55–64, 65 and over), and area of professional emphasis (i.e., applied, basic, conceptual) per presentation. Age cohort and area of professional emphasis data were primarily collected from each invited presenter by way of a survey sent to them for this purpose and secondarily through publicly available information. Point-by-point IOA was assessed by having a second, independent evaluator code the gender of 40.2% (n = 68) of the unique invited speakers (n = 169); IOA was 100%. The data from these analyses are presented as the percentage of invited presentation speakers who were women.

Editorial board appointments. Data on women who were appointed to the editorial boards of JABA, JEAB, and TBA were obtained from journal websites or printed journal issues. Data were collected for the most recent complete publication year (2016) and the first year in which all three journals were simultaneously available and had public editorial boards (1979). The earliest year that the journals all had editorial boards was selected to anchor the analysis of progress to the same point in time. The name and gender of each editorial board member (i.e., editors, associate editors, executive editors, specialty area editors, reviewers) was recorded for each journal for both target years. Point-by-point IOA was assessed by hav-
ing a second, independent evaluator code the gender for 25.2% \((n = 37)\) of the editorial board members \((n = 147)\); IOA was 100%. The data from this analysis are presented as the percentage of editorial board members who were women from each journal per year.

**Publication trends.** Data on women who were either the first or corresponding authors of articles published in *JABA*, *JEAB*, and *TBA* were collected for the most recent publication year (2016) and the first year in which all three journals were simultaneously available (1978). The earliest year that the journals were published was selected to anchor the analysis of progress to the same point in time. All articles were coded for gender of the first or corresponding author for *JABA*, *JEAB*, and *TBA*. Point-by-point IOA was assessed by having a second, independent evaluator code the gender of the first or corresponding author for 30.3% \((n = 95)\) of all articles reviewed \((n = 314)\); IOA was 100%. The data from this analysis are presented as the percentage of women who were first or corresponding author per year.

**Faculty hires.** Program coordinators of 24 ABAI-accredited graduate training programs were surveyed by email to identify the gender and the area of professional emphasis (i.e., applied, basic, conceptual) of their recent tenure-track faculty hires. Twenty representatives (83.3%) of the coordinators responded and were included in the analysis. The coordinators were asked to report the name of the faculty member hired, the year of their hire, and their area of professional emphasis. All faculty were then entered into a spreadsheet and coded for gender. The data from this analysis are presented as the percentage of new hires between 2012 and 2016 who were women and the number of women in each area of professional emphasis.

**Board-certified behavior analysts (BCBAs).** Data were obtained on the gender composition of BCBAs\(^2\) who were credentialed in 2016 (i.e., the representation of recently certified BCBAs who are women). We have only reported data from 2016 because it represents the best indicator of the current gender distribution of new BCBAs. Overall data on gender composition of BCBAs only reflect current and active BCBAs and do not account for attrition. The data from this analysis are presented as the percentage of BCBAs credentialed in 2016 who were women.

**Career-milestone analysis.** Each of the aforementioned categories was classified along a continuum of earlier-to-later career milestones (see Figure 1, x axis). Data were collected on the overall percentage of women represented in each category.

**Results**

**Professional recognition.** A total of 94 individuals have been granted ABAI-fellow since the program’s inception in 2004; 17.0% \((n = 16)\) of ABAI fellows are women. Later career awards were given to 29 individuals from 2012 through 2016; women were the recipients of 17.2% \((n = 5)\) of those awards. Earlier career awards were granted to 20 individuals from 2012 through 2016; women were the recipients of 35.0% \((n = 7)\) of those awards (see Figure 1).

**Professional organization leadership.** Over the past 5 years, 53% \((n = 8)\) of the presidents of ABAI, APBA, and the BACB combined were women.

**Invited presentation speakers.** Overall, 27.9% of the invited presentations at ABAI, APBA, BABAT, and CalABA from 2014 through 2016 were delivered by women (total \(n = 264\)). BABAT accounted for the majority (37.1%; \(n = 98\)) of the invited presentations, followed by ABAI (26.8%, \(n = 71\)), CalABA (18.6%, \(n = 49\)), and APBA (17.4%, \(n = 46\)). Invited presentations delivered by women primarily represented an applied area of professional emphasis (70%), followed by basic (17%) and conceptual (13%) areas. Figure 2 depicts gender distributions by the age cohort of the speakers who delivered invited presentations. The percentage of invited presentations delivered by women shows visible increases across older to younger age cohorts. In the 65+ age cohort, 18% of the invited presentations were delivered by women \((n = 71)\). In the 55 to 64 age cohort, 21% of the invited presentations were delivered by women \((n = 62)\). In the 45 to 54 age cohort, 26% of the invited presentations were delivered by women \((n = 65)\). In the 35 to 44 age cohort, 43.9% of the invited presentations were delivered by women \((n = 57)\). In the 25 to 34 age cohort, 44.4% of the invited presentations were delivered by women \((n = 9)\).

\(^2\) Including individuals who hold the BCBA credential, as well as the doctoral-level designation (BCBA-D).
Editorial board appointments. Figure 3 depicts the percentage of women editorial board members of JABA, JEAB, and TBA in 1979 and 2016. Women editorial board members at JABA increased from 25.0% (n = 14) in 1979 to 41.0% (n = 30) in 2016. Women editorial board members at JEAB increased from 7.7% (n = 3) in 1979 to 29.4% (n = 15) in 2016. Women editorial board members at TBA decreased from 50% (n = 6) in 1979 to 30.4% (n = 7) in 2016. Of note is that each of these journals has appointed women as editors in chief. In 1979, TBA appointed Julie Vargas as its editor-in-chief, the first female editor-in-chief of any behavior-analytic journal. JABA has since appointed three women as editor-in-chief: Nancy Neef (1993); Cathleen Piazza (2008), and Dorothea Lerman (2011) JEAB appointed the journal’s first woman as editor-in-chief (Amy Odum) in 2016.

Publication trends. Figure 4 depicts the percentage of women authors (first or corresponding) in JABA, JEAB, and TBA in 1978 and 2016. Women authors in JABA increased from 17.7% (n = 11) in 1978 to 61.5% (n = 36) in 2016; they increased in JEAB from 7.0% (n = 6) in 1978 to 35.2% (n = 19) in 2016; and decreased in TBA from 27.0% (n = 4) in 1978 to 24.2% (n = 8) in 2016.

Faculty hires. Between 2012 and 2016 there were 37 new faculty hires at the 20 ABAI-accredited training programs that responded to our survey. Of the new faculty, 51.4% (n = 19) were women, 18 of whom reportedly worked in the applied area and one in the basic area of behavior analysis.

Certification. In 2016, there were 3,584 newly certified BCBAs, 88.0% (n = 3,154) of whom were women.

Career-milestone analysis. Figure 1 depicts the percentage of women represented in each career milestone across the following nine categories (listed from earlier career to later career milestones): certification (88%), faculty hires (51.3%), first or corresponding author publications in JABA, JEAB, and TBA (40%), earlier career awards (35%), editorial board appointments (33.6%), invited presentation speakers (28%), leadership roles (52%), later career awards (17.2%), and ABAI fellows (17%).

Discussion

The primary purpose of this article was to provide an updated analysis of women’s representation in behavior analysis in a number of areas and to provide further analyses anchored by career milestones and age cohorts to better detect the changes in women’s representation over time. As seen in Figure 1, we found that women are more represented in categories of analysis that typically occur earlier in a career (i.e., certification, 88%; new faculty hires,
and that milestones that typically do not occur until later in a career (i.e., ABAI fellow status, 17%; later career awards, 17.2%) are much less represented by women. This is not surprising in that the individuals represented in the data for later career milestones began their careers in an era of the discipline that was predominantly male, whereas the individuals represented in the earlier career milestones represent the more contemporary era in behavior analysis in which the majority of new behavior analysts are women. Based on these findings, one might predict that some of the individuals represented in earlier career categories will begin appearing in later career categories, resulting in an increase in women’s representation in later career categories over time.

Other variables associated with some of our categories of analysis might impact women’s representation in each area. As an example, Simon et al. (2007) evaluated gender of ABAI-program coordinators and found no systematic variations related to the percentage of invited women presenters. As discussed by Myers (1993) and Simon et al., another example might be barriers to professional career advancement (e.g., family responsibilities, sexism). Although these variables may impact the rate at which women’s contributions emerge over time in more prestigious categories of analysis by interfering with earlier career activities, this has not been directly evaluated in behavior analysis. The NSF (2017) found that female scientists (i.e., assistant professors, full professors, members of the National Academy of Arts and Sciences) with and without children were reported to have similar publication rates.

A secondary purpose of this article was to introduce additional categories to be considered in analyses of gender representation within our discipline that are anchored in time. For example, the introduction of an analysis of faculty hires over the past 5 years was important in this type of analysis because faculty members are perhaps more likely to obtain the later career milestones represented in each of the categories of data (i.e., publication, editorial board appointment, career awards, invited presentations, ABAI fellows). Another example is the age-cohort analysis of invited presentation speakers, which also happens to be a category that attracts a great deal of attention because of its visibility to the profession. Simon et al. (2007) included

Figure 2. Gender, by age cohort, of speakers who delivered invited conference presentations at the 2014–2016 ABAI, APBA, BABAT, and CalABA conferences. Graphs from top to bottom represent the following successive cohorts: 65+, 55–64, 45–54, 35–44, and 25–34.
discussion points about the benefits of a cohort analysis of ABAI convention participation because presentation format heavily corresponds with level of seniority in the profession. For example, posters are more likely to be authored by student members. Indeed, our age-cohort analysis showed striking increases in women behavior-analytic professionals’ participation the younger the cohorts were (i.e., ages 25–34, 44.4%; ages 35–44, 33.9%). Again, individuals represented in the older cohorts of professionals reflect an era when the profession was male-dominated.

A primary limitation of the present analyses relates to the unknown denominators that might be relevant in each analysis category. For example, Myers (1993) reported comparison data between female first authors in *JEAB* (15%) that was lower than the percentage of women in various other areas (i.e., general population, doctorates in psychology, experimental psychology, full members of ABAI) and concluded that women in *JEAB* as authors were underrepresented. However, Neef (1993) disputed this type of evidence as a metric for underrepresentation because of the many variables (e.g., abil-
parity, interest) that could impact the data. Mc-
Sweeney et al. (1998) expanded upon previous
data by using differences between comparable
journals (authors would be similar in intelli-
gence, background preparation, motivation to
publish, etc.) as a more viable indicator of rep-
resentation beyond trends within a journal. An-
other example pertains to new faculty hires.
Without data on the number and gender of ap-
plicants for those positions, it is impossible to
to fully evaluate equal representation. For exam-
ple, 51.3% of new hires being female is a prom-
ising statistic, but would be less so if it were
evident that the applicants for those positions
were predominantly female.

In addition, there are two potential limitations
to our analysis of career milestones. We as-
signed the temporal position of milestones
based on their likely occurrence within a career,
as well as on reports from other authors. For
example, Neef (1993) stated, “the candidates
normally eligible for editorial positions are ex-
perienced authors with multiple publications”
(p. 358). Based on this information, we assigned
authorship to an earlier career point than edi-
torial board appointments. Thus, the order of ca-
cer milestones likely has variation across pro-
fessionals, so Figure 1 may not be exactly as
depicted on an individual basis for this reason.
The other limitation is related to the varying
time frames that were used for some of the
categories. In some cases (i.e., leadership, fel-
lows, recognition), data were taken from a
larger number of years to increase the sample
size for meaningful data analysis and in other
cases data were taken from a fewer number of
years when the sample size was large enough to
reflect the current status of women in behavior
analysis.

A variable that has not yet been determined in
this line of research is the quantitative goal for
women’s representation in behavior analysis.
One approach to determining the goal is based
on parity, which is defined as “the state or
condition of being equal” (oxforddictionaries.
com). This goal would be 50% representation,
which appears reasonable, as women represent
approximately 50% of the general population.
For example, Figure 4 shows that women have
reached and even exceeded parity on authorship
in JABA. These data imply that an important
achievement has been made. However, the lim-
itation of parity as a goal is its insensitivity to
gender distribution within a specific workforce
(e.g., applied behavior-analytic researchers).

The second approach for determining the
quantitative goal in this line of research is based
on proportionality, which is defined as “the
quality or correspondence in size or amount to
something else” (oxforddictionaries.com). In
this approach, the relevant percentages would
be calculated from the number of women en-
gaging in a specific activity (e.g., research) that
could lead to an outcome (e.g., publication)
compared to the total number of individuals
engaging in that activity. For example, although
women now author 61.5% of JABA articles (see
Figure 4), indicating that the parity goal has
been met, we cannot determine whether the goal
of proportionality has been met without know-
ing the gender distribution of researchers likely
to be engaged in research suitable for JABA.
Thus, women still might be underrepresented in
this area.

We should acknowledge the difficulty of de-
termining whether gender proportionality has
been achieved in an area. Although data on the
gender of ABAI members and BCBAs, for ex-
ample, might appear to be the appropriate start-
ing point, these data sets are too broad for
calculating metrics in specific areas (e.g., lead-
ers in the discipline, editorial board members)
and are not comprehensive enough to be repre-
sentative of all the individuals who engage in
these activities. What is needed are data on the
number and gender of the individuals engaged
in these activities; such data are not presently
available and must be collected specifically for
this purpose. Consequently, it is impossible to
determine proportional representation by
women retroactively (e.g., representation of
women authors in the early 1980s).

Although we do not yet have access to the
data required for determining proportional
women’s representation of behavior analysts, it
is indisputable that this line of investigation,
including the current longitudinal and cohort
analyses, suggests that clear progress has been
made. That said, it is likely that factors still exist
within the discipline and society at large that
function as barriers to the career advancement
of some women. It is therefore important to
periodically reassess the progress demonstrated
in this article. We encourage future researchers
interested in this topic to determine whether
parity or proportionality is the appropriate goal.
and how to collect data for evaluating progress toward that goal.

References


Received September 17, 2017
Revision received November 14, 2017
Accepted December 20, 2017