

Article

Diversity Barriers in Animal Care Careers at Zoos and Aquariums

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Abstract: We applied social cognitive career theory and systems theory to explore the barriers that historically excluded groups face when pursuing animal care careers at U.S. zoos and aquariums. Using a mixed-methods approach, this research combines survey data (N = 592) and interviews (N = 15) from zoo and aquarium animal care staff, including zookeepers, veterinarians, and aquarists. The findings show that historically excluded groups of animal caretakers report higher levels of perceived barriers to securing zoo positions compared to White animal caretakers, particularly in career awareness, self-efficacy, mentorship, and access to internship opportunities. Statistical analyses of animal caretakers revealed a statistically significant difference between historically excluded groups and their White colleagues. Historically excluded groups experience more challenges in securing and succeeding in animal care careers. While institutional barriers did not differ significantly between groups, this study underscores the need for zoos to address systemic inequities and create more inclusive environments. These findings are critical for zoos aiming to diversify their staff and enrich their decision-making processes.

Keywords: historically excluded groups; institutional barriers; systemic inequity; career readiness; animal care; careers; cultural diversity; social cognitive career theory; systems theory



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1. Introduction

Zoos and aquariums (from hereon, the term zoo encompasses both zoos and aquariums) can benefit from the multiple perspectives, lived experiences, and creative problem-solving skills of diverse staff. Diverse staff bring various assets leading to advanced decision-making and higher organizational performance, earnings, and innovations [1,2]. Diversity in zoo and aquarium careers is a vital issue not only for enhancing institutional innovation and decision making but also for addressing historical inequities that have shaped the perception and accessibility of these careers. To better understand their membership, the American Association of Zoo Keepers (AAZK) conducts member surveys that include demographic information [3]. In 1992, 98% of members identified as White. In 2016, that number changed only slightly, dropping to 95%. A 2021 survey of AAZK members found 74% identified as White, compared to the 2021 census where 60% of the U.S. population identified as White [4]. While diversity in the field is trending up, there is significant room for additional growth.

Historically, zoos have not only served as spaces for animal exhibition but also participated in the display of people of color in human zoos or “ethnographic exhibitions” [5–7]. These exhibitions, common in the 19th and early 20th centuries, dehumanized individuals from colonized regions, portraying them as “exotic” curiosities to predominantly White

audiences [7]. Such practices reinforced racial hierarchies and perpetuated stereotypes about non-White cultures. The legacy of these dehumanizing practices continues to influence societal perceptions of zoos and aquariums and their relationships with communities of color.

Current day zoos would benefit from diverse teams contributing their expertise to decision making and problem solving about the well-being of animals, addressing threats to the animals' natural habitats, and stabilizing threatened populations [8–10]. However, early professionals who aspire to enter animal care careers at zoos face real and perceived barriers that may prevent them from securing a position and being successful [11–13]. These barriers can include (1) awareness of potential careers in an industry [13,14], (2) interest and self-efficacy in the fields of study required to pursue and persist in a career [15,16], (3) time and economic resources to gain the required work experience [17], (4) mentorship and role models that create a sense of belonging [18,19], and (5) access to limited opportunities [20,21].

Though the focus of many organizations is building organizational diversity, the self-stated role of zoos is to be a bastion for living beings, including threatened and endangered animal species [22]. In 2007, the mission statements of zoos accredited by the Association of Zoos and Aquariums (AZA) reflected a lack of cultural diversity. From 2007 [23] to 2018 [24], AZA accredited zoo mission statements reflected little change in their mention of culture (17% in 2007, 19% 2018). Research highlights that the lack of diversity in zoo and aquarium staff today reflects broader systemic inequities in Science, Technology, Engineering, and Math (STEM) and conservation fields. Role models from historically excluded groups are particularly critical in these contexts, as they can inspire individuals by demonstrating that success in these careers is attainable and valued. Representation is closely tied to career self-efficacy and interest, particularly among underrepresented populations in STEM fields [25]. Thus, increasing diversity in zoo and aquarium careers not only addresses institutional goals of equity and inclusion but also contributes to reshaping public perceptions, building trust, and creating pathways for historically excluded groups to participate in conservation and education efforts.

Like other STEM fields fraught with challenges for historically excluded groups, zoos have internal systems that are difficult to overcome [8,15,26]. These challenges include White-majority culture practices and policies [13,26] such as biased resume screening [27], institutional structures that maintain social inequity [28,29], discrimination by colleagues [30], and entry-level exclusion. Entry-level animal care career requirements that can exclude potential career seekers are four-year college degrees, paid prior experience at accredited zoos or aquariums, and internships that are most often unpaid and require significant time commitments [3]. Animal care careers are positions focused (or a significant amount of an individual's time is spent) on directly caring for animals, including zookeepers, veterinarian staff, animal welfare staff, aquarists, water quality technicians, commissary staff, and related management staff [31]. Animal care workers receive low wages, which requires them to seek additional financial support or work multiple jobs. Zoos identifying, acknowledging, and dismantling these systems is critical to forwarding a culturally inclusive and demographically representative zoo workforce [19,28].

We framed our work in social cognitive career theory (SCCT) and systems theory. SCCT recognizes three aspects individuals face when pursuing and persisting in a career field. Individuals pursue careers based on (1) high self-efficacy, (2) environmental exposure, and (3) personal goals [32,33]. Personal experiences, knowledge, and skills influence self-efficacy in pursuing a career field. Environmental factors, such as access to relevant experiences and resources, impact self-efficacy. For animal care staff, childhood experiences, including the frequency of zoo visits, may positively influence self-efficacy. Financial and personal goals, interests, and passions should align with career goals. Deficits or challenges

in any of the three aspects become barriers to a successful career for animal care career seekers [34]. Animal care career seekers often face barriers due to inequitable access to essential resources. These barriers include an absence of funding to earn degrees and lack of time and support to complete internships (limited in number) required for many job postings [18]. Animal care career seekers can face detrimental or prohibitive situations, such as an absence of representation in the field and negligible support from families or social groups.

We used a systems theory framework to study institutions and their inner workings [35,36]. Systems theory addresses the external influences on decision making and barriers that zoos and aquariums create and perpetuate through internal systems. These influences shape an institution's operating policies and procedures. Internal system influences include an organization's current leadership, staff, and historical practices. An organization's historical practices may maintain White-majority culture standards [26,28,29,37,38]. External influences include majority culture standards, resource availability, and social pressures. Significant events, like the social justice movement, can create these pressures. Institutions use these influences in hiring and workforce retention decisions, directly shaping their policies and procedures.

2. Materials and Methods

We completed a mixed-methods study to collect data from individuals working in animal care careers at zoos [39]. We sent a cross-sectional survey to the American Association of Zoo Keepers (AAZK), the Association of Minorities in Zoo and Aquarium Professionals (AMZAP), and Minorities in Aquarium and Zoo Sciences (MIAZS) and asked them to share the survey with their members. These membership organizations were selected because they best capture the intended audience of animal care staff working at zoos and aquariums, including those who are most likely to identify from historically excluded audiences. Additionally, we sent survey invitations through AZA listservs and network groups likely to include animal care providers. The study invitation reached 3000 animal care staff, including leadership, managers, students, volunteers, and zookeepers.

In total, 747 individuals engaged with the survey. We requested that respondents provide a brief description of their position to provide context and determine if the position fits within the scope of this study. All the surveys that were completed by individuals self-identifying as holding an animal care career position were analyzed ($N = 592$). The survey respondents identified as zookeeper/animal care specialist/aquarist ($n = 440$), veterinarian/veterinarian technician ($n = 32$), curator ($n = 32$), manager ($n = 15$), animal welfare/enrichment technician ($n = 13$), director ($n = 9$), assistant curator ($n = 8$), supervisor ($n = 8$), commissary/diet preparation ($n = 6$), water quality technician ($n = 3$), vice president ($n = 3$), and other ($n = 23$).

Of the 592 surveys, 404 participants provided their race or ethnicity: of these, 300 self-identified as White. The remaining 104 participants self-identified as Multiracial ($n = 26$), Hispanic or Latinx ($n = 25$), Black or African American ($n = 15$), Southeast Asian ($n = 10$), Central Asian ($n = 5$), American Indian or Alaska Native ($n = 1$), Middle Eastern or North African ($n = 1$), or Native Hawaiian or Other Pacific Islander ($n = 1$). Some participants preferred not to respond ($n = 11$) or preferred to self-describe ($n = 9$). All the individuals who self-described or identified as one of the groups other than White were grouped and identified as historically excluded individuals for data analysis purposes. When combined, the historically excluded group included 92 participants. Of the 404 survey participants, 15 (6 identified as White and 9 identified as historically excluded groups) completed a follow-up interview about their experience pursuing and persisting in an animal care career.

The cross-sectional survey included three sections with Likert scale responses from 0 to 10, 0 indicating the prompt was not a barrier and 10 indicating a significant barrier. We modeled the prompts after (1) a validated survey tool studying staff management [40,41], (2) diversity studies involving students and professionals [42], and (3) a presentation at the 2022 AZA conference [26,28]. A Cronbach's alpha value was calculated to determine the reliability of the first and second sections of the survey. Section 1 [$\alpha = 0.797$, acceptable for internal consistency] and Section 2 ($\alpha = 0.776$, acceptable for internal consistency) included seven prompts each [43].

Section 1 Prompts:

- Awareness of job postings/opportunities.
- Individuals seeing themselves represented in the field.
- Confidence in the knowledge/skills needed to fulfill the job expectations.
- Mentorship or network connections in the field.
- Support from family or social groups.
- Certainty if a position in animal care at a zoo or aquarium was the right fit.
- Certainty if a position in animal care at a zoo or aquarium would be personally rewarding.

Section 2 Prompts:

- Ease of finding a job.
- Schooling/degree requirements in job postings.
- Amount of experience required in job postings.
- Internship requirements required in job postings.
- Job application process.
- Interviewing/hiring process.
- Onboarding/orientation process.

Participants were asked to select the top three most significant barriers to diversifying the field from the previous lists and/or a write-in option. To ensure representation from large and small institutions, this section asked for demographic data, institutional annual budget, and number of full-time employees.

The survey was open for four weeks. Respondents completed the survey in approximately 15 min. We did not calculate a survey response rate because we distributed the survey through listservs and organization distribution lists. The distribution may have overlapped, and respondents may have shared the survey with colleagues.

At the end of the survey, respondents were invited to share their contact information through a separate link to indicate their interest in participating in an interview. Fifty individuals expressed their interest, and all fifty received an email invitation to schedule an interview date and time. Fifteen individuals scheduled and attended an interview.

The interview consisted of nine demographic questions, followed by seven open-ended interview questions. A common method for capturing the firsthand experiences and perspectives of historically excluded groups is interviews [44]. The questions explored career preparation, inspiration to pursue their career, barriers faced while pursuing their career, factors they believe secured their career, advice for others pursuing an animal care career, and suggestions for diversifying the zoo workforce.

The first author used Zoom video conferencing software to record and transcribe interviews. She listened to the interviews and reviewed the transcripts for accuracy. The interviews were an average of 22 min and 2 s, with the shortest being 11 min and 27 s and the longest being 34 min and 40 s. Interviewees could decline to answer any questions with which they were not comfortable.

We grouped the responses for each prompt, and we calculated the Likert scale response means, medians, and standard deviations. We further analyzed the non-parametric data with a Mann–Whitney U test using IBM SPSS Statistics for Windows (Version 29) [45]. We calculated a modified alpha using a Bonferroni correction equation to account for the higher probability of a type I error. We modified the alpha for statistics from 0.05 to 0.00714.

We completed a discourse analysis [46] to develop overarching themes for the interview data. The interview transcriptions were analyzed for sections that were relevant to the research question [47,48] and categorized according to the core concepts of social cognitive career theory [33] and systems theory with a sociological institutional focus [46]. A codebook was developed to provide consistent coding across survey comments and interview transcriptions as seen in Table 1.

Table 1. Codebook.

| Theme | Definition | Code(s) | Theoretical Framework |
|-------------------------------------|---|---|-----------------------|
| Individual Barriers | | | |
| Self-Efficacy | Confidence in ability to accomplish something | Knowledge/Skills | SCCT |
| Outcome Expectations/Personal Goals | Outcomes match personal goals | Rewarding Right Fit Awareness | SCCT |
| Contextual Factors | Shape learning experiences, background experiences, and form interests | Mentorship/Network Representation Family/Social | SCCT |
| Institutional Barriers | | | |
| Recruitment | Internal decision making on where jobs are posted, raising awareness about the career field | Awareness Move/Relocate | Systems Theory |
| Hiring Process | Internal decisions on what experience is needed for positions, use as a limiting factor for high-demand positions | Degree Experience Unpaid Internships | Systems Theory |
| Onboarding/Orientation | Internal decisions on training, including content and length | Management | Systems Theory |
| Persistence | Internal processes to retain workforce | Pay Management, Burnout/Fatigue | Systems Theory |

We coded 1890 survey comments referring to barriers. The comments from each open-ended response prompt from Qualtrics were organized in spreadsheet tabs, printed, and then manually highlighted according to the codebook. After all the comments were coded and totaled, the comments left by individuals who identified from a historically excluded group were separated, allowing for comparisons between the groups and used to provide context to the quantitative data analysis in the Results section of this paper.

Interview transcripts were printed and analyzed using the same codebook. Multiple reviews of the data led to a deeper understanding of the data and helped identify commonalities between survey responses and interview data.

Coding of the survey comments and interview transcripts were verified by an independent reviewer who followed the same process as described above and then compared with the researchers’ version, and discrepancies were addressed.

3. Results

3.1. Surveys

Individuals who identified from historically excluded groups had a higher or equal mean for every prompt. This finding indicates that historically excluded participants found almost all the barriers more significant in pursuing an animal care career than their colleagues who identified as White. Out of the seven prompts that focused on individual barriers, four had statistically significant different means between the responses of the group of historically excluded individuals and those who identified as White, as seen in Table 2. We included the median values for the Likert scale data used in the analysis to reflect the non-parametric data, resulting in all but one prompt (mentorship and networking) having a higher median value for historically excluded respondents than their White colleagues. Nine prompts referenced barriers on an institutional level. None of the prompts had a statistically significant difference between respondents who identified as White and those from a historically excluded group, as seen in Table 2.

Table 2. Significance of Barriers Responses—By Race/Ethnicity.

| Prompt | Group | n | M | Mdn | SD | Z | p-Value 0.00714 |
|----------------------------------|-----------------------|-----|------|-----|------|-------|--------------------|
| Individual Barriers | | | | | | | |
| Awareness of Available Positions | White | 301 | 3.68 | 3 | 2.79 | −2.43 | 0.015 |
| | Historically Excluded | 94 | 4.59 | 5 | 3.19 | | |
| Representation in the Field | White | 300 | 1.95 | 1 | 2.44 | −6.97 | <0.001 * |
| | Historically Excluded | 95 | 4.6 | 5 | 3.26 | | |
| Confidence in Knowledge/Skills | White | 301 | 3.78 | 3 | 2.93 | −2.45 | 0.014 |
| | Historically Excluded | 94 | 4.64 | 5 | 3.04 | | |
| Mentorship/Network | White | 301 | 4.46 | 5 | 3.03 | −1.84 | 0.067 |
| | Historically Excluded | 95 | 5.16 | 5 | 3.28 | | |
| Family/Social | White | 300 | 2.3 | 1 | 2.85 | −2.92 | 0.004 * |
| | Historically Excluded | 95 | 3.35 | 2 | 3.18 | | |
| Good Fit | White | 300 | 3.49 | 3 | 2.91 | −3.21 | 0.001 * |
| | Historically Excluded | 95 | 4.55 | 5 | 2.67 | | |
| Personally Rewarding | White | 299 | 2.49 | 2 | 2.73 | −3.44 | <0.001 * |
| | Historically Excluded | 93 | 3.59 | 3 | 2.89 | | |
| Institutional Barriers | | | | | | | |
| Ease of Finding a Job | White | 301 | 3.41 | 3 | 2.93 | −1.61 | 0.107 |
| | Historically Excluded | 96 | 4.05 | 5 | 3.10 | | |
| Schooling/Degree Requirements | White | 301 | 3.21 | 2 | 3.09 | −0.72 | 0.473 |
| | Historically Excluded | 96 | 3.45 | 3 | 3.07 | | |
| Amount of Experience | White | 301 | 5.63 | 6 | 3.19 | −0.72 | 0.471 |
| | Historically Excluded | 96 | 5.9 | 6 | 3.18 | | |
| Internship Requirements | White | 301 | 3.73 | 3 | 3.41 | −0.17 | 0.862 |
| | Historically Excluded | 95 | 3.78 | 4 | 3.30 | | |
| Job Application Process | White | 301 | 2.95 | 2 | 2.74 | −1.72 | 0.086 |
| | Historically Excluded | 96 | 3.58 | 3 | 3.05 | | |
| Hiring/Interview Process | White | 301 | 3.15 | 3 | 2.75 | −1.45 | 0.147 |
| | Historically Excluded | 95 | 3.68 | 4 | 3.05 | | |
| Onboarding/Orientation | White | 299 | 1.5 | 1 | 2.03 | −2.52 | 0.012 |
| | Historically Excluded | 96 | 2.18 | 1 | 2.44 | | |

* Statistically significant results.

3.1.1. Representation as a Barrier

Historically excluded participants indicated they did not see people who acted and looked like them in animal care careers. The results in Table 1 show the statistically significant difference for the groups. For example, historically excluded participants stated, “[I was] uncertain if a position at a zoo or aquarium is the right fit BECAUSE of a lack of representation of diverse individuals in the field.” “There is a strong lack of minority faces in this field.” “I was sometimes the only BIPOC in my major while getting my degree which was sometimes hard.”

3.1.2. Family and Social Group Support as a Barrier

Participants’ responses about a lack of family or social group support impacting their career pursuit showed a statistically significant difference ($p = 0.004$), as represented in Table 1. The data indicate that the support of family and friends can increase the self-efficacy and confidence of animal caregivers that the career will be rewarding. A historically excluded participant shared that they had to justify their animal care career choice to their family and friends, “Explaining my goals to family and friends who didn’t understand my career choice.” Another historically excluded participant explained culture is important to families, “Cultural understanding. Many on one side of my family didn’t understand ‘why I was wasting time with animals when there is human suffering.’”

3.1.3. Low Pay as a Barrier

Of the 1890 survey comments, 590 mentioned low pay as a barrier. A participant stated, “It is very common to take on a second job.” Another supported the notion of pay as a barrier, “Love the job, but am unable to build savings or buy a home on my salary.” Participants recognized the limitations of pay as a reason to leave their animal care career, “I cannot afford this career in the long run.” and “I love my job, but the pay-to-cost-of-living ratio is too low for me to envision staying at this specific institution forever.”

3.2. Barriers to Diversifying the Field

We asked participants to rank the seven barrier prompts they believe prohibit diversity. As shown in Table 3, participants from historically excluded groups ($n = 93$) ranked first a lack of mentors and network connections (96.7%), second the amount of experience, paid/unpaid (86.0%), and third seeing themselves represented in the field (82.8%). White participants ranked first the amount of experience, paid or unpaid (84.2%), second the lack of mentors and network connections (58.7%), and third low pay (54.8%).

Table 3. Top Three Barriers to Diversifying the Field.

| Barrier | % of Historically Excluded Respondents Who Selected the Barrier as a Top Three ($n = 93$) | % of White Respondents Who Selected the Barrier as a Top Three ($n = 310$) |
|--|---|--|
| Lack of Mentors/Network | 96.7% * | 58.7% * |
| Amount of Experience, Paid/Unpaid | 86.0% * | 84.2% * |
| Representation in the Field | 82.8% * | 44.2% |
| Amount of Schooling/Degree requirements | 48.3% | 52.6% |
| Awareness of Available Positions | 43.0% | 29.4% |
| Ease of Finding Job Postings | 41.9% | 31.6% |
| Internship Requirements | 38.7% | 45.8% |
| Lack of Family/Social Group Support | 35.4% | 30.0% |
| Lack of Confidence/Knowledge/Skills | 33.3% | 26.1% |
| Hiring/Interviewing process | 29.0% | 19.7% |
| Uncertain if Good Fit | 29.0% | 14.8% |
| Job Application Process | 19.4% | 12.6% |
| Uncertain Personally Rewarding | 16.1% | 7.4% |
| Onboarding/Orientation process | 5.4% | 5.5% |
| Write-in Comments: Low Pay | 36.5% | 54.8%* |
| Write-in Comments: Unpaid Internships | 8.6% | 33.5% |
| Write-in Comments: Degrees/Experience Needed | 5.4% | 14.8% |

Note: * indicates the top three results for each group.

3.3. Qualitative Results

We collected qualitative data through the 15 interviews. We were able to prompt additional details and clarification during the interviews. After redacting all potentially identifying information, we coded the data using discourse analysis [46] and independently verified by a professional colleague, as seen in Table 4. We coded the interview data using the system shown in Table 1.

Table 4. Interview Coding Frequency.

| Barrier | Group | Number of Interviewees | Total Mentions |
|----------------------------|-----------------------|------------------------|----------------|
| Unpaid Internships | White | 5 | 8 |
| | Historically Excluded | 3 | |
| Experience | White | 4 | 6 |
| | Historically Excluded | 2 | |
| Move/Relocate for Position | White | 2 | 5 |
| | Historically Excluded | 3 | |
| Low Pay | White | 2 | 4 |
| | Historically Excluded | 2 | |
| Awareness | White | 1 | 4 |
| | Historically Excluded | 3 | |
| Mentorship/Network | White | 1 | 3 |
| | Historically Excluded | 2 | |
| Representation | White | 1 | 2 |
| | Historically Excluded | 1 | |
| Degree Requirements | White | 1 | 2 |
| | Historically Excluded | 1 | |
| Management | White | 2 | 2 |
| | Historically Excluded | 0 | |
| Family/Social Support | White | 0 | 1 |
| | Historically Excluded | 1 | |
| Knowledge/Skills | White | 0 | 0 |
| | Historically Excluded | 0 | |
| Rewarding | White | 0 | 0 |
| | Historically Excluded | 0 | |
| Right Fit | White | 0 | 0 |
| | Historically Excluded | 0 | |
| Burnout/Fatigue | White | 0 | 0 |
| | Historically Excluded | 0 | |

3.3.1. Most Significant Barriers

Interviewees ($n = 8$) identified unpaid internships most often as a barrier mentioned. The next most significant barrier was the amount of experience needed to be hired, with six interviewees mentioning experience. Five individuals described the need to relocate or move for job opportunities. Four interviewees mentioned the amount of experience needed to apply for job opportunities, low pay in the field, and awareness of job opportunities.

3.3.2. Overcoming Barriers by Volunteering

Each interviewee offered insight into how animal caretakers overcame the barriers to secure an animal care career. Six interviewees volunteered at zoos or aquariums before being hired to gain the required experience. Two individuals who volunteered identified from a historically excluded group, and the other four identified as White. Most of the inter-

viewees who volunteered did so for between two and four years, with two starting as early as their high school years. Two volunteer positions included animal care responsibilities, two cared for invertebrates, and another worked in education and guest interpretation. The final interviewee did not disclose the capacity in which they volunteered. One interviewee shared, "I volunteered at the zoo when I was in high school. I guess that was the first time I actually worked with people that had this as a job and realized this was a career." Another interviewee shared their volunteer experience, "I consider it a luxury a lot of people don't have that time and ability to commit, especially for three years, to volunteer. I was doing like 15 h a week while I was going to school." A survey respondent who identified as from a historically excluded group shared the following insight in an open-ended comment, "I got my first job and all jobs following based on my actual animal care experience that started as a volunteer."

Volunteering had more flexibility than traditional internships, allowing individuals to continue working and earn income while pursuing their careers. "I did not have the financial means to do unpaid internships at the time. . . so I volunteered for about a year. . . and then I basically had to move back in with my mom."

3.3.3. Low Pay as a Barrier

The interview data highlighted low pay in the field as a barrier. Interviewees relied on support from their families, including parents, grandparents, and spouses, to work in positions that did not provide enough income for individuals to support themselves. The two individuals who identified from historically excluded groups in the interviews mentioned relying on family support to pursue their careers. One of them elaborated as follows:

The pay was pretty tough, especially early on. I remember when I was offered the job at the zoo. . . It was full-time, temporary. . . and [city], thankfully, is a relatively affordable place to live, especially if you're living on your own, which I was. I found an apartment, a studio-efficient apartment that was basically across the street from the zoo. So, I didn't even have a car at the time, and was able to make it work on my salary, partly because I didn't have a car, and partly because I lived a very low-key life. . . I did have some family in town, so that was helpful. I could always ask them if I needed help getting somewhere.

The other shared, "The way that I survived, survived because. . . I was newly married. So double income."

3.3.4. Academic Degrees as a Barrier

Two interviewees noted that degree requirements were their most significant barrier. One individual was from a historically excluded group, while the other identified as White. The former individual mentioned that not having a degree prevented them from being promoted. "The one defining barrier at [institution] was a degree." The interviewee went on to share that degree requirements are "something that's a norm in today's society. . . I don't like it, but I understand it."

The historically excluded individual shared their challenge in moving up within the zoo where they worked. When they applied for a promotion, they were excluded because they did not have the required job title according to the new position's requirements. Two of their colleagues, who were White and at the same level as the interviewee, were allowed to interview. When the interviewee pointed out the discrepancy to their supervisor, they "got the run-around." They shared, "That was a really big smack in the face in terms of access." The position had not been filled by a member of a historically excluded group since the 1990s.

3.3.5. Representation as a Barrier

An individual who identified from a historically excluded group shared the impact representation had on the pursuit of their animal care career. “I always liked the zoo; I loved going on trips to the zoo and everything. But I didn’t necessarily think I could be a zookeeper.” Fortunately for this individual, a college professor took their class to the zoo. The individual saw the work a zookeeper performed firsthand and identified that they could do this job, which might fulfill their passion for animals. Another interviewee shared their connection with representation in the field. “Knowing that I was leaving a legacy in that respect, and being at the forefront, especially working as a [animal] keeper and getting a lot of interviews, and TV interviews, and that would be the first thing I talk about, my background.”

Another interviewee shared initiatives at their institution and why they felt important:

I think some of it is being more cognizant of diversity, equity, and inclusion. We have started some of those initiatives here, and we are through some of the programs and through [institution] as a whole. Like getting the ability to try to get more minority representation within the zoo community, because, honestly, some of it is you see yourself in this field. And if an African American individual doesn’t see an African American, if they, I don’t want to speak for them, but I like, I feel wholeheartedly that they get discouraged or they already feel like they’re behind.

These comments reinforce how representation is reflected through the environmental component of social cognitive career theory [25] and the decision making that contributes to internal systems within institutions [49], such as the policies and procedures that dictate who represents the institution through media outlets.

4. Discussion

Diversity in zoo and aquarium careers is a critical area of study because it directly impacts the ability of these institutions to fulfill their conservation, education, and community engagement missions. A diverse workforce brings varied perspectives and innovative approaches to addressing challenges in animal care, conservation, and public outreach [2]. Additionally, workforce diversity in zoos and aquariums can enhance organizational decision making and foster greater connections with the increasingly diverse communities these institutions serve [50,51]. However, the data indicate that significant barriers remain for historically excluded groups, limiting their representation in animal care careers and, consequently, the field’s potential to realize these benefits.

We identified four critical issues: (1) representation, (2) individual rewards, (3) mentorship relationships, and (4) professional networks. These issues are barriers to occupational diversity in zoos and aquariums. We identified common trends to guide efforts in reducing or removing these barriers. We analyzed quantitative and qualitative data from animal care professionals to compare barriers across demographic groups and institution sizes. We used social cognitive career theory to examine individual barriers and applied systems theory with a sociological institutionalism lens to understand institutional barriers. To address these challenges, targeted solutions and actionable recommendations are outlined below.

4.1. Individual Implications

We framed career barriers through SCCT. Environmental influence, a key component of SCCT [33], shapes career choices. These influences include seeing representation in the field by individuals who share similar values, experiences, or characteristics [33,52,53]. Additionally, SCCT emphasizes finding a career that aligns with personal goals, leading to

a sense of reward [21,53]. In the animal care field, passion consistently drives individuals to overcome barriers and persist in their career pursuits.

4.1.1. Representation

Survey data showed that representation was one of the top two barriers for historically excluded individuals compared to their White colleagues. Open-ended comments in surveys and interviews reinforced this finding and provided context for the challenges individuals faced in pursuing careers. Addressing representation often requires individuals from historically excluded groups to set a precedent, frequently becoming the only—or one of few—in their team or organization [19]. This role can be highly taxing and stressful [52]. Access to strong support networks and mentorship programs, such as AMZAP or MIAZS, can help individuals succeed while inspiring others from historically excluded groups to pursue animal care careers [10]. Mentors or sponsors from historically excluded groups can significantly impact future colleagues from minority groups through representation [19].

Role models play a pivotal role in career choice and development, particularly for individuals from underrepresented populations. Seeing someone with shared experiences and backgrounds succeed in a desired field can inspire confidence, validate aspirations, and provide a blueprint for overcoming challenges [8]. Research consistently highlights that role models influence self-efficacy, motivation, and persistence in career pathways, especially in fields where representation is lacking (e.g., STEM disciplines) [54]. For zoo and aquarium careers, the visibility of role models is further complicated by systemic barriers, such as limited hiring diversity and public representation. While existing studies, including [10], touch on the importance of role models, a deeper exploration of how their presence (or absence) shapes career pathways for underrepresented populations would strengthen the discourse on occupational diversity in zoos and aquariums. Addressing these gaps in the literature not only underscores the need for intentional role model development and visibility but also emphasizes their long-term impact on workforce equity and institutional success.

The data showed that institutions can engage communities through targeted programming, events, and marketing efforts. Staff can advocate for diverse representatives to showcase their organization on social media, in TV interviews, or other high-profile roles. These efforts can inspire individuals who may never have considered a career in animal care by seeing someone they identify with in that role. Inclusive marketing uses promotional materials that highlight the diversity of current staff and demonstrates a commitment to inclusion. Partnering with community organizations and schools to actively recruit individuals from historically excluded groups could develop broader representation in entry-level roles.

Individuals not from historically excluded groups can support colleagues by amplifying their voices and perspectives, helping to diversify the animal care field [11]. Allies play a critical role in creating safer, more welcoming environments for historically excluded groups within the workforce and community [55]. Interviewees and survey respondents who identified as White consistently expressed support and concern for their historically excluded colleagues, which was encouraging. Demonstrating and reinforcing that animal care careers are for everyone will require an ongoing effort but is essential for diversifying the field [18,56].

4.1.2. Personally Rewarding

Personal rewards, such as job satisfaction and alignment with personal goals, are essential for career persistence. Many survey respondents and interviewees expressed a lifelong passion for working with animals, often citing this as their motivation to persist

in seeking employment. Most also mentioned role models who nurtured their passion by providing regular access to zoos, aquariums, and natural areas. Role models can inspire the next generation by offering similar experiences and access to these resources [19]. Programs that raise awareness of STEM careers [21,57,58] and increase access to nature [59] have successfully reduced barriers for historically excluded groups and could be adapted for the zoo and aquarium field. Sharing passion is a powerful tool.

4.1.3. Mentorships and Professional Networks

Survey and interview data revealed that mentorship and networking ranked as the most significant barrier for respondents. Although no statistically significant differences emerged between White individuals and historically excluded groups, respondents emphasized the importance of mentorship for securing positions. Many highlighted the small size of the animal care field as both an advantage and a challenge.

Positive mentorship experiences included skill building, advocacy for hiring or promotion, and valuable feedback. Conversely, negative experiences with influential colleagues could be career-ending. Finding a mentor and building a network requires persistence and access to professionals in the field. Joining organizations such as the AZA, AMZAP, or MIAZS can help individuals form connections and access opportunities and increase access to career resources. Mentors play a critical role in supporting their mentees and should strive to offer meaningful guidance [19].

Recommendations include establishing structured mentorship programs that pair new hires with experienced staff and prioritizing mentorships for individuals from historically excluded backgrounds. Alumni networks for former interns and employees to stay connected could provide ongoing mentorship and career guidance for individuals trying to enter the field.

Strong professional networks are essential for career advancement, yet individuals from historically excluded groups may lack access to these connections. Hosting networking events focused on diversity and inviting students, early-career professionals, and seasoned experts to connect and share opportunities can help form these associations.

4.2. Institutional Implications

Institutions hold the responsibility and privilege of inspiring the next workforce generation. They also contribute to barriers in recruiting, hiring, and retaining staff. Job postings and hiring processes, shaped by institutional systems, influence access to positions. Institutions have significant power to implement changes that reduce barriers and expand access to animal care careers.

4.2.1. Increasing Access

Access to zoos, aquariums, parks, and natural areas emerged as a consistent theme when interviewees discussed career paths. Exposure to these spaces builds awareness of career opportunities and provides valuable context for future decisions, as outlined in SCCT's environmental factors [33]. Many zoos and aquariums offer free or reduced-cost admission, but studies show this alone does not diversify visitor demographics [60]. Providing free or low-cost programming, including transportation, may be more effective in reaching new audiences. Planned programming offers intentional, resource-rich experiences that maximize engagement. Additional research on the long-term impacts of targeted programming, especially comparing episodic versus consistent engagement, could provide valuable insights for the field.

4.2.2. Increasing Career Awareness

Survey and interview responses highlighted job awareness as a barrier to diversifying the field. Many individuals are unaware of career opportunities beyond veterinary roles. Institutions can promote awareness by participating in community events, such as career fairs, and strategically targeting historically excluded groups. Programs that engage underrepresented audiences in other fields have successfully increased career awareness [51, 57]. Introducing youth to the skills and knowledge needed for animal care careers can guide their educational and extracurricular choices, creating a stronger foundation for career pursuit. Sharing proven models of career awareness programming across institutions could encourage broader adoption of these practices.

4.2.3. Rethinking Experience Requirements

Requiring extensive experience for entry-level positions can unintentionally exclude candidates without access to resources, contributing to a lack of diversity [61]. Institutions should evaluate the experience and academic degrees truly necessary for success in these roles. Several respondents noted that their academic degrees were minimally helpful, with hands-on experience proving far more valuable. Institutions should ensure that pay scales align with the required experience to attract diverse candidates. Future research should explore how hiring requirements impact those unable to secure positions, particularly among historically excluded groups.

4.2.4. Unpaid Internships

Internships provide valuable, hands-on experience that prepares individuals for their desired careers [62]. Institutions offering internships must understand the legal requirements for paid versus unpaid internships [18]. Survey and interview respondents emphasized the importance of thoughtfully designing internships. Factors such as weekly hour requirements, the type of experiences offered, mentorship and supervision, and schedule flexibility significantly influence the quality of the internship experience. Many respondents noted the difficulty of committing to a 40-h-a-week internship without the ability to work a paying job to cover expenses. By adjusting internship requirements, institutions can improve access, making these opportunities more equitable for individuals without external financial support.

Paid internships expand access for individuals who lack financial resources, such as support from family or friends [63,64]. Compensation can include an hourly wage, a stipend, housing, or a combination of these. Research has shown that paying interns does not compromise an institution's financial stability [64]. The debate over paid internships remains a pressing equity issue in zoos and aquariums and will continue to require resolution [18,64].

4.2.5. Institutions' Role in Representation

Comments from individuals in historically excluded groups highlighted issues with representation in the field. These challenges affect both those pursuing careers and their families and social groups. Zoos have a tremendous opportunity to engage their communities in science and showcase diverse STEM professionals. With more annual visitors than all major U.S. sporting events combined [65], zoos can amplify representation. However, their staff demographics often fail to reflect their communities. Some zoos are now elevating the voices of historically excluded colleagues and highlighting their contributions [11].

The Association of Minorities in Zoo and Aquarium Professions (AMZAP) reaches an average of 30,000 viewers monthly on social media. By sharing members' career journeys, AMZAP highlights the successes of historically excluded colleagues [11]. Vicarious experi-

ences, where individuals share lived experiences, effectively encourage career pursuits, as reflected in social cognitive career theory [33,66]. Providing platforms for animal care professionals to share their stories may help aspiring individuals, especially from historically excluded groups, to envision success in the field.

Institutions have begun highlighting diverse staff during heritage months, such as African American History Month [6,67,68]. However, more consistent efforts are needed to emphasize the contributions and expertise of historically excluded staff. Increasing representation and visibility could enhance workforce diversity in animal care and other STEM fields [52,69].

Beyond staffing, zoos are addressing global crises, including biodiversity loss, climate change, and human environmental impact [70–72]. These issues disproportionately affect historically excluded populations [73,74]. Conservation education programs could become more relevant and effective by incorporating diverse voices, especially those of people most affected by environmental issues [75]. Institutions must examine unrepresented groups among their staff and take steps to diversify teams to address these global challenges [51]. Institutions could engage paid community consultants or partnerships for insight if hiring additional staff is not feasible. Larger organizations, such as the Association of Zoos and Aquariums, can centralize efforts and support member institutions in these critical initiatives [76].

4.3. Implications for Zoos and Aquariums as a Field

Zoos and aquariums are vital cultural institutions within their communities. AZA-accredited facilities welcome over 200 million visitors annually, underscoring their societal importance and their mission to promote conservation and education [23,65]. The field must take responsibility for changing internal systems to create a more diverse workforce, including in animal care positions, that reflects community and national demographics. The Association of Zoos and Aquariums began requiring diversity plans for accreditation in 2020, marking an initial step toward recognizing and addressing inclusivity gaps [77].

Institutions leading efforts to diversify their workforce and practices should share best practices whenever possible. Featuring sessions on diversity, equity, and inclusion at annual conferences, as the American Alliance of Museums does, can provide resources and foster discussions among zoo and aquarium leaders on measurable changes and strategies to achieve them [78]. Building stronger community connections and addressing community needs and strengths can replicate successful models from other industries and guide zoos and aquariums toward a more equitable future [60,78].

5. Conclusions

Increasing transparency about the diversity of institutions' workforces provides a first step in understanding the severity and complexity of the issue. Researching programs and other initiatives that institutions have in place or are considering as a part of their diversity efforts may provide valuable insight into where to focus their resources while informing the field through practical models.

Our study provides valuable insights into barriers for diverse staff who desire a position in animal care careers. Through a mixed-methods approach, the research provides a comprehensive view of how factors such as representation, mentorship, professional networks, and institutional practices shape career pathways in animal care. The findings emphasize the importance of addressing these barriers through targeted interventions, including paid internships, mentorship programs, and inclusive recruitment and retention strategies.

The implications of this research extend beyond diversifying the zoo and aquarium workforce. By fostering a more inclusive environment, zoos and aquariums can better reflect the communities they serve, enhancing public trust and engagement. A diverse workforce brings a variety of perspectives and innovative solutions to critical challenges in conservation, education, and community outreach. These contributions not only strengthen the effectiveness of zoos and aquariums in fulfilling their missions but also position them as leaders in advancing equity and inclusion in STEM fields.

Furthermore, this research highlights the transformative potential of diversity in achieving broader societal goals. By addressing systemic barriers and amplifying the voices of historically excluded groups, zoos and aquariums can serve as models for other organizations striving for equity and inclusion. The actionable insights provided here offer a roadmap for institutions to create meaningful change, demonstrating the power of diversity to drive institutional success and societal progress.

Locating individuals who did not break through barriers to be successfully hired in an animal care career to understand what was insurmountable in their quest could provide valuable data on how institutions could better support a more diverse workforce. The data collected through this study only included individuals currently in the field, indicating they could overcome the barriers, and their experiences likely do not represent those who were not able to. Additional data and perspectives may contribute to prioritizing action steps within the field.

Zoos and aquariums need input, expertise, and support from their local, regional, and global communities to achieve their ambitious goals. Becoming a more diverse and inclusive field is challenging, but leadership can use insights from this study and others to make informed decisions. Advocates within organizations are already pushing for change [2]. AZA has emphasized diversity through updates to its accreditation standards to include diversity goals [77]. It also included a fifth promise in its strategic plan, which focuses on advancing diversity efforts across all institutions by increasing awareness, building capacity, developing policies, and implementing strategies [76]. A more diverse workforce is achievable and holds immense potential for success. However, this requires the courage to dismantle existing barriers and embrace meaningful change.

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