Gender Equality in Gambling Student Funding: A Brief Report

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Abstract: Acknowledgement of gender disparity in academia has been made in recent years, as have efforts to reduce this inequality. These efforts will be undermined if insufficient numbers of women qualify and are competitive for academic careers. The gender ratio at each graduate degree level has been examined in some studies, with findings suggesting that women's representation has increased, and in some recent cases, achieved equality. These findings are promising as they could indicate that more women will soon qualify for early-career academic positions. Most of these studies, however, examine a specific—or narrow subset—of academic disciplines. Therefore, it remains unclear if these findings generalize across disciplines. Gambling researchers, and the graduate students they supervise, are a uniquely heterogeneous group representing multiple academic disciplines including health sciences, math, law, psychology, and sociology, among many more. Thus, gambling student researchers are a group who can be examined for gender equality at postgraduate levels, while reducing the impact of discipline specificity evident in previous investigations. The current study examined graduate-level scholarships from one Canadian funding agency (Alberta Gambling Research Institute), awarded from 2009 through 2019, for gender parity independent of academic discipline.

Keywords: gender bias, women in science, gambling research, graduate training, funding data

Introduction

The 'leaky pipeline' metaphor has been used extensively to describe the tendency for women to discontinue the pursuit of higher academic rank prior to the pipe terminus (i.e., attainment of full professor academic rank) (see for example: Alper, 1993; Barshay, 2016; Blickenstaff, 2005; Grogan, 2019). The pipeline metaphor was formulated decades ago in association with science, technology, engineering, and mathematics (STEM) disciplines (Miller & Wai, 2015) but has since been used as the framework for studies in many academic disciplines examining the stage—that is, academic level—at which women's representation is diminished (i.e., when 'leakage' occurs); for example, behavioural neuroscience (Titone et al., 2018), biomedical sciences (Hechtman et al., 2018; Pohlhaus et al., 2011), palliative care (Sleeman et al., 2019), anthropology (Turner et al., 2018), etc. Alongside the increasing prominence of gender equality issues being articulated in the academic literature, concentrated efforts to recruit traditionally underrepresented groups into academia have been undertaken, including specific efforts to recruit women.[2] Yet, early academic career gender disparity continues to be evidenced in some studies (e.g., Duch et al., 2012; Hill et al., 2010; Vaid & Geraci, 2016), possibly because overcoming long-standing institutional biases is a slow and arduous process (Shaw & Stanton, 2012). Interestingly, some have argued that gender parity has been achieved in academia (e.g., Ceci et al., 2014; Ceci & Williams, 2011; Miller & Wai, 2015)—a claim that is countered by others who assert that reductions in the gender gap do not amount to a full redressing of gender inequality (e.g., Geraci et al., 2015; Grogan, 2019; Titone et al., 2018). It may be the case that these conflicting conclusions stem from either the metrics used to assess gender equality, or the academic discipline of the sample investigated, or some combination of the two. That there is not yet consensus on the matter necessitates additional research focused on gender (in)equality in academia.

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[2] We acknowledge that the demarcation of bivariate genders is insufficient and not necessarily representative of, or consistent with, one's biological sex. Also, despite these shortcomings, we opted to use the terms women and men to indicate gender to be consistent with the literature discussed.

Measuring Equality in Academics

To establish if equalization efforts are being realized in career academia (i.e., early through late career academic levels), previous work has examined equality in the number of doctoral degrees awarded or other research productivity metrics, including the number of publications (Feldon et al., 2017; Lubienski et al., 2018; Mihaljević-Brandt et al., 2016; Pezzoni et al., 2016; Rossello et al., 2020; Turner et al., 2018), authorship order on publications (Fox et al., 2016; Mihaljević-Brandt et al., 2016; West et al., 2013), research impact factors (Astegiano et al., 2019; Myers et al., 2019; Yang et al., 2019), research funding received (Hechtman et al., 2018; Pohlhaus et al., 2011; Titone et al., 2018), and invited talk opportunities (Sleeman et al., 2019). These metrics have likely been used to examine equality in academia as they are in line with the productivity necessary to secure promotion and tenure (e.g., Emden, 1998; Hechtman et al., 2018; McGrail et al., 2006), and as such, there is valid reason for the use of each of these metrics. There are, however, also problems with these metrics.

Awarded Degrees

Early career tenure-track academic applicants typically have received, or are about to receive, a doctoral degree.[3] Equality of gender among PhD recipients does indicate that an equal number of individuals are becoming *qualified* for early academic career positions (i.e., have the degree required for a tenure-track position). What complicates conclusions about the career academic pipeline based on this metric is that not all PhD recipients will try—or even intended to try—to transition into academic career placements. Some PhD recipients may be 'leaking' out of the pipeline at this level; others, however, will have had career aspirations outside of the academic pipeline in the first place. Examining equality in the number of doctoral degrees awarded does not, therefore, fully inform our understanding of equality in early academic career status. Moreover, while the number of PhDs awarded has—at times and in certain disciplines—been at or near parity (Burrelli, 2008; Miller & Wai, 2015; Phou, 2017; Shaw & Stanton, 2012; Walker, 2018; West & Curtis, 2006), this equality does not necessarily translate into equitable professional *competitiveness* for new/early career academic positions. Competitiveness, based in large part on research productivity, is an important issue as new tenure-track positions in academia are increasingly rare. Although the actual availability of these new positions varies by discipline and by country (e.g., Burrelli, 2008; Edge & Munro, 2015; Hargens & Long, 2002; Phou, 2017; Shaw & Stanton, 2012; Valian, 1999; West & Curtis, 2006).

Research Productivity

Instead of doctoral degree attainment, many studies have examined research productivity metrics for indications of gender equality in academics (i.e., number of and/or authorship order on publications, research impact, research funding, etc.). Of note, metrics indicating research productivity for career academics are the same as the metrics that provide a competitive edge to those applying for early career academic positions. Amassing a competitive early career curriculum vitae takes time however, which necessitates a history of successful performance that must begin prior to receiving a PhD. In academics, success begets success, as it has been shown that an early publication history (i.e., first year of PhD program) predicts increased number of subsequent publications (Pezzoni et al., 2016), those with more publications are more likely to secure research funding (Pohlhaus et al., 2011), and early career recipients of major grants are more likely to be awarded subsequent research funding (Hechtman et al., 2018). As such, equality studies must consider these performance metrics where they typically begin. Examinations of gender differences in these performance metrics at the graduate studies level (i.e., among academics in training) would contribute important insights toward our understanding of equality in academia, specifically in relation to competitiveness for academic careers.

Gender Differences in Productivity During Graduate Studies

Publications

A number of studies have examined gender differences in publications of students at the graduate level. One study examined publications from STEM disciplines with graduate students as first authors: Pinheiro et al. (2014) demonstrated that in the years between 1970 and 1999, graduate students that were published as first authors tended to be men. Pinheiro et al. (2014) also report, however, that from the year 2000 onward, the trend reversed as more women graduate students published articles as first authors. Pinheiro et al.'s study may be an anomaly in the literature as the general trend is for graduate students who are men to be responsible for more publications submitted (Feldon et al., 2017; Lubienski et al., 2018; Pezzoni et al., 2016; Rossello et al., 2020; Turner et al., 2018), more co-authored papers (Pezzoni et al., 2016), more invited podium and symposium presentations (Turner et al., 2018), and more presentation-based disseminations (i.e., podium or poster presentations; Turner et al., 2018). Graduate student men were also found to receive greater international recognition of their work as compared to women (i.e., research impact factor; Horta et al., 2018). This trend is reportedly the case in STEM disciplines, social sciences, applied health, humanities,

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[3] This may not be reflective of teaching stream/non-tenure track applicants.

and creative arts (Feldon et al., 2017; Lubienski et al., 2018; Pezzoni et al., 2016; Rossello et al., 2020); but not in education or bioarchaeology, where no significant gender differences were found (Lubienski et al., 2018; Turner et al., 2018).

Productivity as a Function of Funding

Two other studies were conducted that should be noted, as they both investigated publications as a function of PhD-level funding. The first investigated life science publications after students in this discipline either received, or had honourable mentions for, a prestigious merit-based science and engineering research award (Graddy-Reed et al., 2019). Graddy-Reed et al. (2019) report that five years after award distribution, women award recipients had published less than both groups of men: those who won the award and those who received an honourable mention. The findings of Graddy-Reed et al. (2019) are not surprising as they follow the trend previously noted. What is surprising is that they did not attempt to ascertain if there were gender differences in the award distributions and even go so far as to say that they 'assume that the benefit from the financial allocation does not vary across gender' (p. 2). The second related study also found that men who received funding tended to publish more than women, irrespective of research discipline (Horta et al., 2018). Horta et al. also found, however, that those who received PhD funding had greater academic career productivity irrespective of gender. It might be the case that funding allows students more time to research and publish, time that would otherwise have been spent in non-academic work necessary to sustain basic necessities, including food and lodging. That funded women were shown to publish less than funded men indicates that the direct impact of funding on publication rates is more complex and requires additional research.

Funding

As noted, although few in number, there are studies that have examined career trajectories indicating that graduate-level funding does influence graduate publishing performance and is also an important indicator of subsequent academic career trajectory (e.g., Graddy-Reed et al., 2019; Horta et al., 2018). Yet few studies have been conducted to examine if the research funding allocated to graduate students varies by gender. Those that have undertaken this challenge have reported conflicting results: one reporting more funding distributed to men than women in STEM PhD programs (Buffington et al., 2016), one demonstrating equality in the distribution of graduate-level (master's and doctoral) awards in cognitive psychology and neuroscience (Titone et al., 2018), and another reporting that men were somewhat less likely to receive PhD funding than women in the disciplines of medical and natural sciences, social sciences, and humanities (Horta et al., 2018). Based on these reports, it may be

tentatively inferred that, in very recent years, graduate-level funding is being distributed at least equitably between women and men. It remains a possibility, however, that the conflicting findings noted above are influenced—at least in part—by the disciplines examined in each study.

The Current Investigation

The current research aimed to add to the body of research examining gender equality in graduate-level scholarship award distributions. Specifically, gender equality among graduate-level gambling research scholarship award recipients was examined.

Method

Sample

Scholarship Recipients

The sample examined in this study consisted of Alberta Gambling Research Institute (AGRI) master's- and doctoral-level scholarship recipients. There were two reasons for choosing to examine gambling student researchers. First, gambling researchers and the graduate students they supervise are a uniquely heterogeneous group representing multiple academic disciplines, including health sciences, mathematics, law, psychology, and sociology, among many more. Thus, gambling student researchers constitute a group that can be examined for gender equality at postgraduate levels that is less impacted by the discipline specificity evident in previous investigations. Second, while it *might* be the case that established gambling researchers are influenced by (or are characteristic of) the patriarchal hegemony seen in academia more broadly (for discussion, see: Armato, 2013; Bagilhole & Goode, 2001; Ceci et al., 2014), it *is* the case that gambling research in the future will be conducted by some of these students (i.e., rising gambling researchers). Any shift towards equality in the characteristics of gambling researchers specifically, and academics more broadly, requires the training and upward mobility of women researchers.

Scholarship Funding Agency

The AGRI merit-based scholarship program was selected for four reasons. First, AGRI is currently the only remaining gambling-specific research institute in Canada. AGRI's primary purpose is to support gambling research in Alberta, Canada, while also aiming to achieve international recognition by actively promoting institute-affiliated research and by contributing research funds for international collaborations. Second, AGRI's scholarship recipients are acknowledged in publicly available annual reports, thereby providing unhindered access to scholarship awards data. Third, AGRI's scholarships are single-year awards. In this way, AGRI differs from some funding agencies (e.g., Canadian tri-council) that award varying lengths of multi-year awards (2, 3, or 4 years) depending on the program level and the proposed project. Students are able to receive

multiple awards from AGRI—up to a maximum of four awards—but they must apply annually, allowing annual comparisons to be made. Finally, AGRI's scholarship program, unlike many other Canadian scholarship programs, is inclusive. Meaning that AGRI's master's- and doctoral-level scholarships may be awarded for any gambling-related project without bias based on the applicant's academic discipline, the research type (applied versus pure), or the specific topic or aims of the gambling project.[4]

Coding Data and Gender

Titone et al.'s (2018) procedures were used to examine the distribution of AGRI scholarships as a function of gender. Specifically, publicly available AGRI annual reports for the years 2009–2019 were accessed via the institution's website (Alberta Gambling Research Institute, n.d.). From these reports, we determined the scholarship year, the scholarship recipients' names, recipients' disciplines, and award levels (master's or doctoral). As this information was publicly available, neither AGRI nor the award recipients were contacted for this study. Gender was coded based on the scholarship recipient's first name. As per Titone et al.'s (2018) procedures, when uncertainty existed from the first name alone, public profiles were examined.[5] Following these procedures, the gender of one case remained uncoded. As has been done in previous studies (for discussion, see: Mihaljević-Brandt et al., 2016), the English-European name was coded based on the gender indicated by an online Western culture–based baby name dictionary (babyname.com).

Planned Analysis

To evaluate whether gambling scholarship award distributions at the master's or the doctoral level varied as a function of gender, non-parametric hypothesis testing analyses were planned. A priori alpha was set to .05 for planned analyses, and this alpha level was maintained for exploratory analyses.

Results

In the years 2009 through 2019, 99 scholarships were awarded; 36 master's-level and 63 doctoral-level awards. Scholarships were distributed to 47 recipients: 28 recipients were women and 19 were men. The number of master's and doctoral awards given per year by gender are presented in Table 1.

Award recipients were training in the following academic disciplines: general psychology (36%), clinical psychology (23%), neuroscience (8%), educational psychology (5%), business (5%), sociology (4%), health sciences (4%), anthropology (4%), psychiatry (3%), economics (2%), physical education and recreation (2%), public health (1%), education (1%), and counselling (1%).

For each scholarship level, master's and doctoral, a chi-square analysis was conducted to examine award distribution as a function of gender. Fig. 1 (Panel A) presents the total number of awards distributed, collapsed across years, for each scholarship level by gender. The chi-squared analysis of master's-level scholarships was significant ($X^2(1, N = 36) = 4, p < .05$), indicating women received significantly more master's-level scholarships than men. The chi-squared analysis of doctoral-level scholarships, on the other hand, was not significant ($X^2(1, N = 63) = 0.12, p = .71$). Meaning that the distribution of scholarships issued was equitable between genders at the doctoral level.

A second set of analyses was used to explore whether the results of the planned analyses were stable across time. Specifically, these analyses were conducted to examine if the detected inequality that favoured women at the master's level was consistent in early and later years, and if equality in the doctoral award distribution was stable across time. Two chi-square goodness-of-fit analyses were conducted, comparing awards issued in earlier years (2009–2014) to late years (2015–2019), one at each scholarship level (Fig. 1, Panel B). Non-significant chi-square test results were found at both the master's ($X^2(1, N = 36) = 1.41, p = .24$) and doctoral level ($X^2(1, N = 63) = 0.06, p = .80$), indicating that the distribution of awards issued at each scholarship level has been consistently equitable across the times in question. In addition, this analysis implies that the favour shown for women at the master's level was an artifact of the analysis created by combining years. Taken together, both master's- and doctoral-level scholarship award distributions tend towards gender equality.

One final exploratory analysis was conducted to examine award distribution rates for possible gender differences. Recall that AGRI scholarships are annual awards, regardless of scholarship level, and that students are eligible to receive up to 4 awards. Among the recipients, 57.2% of women ($n = 16$) and 77% of men ($n = 13$) received two or more AGRI scholarships. Fig. 1 (Panel C) presents the frequency of total awards received by gender. An exploratory analysis was conducted to ascertain if the percentage of recipients receiving more than one scholarship differed between men and women. The results indicate that this is not the case ($X^2(1, N = 28) = 2.92, p = 0.09$). Women and men were equally likely to receive multiple awards, a result that further indicates gender fairness in AGRI award distribution.

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[4] In contrast with AGRI's inclusive policy, Canadian tri-council funding agencies divert projects between three categories: health (CIHR), social science (SSHRC), and natural science (NSERC). As such, examining any branch of tri-council funding for gambling research will be biased by discipline.

[5] Public profiles for four individuals were reviewed. Profiles were examined for pictures and/or personal pronouns.

Table 1

Number of Master's and Doctoral Scholarships Awarded by Gender by Year

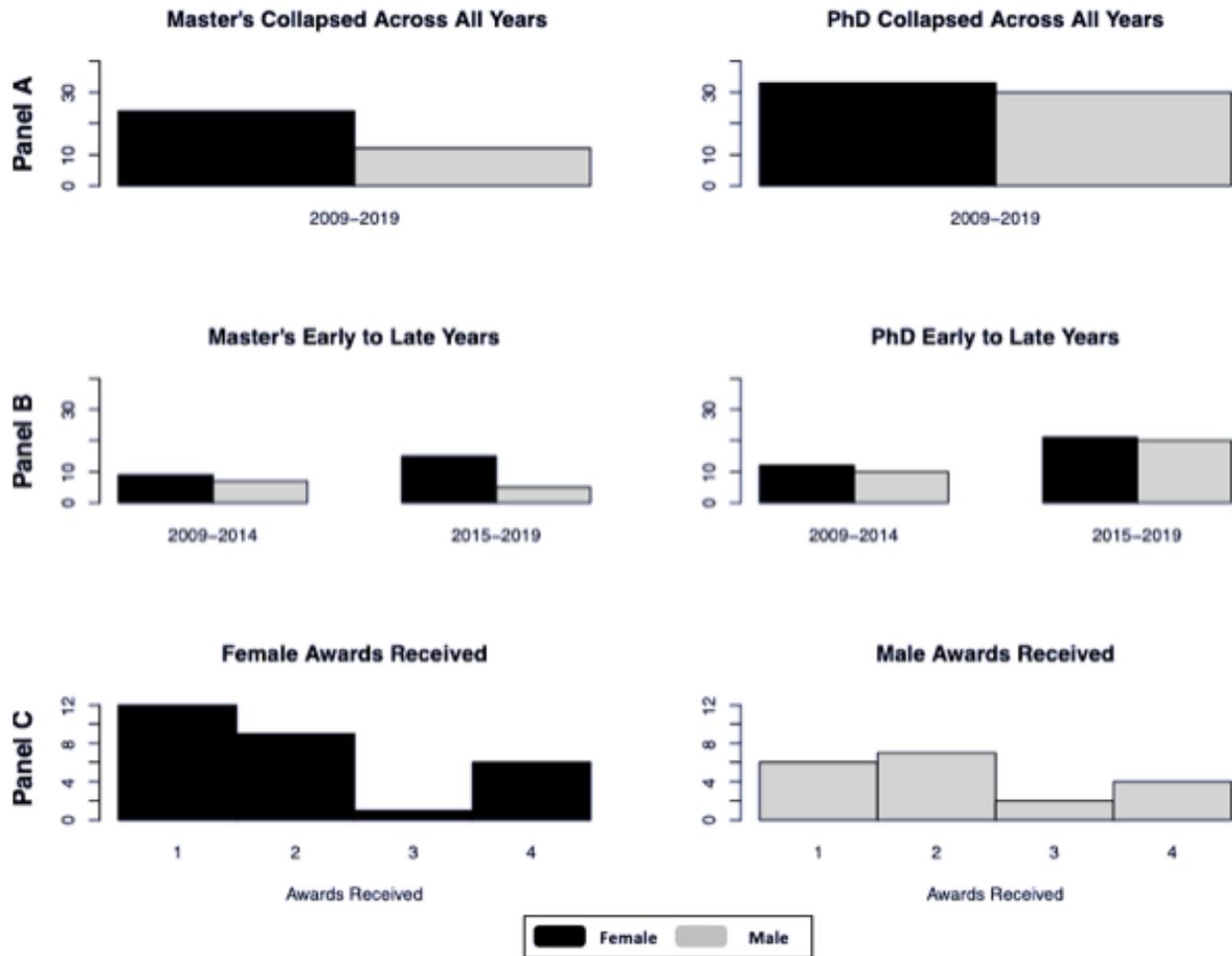|	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Master's											
Men	1	1	0	2	3	0	1	3	1	0	0
Women	2	1	1	1	2	2	1	2	2	5	5
Doctoral											
Men	2	0	1	0	2	5	3	3	6	4	4
Women	1	0	1	2	4	4	5	6	3	2	5

Fig. 1. Panel A: Total number of master's-level awards (left) and doctoral-level awards (right) by gender across the years in focus (2009–2019). Panel B: Total number of awards granted in early years (2009–2014) and late years (2015–2019) by scholarship level: master's (left) and doctoral (right). Panel C: Total number of annual awards received across all years by female recipients (i.e., women) (left) and male recipients (i.e., men) (right).

Discussion

When reviewing the literature addressing whether or not gender parity has been achieved in academia, two points became increasingly clear. First, equality in the upper echelons of academia cannot be *attained or sustained* if insufficient numbers of women are being adequately prepared to move up through the academic pipeline. Preparation in this sense includes receiving a doctoral degree, but the experiences that will help build a competitive curriculum vitae, such as receiving competitive funding, are also important. Equality in competitive graduate-level funding from AGRI provides some indication that women are being prepared for the transition into early career academic positions. Second, much of the literature is influenced by discipline specificity; that is, previous studies focus on one—or a select few—research disciplines. So, if leaks in the pipeline are found, they too are discipline specific.

Gambling as a research focus, on the other hand, is uniquely multidisciplinary, and thus is less impacted by research/academic discipline specificity. Examining this particular group of scholars is a novel undertaking in itself, as previous gambling studies have not focused on gambling researchers.

The results of this study indicate that AGRI's annual graduate-level scholarships were distributed equally between women and men. This was the case across all years investigated (2009–2019), and at each graduate-level rank (master's and doctoral). It was also found that women and men were equally likely to receive subsequent annual awards from AGRI. This indicates that the meritocratic advancement of graduate students appears to be gender fair, through both graduate-level ranks, at least among those within AGRI's purview. This supports the growing body of research that finds increasing gender fairness among recipients of competitive graduate-level funding (Horta et al., 2018; Titone et al., 2018). Given the inconsistent findings reported by Buffington et al. (2016), however, additional research is required to be confident that gender equality is being achieved in graduate-level funding in broader arenas (i.e., different multidisciplinary samples and award types). Second, this finding speaks to the gender representation among *funded* gambling student researchers. Equality among this sample suggests that rising gambling researchers are allotted equal competitive advantages with respect to the productivity metric of funding. While our results indicate equality across the decade examined, replication using a larger sample is required to be confident that these results are robust. Further research is needed to determine if the equality evidenced in this sample of AGRI-funded gambling student researchers is representative of the gender composition of all gambling student researchers, and whether the same equality exists in samples of gambling students funded through other sources (e.g., Canada's tri-council funding agencies).

Although no formal investigations of gambling researchers (students or established researchers) have been undertaken previously, we expected our sample of gambling research students would be discipline heterogeneous. Relative to previous investigations of equality in academia (e.g., STEM, Buffington et al., 2016; social sciences and humanities, Horta et al., 2018; cognitive psychology and neuroscience, Titone et al., 2018), discipline diversity was evident in our sample, with award recipients representing 14 different academic disciplines from anthropology to public health.[6] While there are certainly more than 14 research disciplines in academia, the sample used in this study is more diverse than those used in previous investigations. That being said, additional research is

required to be assured of the generalizability of the current findings. Future investigations of gender equality in both gambling-specific studies and academia more broadly would benefit from the use of discipline-diverse samples to limit discipline specific conclusions.

Two limitations of the current study require acknowledgement. First, as previously noted, coding gender based on published first name contributes to the artificial bivariate characterization of gender. Despite this limitation, the methods used in this study were selected to allow connectivity with—and the ability for comparison to—previously published studies on the topic of equality in merit-based funding. Second, the current study used publicly available award distribution information, but cannot speak to equality at the application stage. Future studies should therefore review scholarship *success rates* for gender parity. Success rates would allow for the gender distribution of all applicants to be taken into account when examining the distribution rates. An analysis of this kind would answer the slightly different, yet important, question of whether women and men are equally likely to be successful in the pursuit of competitive funding.

One of the goals of this study was to examine gender differences in gambling student researchers specifically, as some of these students will likely form the next cohort of gambling researchers.[7] Thus, this study intended to provide a platform on which future investigations of gender equality in gambling research can build. Of immediate note, the current study's results indicate two paths of future research. Future studies should investigate whether gambling scholarship recipients pursue academic careers and, if so, examine the career trajectories of these recipients. Mixed methods research may be most suitable for the first line of investigation suggested. An examination of career intention is deemed necessary to overcome a weakness of the leaky pipeline metaphor: evaluating if recipients who left academia 'leaked out of the pipeline' at the graduate school level or if graduate training was undertaken to fulfill career aspirations outside of academics (i.e., they were not really in the pipeline to begin with).

The latter recommendation would build on previous literature indicating that graduate-level scholarship recipients evidenced greater academic career productivity years later (Graddy-Reed et al., 2019; Horta et al., 2018). Here, we found that gambling student researchers were discipline diverse and that equitable numbers of women and men received the competitive AGRI scholarship. The career trajectories of these gambling research students were not investigated in this study; however, this line of investigation does seem a logical next step. Future studies then should seek to

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[6] Just over half of the disciplines represented can be considered psychology related; however, each of these are sufficiently different with respect to educational training and outcomes to consider them distinct disciplines.

[7] It is possible that academics with established research programs will shift focus to include gambling research; however, it is more probable that students doing graduate-level training in gambling studies will continue studying gambling if they remain in academia.

ascertain if gender equality continues among those who pursue academic careers, and whether greater academic career productivity can be predicted from receiving an AGRI scholarship.

Conclusion

The current study was undertaken to meet two distinct, yet intertwined, goals. The first goal was to contribute to the discussion of gender equality in the academic pipeline. The second goal was to begin the discussion of gender equality in gambling research and provide some preliminary information about upcoming gambling researchers. Herein, graduate-level scholarships from one Canadian funding agency (AGRI), awarded from 2009 through 2019, were examined for gender parity. Discipline diversity was detected among the 47 award recipients with 14 different academic disciplines represented. The results indicated that AGRI's annual graduate-level scholarships were distributed equally between women and men, across years (2009–2019), and at each graduate level (master's and doctoral). Women and men were also equally likely to receive subsequent annual awards from AGRI. Future studies should examine the impact of receiving these gambling-specific graduate-level scholarships on career competitiveness and trajectory.

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