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Building inclusive engineering education conferences: a responsive approach to identifying and mitigating barriers

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ABSTRACT

Academic conferences are a key development activity due to their role in capacity building and identity formation. However, meaningful participation is limited by barriers which differentially impact individuals, influencing their career development and progression. This work aims to understand how organisational practices (i.e. established norms) support participants with diverse identities when participating in the European Society of Engineering Education (SEFI) conference, and their perceptions regarding initiatives to reduce barriers to inclusion. Data from two surveys (prior to and during SEFI2024) are discussed in relation to the concept of inequality regimes. Implemented initiatives appear to have reduced some of the identified barriers to submission and attendance; however, the apparent disconnect between value statements and disparate levels of individual awareness underlines the need for inclusion to be integrated transversally into the conference culture and organisational structures. The paper concludes with reflections and recommendations for future conference organisers.

1. Introduction

Diversity, equity, and inclusion (DEI), here defined by adopting definitions from the SEFI DEI Special Interest Group (SEFI DEI SIG 2023), are viewed as crucial components of contemporary academia for their capacity to promote excellence. DEI supports the ethical and moral obligations of public research and there is evidence showing that diverse teams create more innovative and novel solutions (Díaz-García, González-Moreno, and Jose Sáez-Martínez 2013; Hong and Page 2004; Jackson and Joshi 2011; Nielsen et al. 2017; Page 2008), that their publications receive a higher number of citations (Campbell et al. 2013) and that their research has greater impact (AlShebli, Rahwan, and Woon 2018). Despite this, initiatives aimed at reducing barriers and policy changes do not appear to be keeping pace with shifts in cultural norms and values (Pless and Maak 2004; Puritty et al. 2017) and there is potential to cause greater harm by instigating initiatives to achieve a more diverse academic community, without provision for an inclusive and equitable environment (Pless and Maak 2004; Puritty et al. 2017) that supports the participation and success of all academics.

Academic conferences are an integral activity for academic staff and play a key role in researcher socialisation (Egri 1992), and in promoting scholarly discourse, networking (Hauss 2021), and collaboration (Campos, Leon, and McQuillin 2018; Hauss 2021). They further promote the dissemination of research findings, and have been shown to increase visibility and citations, particularly for academics with less experience or from lesser-known institutions (de Leon and McQuillin 2020). Additional benefits include: invitations to present or lecture at another institution (Hauss 2021); access to knowledge (Hauss 2021), new methods and ideas (Oester et al. 2017); income generation (Hauss 2021); contacts leading to grant proposals (Oester et al. 2017); and job offers (Hauss 2021). It is therefore not surprising that attending conferences has a considerable impact on the career progression of many academics. To this end, an inclusive climate at the level of the profession can be more significant than at a research group or department level (Douglas et al. 2025).

Conferences are considered particularly important in developing fields such as engineering education research (EER), where they play an important role in capacity building (Borrego and Streveler 2014; Jesiek, Newswander, and Borrego 2009) and in providing a community, especially for those who lack a national network or institutional support (Edström et al. 2018; Gardner and Willey 2018), with one annual national conference being framed as "a focal point in the development of the maturing community of engineering education researchers" (Godfrey and Hadgraft 2009). Participation in conferences is important in shaping the identity-trajectory of engineering education researchers at all career stages (Gardner and Willey 2018), with peer review enabling or constraining individuals' development as researchers (Gardner and Willey 2013). Conference proceedings constitute the primary means of dissemination for many researchers in the field (Shawcross and Ridgman 2013; Wint and Nyamapfene 2023). Thus, professional societies that host and run conferences have a powerful role in both supporting the career advancement of their members and promoting inclusive cultures. Such work necessitates a nuanced understanding of the specific factors that limit attendance at, and participation in, specific academic conferences.

In keeping with such a need, this work focuses on understanding the specific barriers (i.e. structural, procedural, cultural, or interpersonal obstacles) that people face to both being a part of the European Society of Engineering Education (SEFI) community and participating in SEFI events, primarily the annual conference. The empirical evidence obtained from survey data may be used to inform initiatives (here meaning actions to address barriers) and changes to future conferences, as well as in supporting other societies and institutions when organising inclusive conferences.

In the next section, we introduce 'inequality regimes' as a theoretical lens through which to view DEI work at academic conferences. We then explore potential barriers to conference participation, as well as previous attempts to overcome such barriers both in a global context and in the EER context.

2. Background

2.1 Theoretical framework: inequality regimes

Inequality regimes is a theoretical framework introduced by Acker (2006) and builds upon previous work on gendered organisations (Acker 1990) by incorporating the concept of intersectionality, as first defined by Crenshaw (1991), to address the lack of studies focused on the 'mutually reinforcing' processes involved in inequalities.

In their work, Acker (2006) presents inequality regimes "as an analytic approach to understanding the creation of inequalities in work organizations" (441), defining them as

> systematic disparities between participants in power and control over goals, resources, and outcomes; workplace decisions such as how to organize work; opportunities for promotion and interesting work; security in employment and benefits; pay and other monetary rewards; respect; and pleasures in work and work relations. (443)

and which "result in continuing inequalities in all work organizations" (441), particularly in relation to gender, race, class, sexuality, religion, age, and physical disability. They define several organising processes that create inequality regimes within organisations: organising the general requirements of work, organising class hierarchies, recruitment and hiring, wage setting and supervisory practices, and informal interactions while 'doing the work'.

Previous work (Walters, Hassanli, and Finkler 2022) has drawn upon the four components (gendered substructures, gendered subtexts, gendered logic or organisations, and the abstract worker (implicitly white and male) that contibute to gendered organisations (Acker 2012), to understand the way in which academic conferences act to reproduce gendered practices. Gendered substructures are considered to consist of four components: organisation culture, which pertains to beliefs around inequality and acceptable behaviour, with Acker claiming that 'a culture of denial and invisibility of inequities perpetuates the inequities' (Acker 2012, 216); organising processes, which relate to the way in which inequalities become enforced by factors such as job roles, decision-making, the work environment, and behavioural norms; interactions on the job, which refer to interactions between individuals and groups at different levels of the hierarchy; and gendered identities, which consider the ways in which individuals are expected to behave in the workplace. The concept of gendered subtext is concerned with documentation (e.g., policies, memos, and guides) that shape aspects of organising processes.

Walters, Hassanli, and Finkler (2022) argue that conferences share characteristics of an organisation in that they are business events involving people engaged in a common purpose, are guided by rules and structures, and have their own cultural norms which may vary depending on discipline (Ford and Harding 2010; Walters 2018). Their findings reveal a situation in which academic conferences function as gendered substructures, through: organisation culture which considers the recognition and awareness of inequality at conferences; organising processes which focus on the distribution of decision making; interactions on the job which consider interactions at a conference and on organisation committees; and gendered identities which include setting the tone and research topics. The authors found that conferences communicate organisational logic and that even in cases where women make up a significant proportion of the delegation, organisational logic is manifested in the bodies that give keynote and adopt visible roles. This work thus demonstrates the potential insights which may be gained by making use of the concept of inequality regimes as a lens through which to view the findings of the current work.

2.2 DEI at academic conferences

There is a growing body of literature focused on DEI in the context of academic conferences. A large number of publications focus on providing a summary of the current situation as evidence for a need to change, for example, by analysing attendee demographics (e.g. Bano and Zowghi 2019; Barreto et al. 2024; Cheeke et al. 2018; Graesser et al. 2021; Isbell, Young, and Harcourt 2012; Larson et al. 2020; Niner and Wassermann 2021; Penaluna et al. 2017; Potvin et al. 2018; Sardelis and Drew 2016; Schroeder et al. 2013; Shishkova et al. 2017). The overwhelming majority of this work focuses solely on binary gender identity, and the role that other aspects of people's identity play in shaping the conference experience remains largely unaddressed. Other work compares the approaches taken to inclusivity by two or more different conferences in the same research domain (e.g. Arend and Bruijns 2019; Foxx et al. 2019; Rushworth et al. 2021; Sarabipour et al. 2021; Sardelis and Drew 2016; Velin et al. 2021), provides general guidance and tips for making conferences more inclusive, both generally and for those with specific characteristics (e.g. Callus 2017; Joo et al. 2022; Martin 2014; Sardelis, Oester, and Liboiron 2017; Serrato Marks 2018), or takes the form of advocacy pieces (e.g. Favaro et al. 2016; Goring, Whitney, and Jacob 2018; Serrato Marks, Solomon, and Stack Whitney 2021). In some cases, conference organisers had surveyed members in an attempt to fully understand the barriers faced (e.g. Abernethy et al. 2020; Canfield et al. 2023; O'Meara et al. 2019), some of which are discussed in the next section.

2.3 Identified barriers to conference participation

Barriers to conference participation exist at all stages of the conference cycle, from submission to engagement during attendance, and have been found to differentially impact those with certain characteristics, identities, and lived experiences (often in relation to dominant identities within the professional association under consideration). Here, we highlight some of the characteristics and identities impacting barriers before discussing the different barriers that present at different stages of the conference cycle.

Obstacles for academic conference participation have been documented for Black and ethnic minorities (Abernethy et al. 2020; O'Meara et al. 2019), those with a disability (Abernethy et al. 2020; Rushworth et al. 2021; Serrato Marks, Solomon, and Stack Whitney 2021; Solomon 2021), LGBTQ + (Abernethy et al. 2020; O'Meara et al. 2019; Rushworth et al. 2021), first-generation status (Abernethy et al. 2020), single parents (Aracri et al. 2024); individuals from lower-income countries (Aracri et al. 2024; Arend and Bruijns 2019; Velin et al. 2021), who can face financial constraints as well as visa restrictions (Chugh and Joseph 2024; Recchi et al. 2021; Velin et al. 2021; Waruru 2018); junior or early career status (O'Meara et al. 2019), as well as gender (particularly within STEM disciplines), even in cases where women are the numerical majority (e.g. Isbell, Young, and Harcourt 2012). Those with multiple marginalised identities are more likely to experience issues and barriers (Clancy et al. 2017; Douglas et al. 2025).

Barriers to conference participation exist at all stages of the conference cycle from submission to engagement during attendance. Barriers to travel,which may prevent submission or eventual attendance include the associated carbon footprint (Abbott 2020; Achten, Almeida, and Muys 2013; Coroama, Hilty, and Birtel 2012; Sanz-Cobena et al. 2020), financial costs (Abbott 2020; de Lima et al. 2024; Niner and Wassermann 2021), as well as issues associated with being away from home, for example for those with caregiving responsibilities (Abbott 2020; Calisi & a Working Group of Mothers in Science 2018; de Lima et al. 2024; Niner and Wassermann 2021). Other burdens include the lengthy, stressful, and expensive process of obtaining a visa (Abbott 2020; Chugh and Joseph 2024; Recchi et al. 2021; Velin et al. 2021; Waruru 2018), and the increased time involved in conference preparation, particularly for those with disabilities (Solomon 2021; Woodcock, Rohan, and Campbell 2007). Conferences have also been reported as being held in locations that discriminate against certain identities (Abernethy et al. 2020; Tulloch 2020). Other barriers to paper submission and attendance include bias in peer review (Benson et al. 2022).

Meaningful participation and contribution in conferences has also been shown to be limited by the presence of bias in the academic community. This has the potential to decrease the visibility of work and impact opportunities for development. For example, women may have fewer attendees at their presentation (Barreto et al. 2024) and are less likely than men to ask questions (Carter et al. 2018; Chen et al. 2025; Hinsley, Sutherland, and Johnston 2017; King et al. 2018). Further examples include potential bias in prize awardees (Cheeke et al. 2018) and a lack of diversity of keynote speakers and people holding leadership positions including chairs and committee members (Bano and Zowghi 2019; Cheeke et al. 2018; Graesser et al. 2021; Schroeder et al. 2013). It is thus concerning that conference participants are not yet fully representative of the wider academic community, and that those who do attend do not always have an equitable experience (e.g. Biggs, Hawley, and Biernat 2018; Débarre, Rode, and Ugelvig 2018; King et al. 2018; Rushworth et al. 2021; Shishkova et al. 2017). Another set of barriers related to the experiences of conference attendees includes organisational culture, behaviour of peers (Clancy et al. 2017; King et al. 2018); instances of sexual harassment (Custer 2019); and language barriers associated with the predominant use of English (Amano, González-Varo, and Sutherland 2016, 2023; de Lima et al. 2024; Ramírez-Castañeda 2020). Such factors may impact the ability to fully engage at conferences or intentions to attend in future. There is evidence to suggest that experiencing a 'chilly climate' at conferences leads some to make the decision to leave academia (Biggs, Hawley, and Biernat 2018).

More specifically within the EER community there are several barriers associated with the lack of shared understanding of disciplinary paradigms, terminology, publishing traditions, and norms (Jesiek, Newswander, and Borrego 2009). As has been reported in the context of engineering ethics education, the dominance of American and Anglo-speaking research and literature reflects an incomplete view of potential approaches (Martin et al. 2023). Institutional-level barriers which are unique to EER may also contribute towards non-participation. For example, the reported lack of respect for literature and conference participation pertaining to learning and teaching, (Cretchley et al. 2014), alongside its framing as a 'teaching activity' as opposed to a 'viable research area' (American Society for Engineering Education [ASEE] 2009, 2012; Olds et al. 2012), as well as questions pertaining to whether engineering education conference papers should be categorised for the purposes of promotion and tenure as teaching, service, or research contributions (Borrego and Streveler 2014) are likely to create barriers in terms of both funding and incentivisation.

2.4 DEI-based initiatives

The suitability of an initiative to mitigate barriers is dependent upon both characteristics of those impacted, as well as the specific barriers faced. Recommendations for organising inclusive conferences involve focusing on strategies to mitigate barriers (occurring prior and during the event), as well as implementing broader initiatives designed to foster inclusion and belonging (Aracri et al. 2024; Arcila Hernández, Chodkowski, and Treibergs 2022; Barrows, Sukhai, and Coe 2021; Blackman et al. 2020; Joo et al. 2022; Levitis et al. 2021; Martin 2014; NumFOCUS DISC 2022; Sardelis, Oester, and Liboiron 2017).

Initiatives proposed within the literature primarily focus on overcoming pragmatic barriers, and thus on increasing diversity in participation. These include: divergence from traditional conference formats and the use of virtual hubs (Abbott 2020; Reshef et al. 2020), pre-recorded sessions (Blackman et al. 2020), Information and Communication Technologies (Coroama, Hilty, and Birtel 2012), aids such as captioning (Gernsbacher 2015), and provision of strong/fully online components (Joo et al. 2022; Niner and Wassermann 2021); relocation of conferences (Velin et al. 2021), for example to more inclusive or affordable areas; developing administrative and advocacy solutions which include working with local embassies and provision of visa requirements and letters (Velin et al. 2021); fee discounts, waivers, grants, scholarships or use of (peer-to-peer) sponsorship models (Abernethy et al. 2020; Arend and Bruijns 2019; Sardelis, Oester, and Liboiron 2017; Segarra et al. 2020; Velin et al. 2021); and the availability or childcare solutions (Aracri et al. 2024; Bos, Sweet-Cushman, and Schneider 2019; Calisi & a Working Group of Mothers in Science 2018; Gould 2018; Langin 2018; Sardelis, Oester, and Liboiron 2017).

Despite the efforts focused on increasing diversity, it is important to note that these types of initiatives do not necessarily lead to an increased sense of inclusion or belonging (Puritty et al. 2017). Initiatives more suited to creating a culture of inclusion include: the organisation of events or meet-ups for underrepresented groups (Aracri et al. 2024; Chance, Direito, and Pale 2023), including specific conferences for minority students (Casad, Chang, and Pribbenow 2016); formation of affinity groups (Canfield et al. 2023); mentorship opportunities (Sardelis, Oester, and Liboiron 2017; Velin et al. 2021); ensuring diversity of chairs, keynotes, and speakers (Aracri et al. 2024; Barreto et al. 2024; Casadevall 2015; Cheeke et al. 2018; Débarre, Rode, and Ugelvig 2018; Else 2019), and decision-makers (Joo et al. 2022); ensuring information and knowledge is accessible, particularly for those with disabilities (Callus 2017; Goring, Whitney, and Jacob 2018); randomising the conference schedule (Sardelis, Oester, and Liboiron 2017); the creation of inclusivity plans or visions (Abernethy et al. 2020; Débarre, Rode, and Ugelvig 2018), and codes of conduct (Abernethy et al. 2020; Adams, Tashchian, and Shore 2001; de Lima et al. 2024; Débarre, Rode, and Ugelvig 2018; Favaro et al. 2016; Foxx et al. 2019; Sardelis, Oester, and Liboiron 2017) with reporting mechanisms (Joo et al. 2022) and signed pledges (NASEM 2018; Sardelis, Oester, and Liboiron 2017); the presence of trusted or trained individuals (Joo et al. 2022; Sardelis, Oester, and Liboiron 2017); and use of

affirmative messaging (Débarre, Rode, and Ugelvig 2018). One contribution referred to 'empathetic event logistics' (Canfield et al. 2023), which takes account of the emotion associated with personal challenges and social anxiety, as well as challenging discussions, and cognitive load.

2.3 Research purpose and questions

Despite the growth in DEI interventions in the context of academic conferences more widely, there is a lack of research that focuses specifically on barriers to conference participation within EER specifically, something which is significant given their importance for capacity building within developing research areas (Borrego and Streveler 2014), and the diverse perspectives necessary to ensure inclusion and equity within the education of future engineers.

This work seeks to address the identified gap in the research and makes use of two surveys (described in section 3.3) to identify and understand the barriers to inclusion that members of the EER community face to participation in SEFI conferences. In so doing, it addresses the following research questions (RQ):

- How are participants' identities and lived experiences supported (or not) by current conference structures and processes?
- How does the SEFI community perceive efforts to increase inclusion and belonging?

The answers to these questions will be used to identify actions and interventions that may be implemented to increase inclusion and belonging at future SEFI conferences and events.

3. Methodology

3.1 Positionality

This study is not solely an academic endeavour, as we sought to engage and involve the SEFI community in reconsidering the impact of the barriers and norms present at the SEFI conference. We share a belief that academic knowledge production should be inclusive and representative of diverse voices, and our involvement with the SEFI community, and specifically the DEI SIG, has encouraged us to consider these barriers and also to interact with others who are concerned about such barriers. We have been involved in various initiatives aimed at addressing inequalities within SEFI, for example, the development of a Code of Conduct and community events where good initiatives are shared. The involvement of two of us in the organisation of the 2024 annual conference provided an opportunity to implement specific inclusion actions and to obtain empirical data to inform such actions.

3.2 Research context

This work took place during the period leading up to, and including, SEFI2024, which was held at EPFL, the Swiss Federal Institute of Technology in Lausanne, between 2nd and 5th September 2024. In the following sections, we introduce the organisations involved in conference organisation.

SEFI:
The European Society for Engineering Education (SEFI) has been active since 1973 and is generally seen as the largest network of those involved in engineering education within Europe. The SEFI board has 25 members (from 18 countries), and the mailing list includes people from ~65 countries distributed across all the continents. However, as membership is mostly through 'institutional membership', demographic information about individuals is not available. Conference attendees typically

include deans, professors, researchers, students, university staff such as librarians and pedagogical advisors, professionals employed in industry, and other associations and societies.

SEFI aims to contribute to the improvement and image of engineering education by bringing stakeholders together and facilitating knowledge exchange. The values guiding SEFI include both "Supporting and respecting diversity, equality and different cultures in our interactions and collaborations within SEFI and all over the world" and being "Inclusive in involving higher and continuing engineering education stakeholders, at individual, institutional, organisational and policy levels" (SEFI 2024).

SEFI works towards its mission through a number of activities including Special Interest Groups (SIGS),[1] regional conferences and seminars, involvement in research projects, publication of academic journals (namely the European Journal of Engineering Education and SEFI Journal of Engineering Education Advancement), and the organisation of the annual conference, a scientific conference focused on engineering education, the latter being the focus of this work.

DEI has been part of the SEFI mission for several decades (Figure 1). Evolution in the terms associated with DEI is exemplified within the *SEFI Position Paper on Diversity, Equality and Inclusiveness in Engineering Education* (SEFI 2018), which calls for individuals from the entire community to engage in practices (i.e. ongoing cultural/organisational norms) and behaviours that promote inclusivity, making it a shared commitment rather than relying solely on specific initiatives aimed at underrepresented groups, and the ASEE and SEFI Joint Statement on Diversity, Equity, and Inclusion (ASEE & SEFI 2020), which calls for a commitment to "deepen and broaden our understanding of inequities, so that we are prepared to take action to transform our institutions, universities, and the whole of the engineering community" (2). The organisations acknowledge that "steady gains have been made" in terms of "decreasing imbalance for white women" but claim that progress is needed in relation to "all
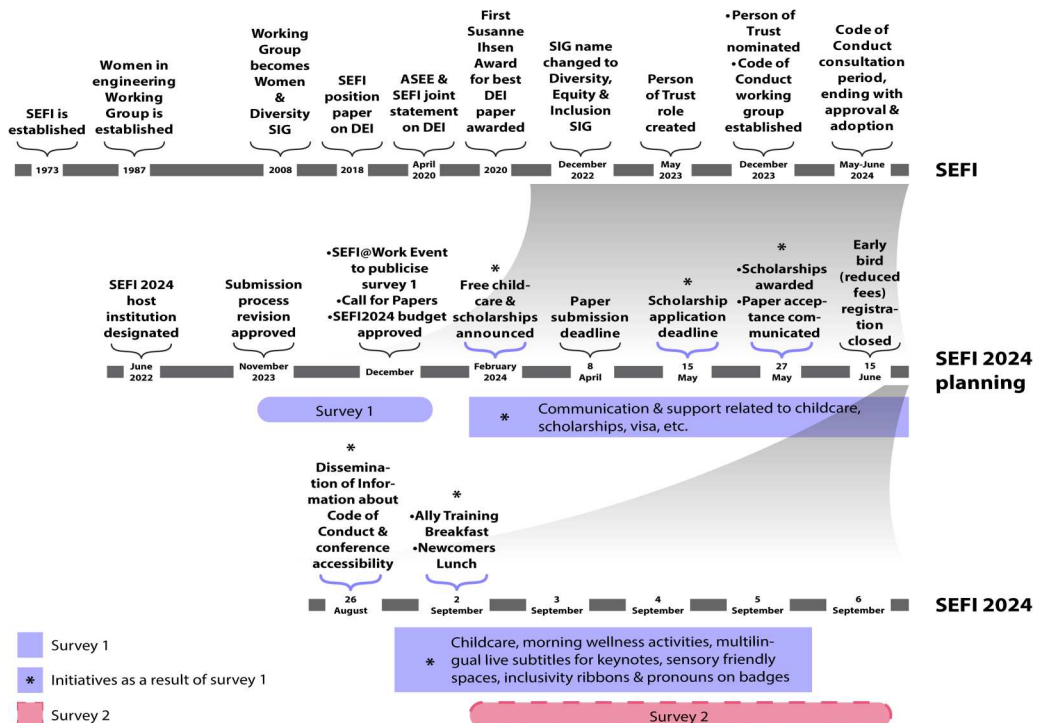

Figure 1. Timeline of DEI related milestones and interventions at the level of SEFI as an institution (top row), during the lead-up to SEFI2024 conference (middle row), and during the SEFI2024 conference (bottom row).

segments of our society, including minoritized races, immigrant populations, disabled persons, and economically marginalized groups" and that it is

> our engineering duty that no one is disadvantaged or receives less favourable treatment because of age, disability, neurodiversity, gender, gender identity and expression, sexual orientation, race, ethnicity, religion or belief, socio-economic status, national status, pregnancy and maternity, marriage and civil partnership, or any other minority status. (3)

In keeping with such commitments, it is interesting to note that (what was) the SEFI Gender and Diversity Special Interest Group (SIG), changed their name to Diversity, Equity and Inclusion in 2022, saying that they

> embrace a broad understanding of diversity, equity and inclusion and work to better represent all SEFI members and the wider engineering education community. It is our experience that definitions of diversity, equity and inclusion vary considerably between different contexts and institutions, and that many initiatives have been primarily concerned with widening the participation of women in engineering.

Additionally, highlighting the organisational prioritisation of DEI, in 2020, SEFI launched the Susanne Ihsen Award awarded to conference papers that best exemplified the principles and values of DEI.

EPFL:
Established in 1969, EPFL is one of two federal universities in the ETH domain (the Swiss Federal Institutes of Technology), Switzerland. Diversity is an integral part of EPFL as it is bilingual (English/French) and has more than 130 nationalities represented on campus, with almost 60% of the student population being non-Swiss. Recognising its responsibility as a publicly funded institution, holding to the ideal that diversity is a strength, and being committed to furthering a culture of inclusion and respect, EPFL has strong policies related to inclusion and providing equal opportunities. Being a federal institution, these policies are based on Swiss Federal and ETH domain legislation. Mirroring discussions and changes happening internationally, EPFL proposed an Equal Opportunity & Diversity Action Plan 2021–2024 (Equal Opportunity Office, EPFL 2021) that specifically sought to expand the understanding of diversity at EPFL and to address the different needs of this diverse population. For instance, it recognised the needs of caregivers who work at EPFL and put in place policies to improve their work-life balance. This office also provided support for the DEI initiatives at SEFI2024 by offering advice, proposing solutions, and providing partial funding for scholarships and daycare. In addition to the focus on inclusion, the integration of sustainability concerns across campus is also a major focus. This is relevant to equity at the macro scale because of the differential impact of climate change on lower income people and also to accommodate people with dietary restrictions.

SEFI2024:
The local organising committee started preparations for SEFI2024 soon after EPFL was announced as the host institution in June 2022. The preparations related to DEI started in September 2023 (Figure 1). To ensure that implemented initiatives addressed actual needs of the community, the SEFI2024 DEI team sought and obtained ethical approval to conduct two surveys. Informed by the results of the initial survey (later referred to as Survey 1) and prior work by other academic organisations, several inclusivity initiatives were implemented (several for the first time) both during the lead-up to and during the conference (Table 1).

3.3 Data collection

Surveys were selected as the research method because they are an efficient and flexible means to collect data from a large number of people across a wide geographic area and their use has previously led to the to a deeper understanding of the experiences of community members (Amano

Table 1. Initiatives implemented at SEFI2024 to address community barriers and promote inclusivity.

Initiative	Identified barriers
Free childcare	Child-caring responsibilities; financial
Scholarships & fee reductions	Financial; geographical diversity
Extensive help with visas	Visa requirements to travel to Switzerland; financial
Ensuring accessibility	Physical accessibility
SEFI Ally training for active bystanders	Experiences of discrimination and problematic behaviour
Newcomer integration lunch	Isolation and lack of network for first time conference attendees
Inclusivity Ribbons	Isolation and lack of network for attendees
Morning wellbeing activities	Isolation and lack of network for attendees; Fostering mental/physical health while engaging in informal social activity
Multilingual Live Subtitles	Diverse linguistic backgrounds & persons who are D/deaf or hard of hearing
Live streaming of the plenaries	Neurological conditions; financial and travel barriers that prevented conference attendance.
Special spaces	Neurological conditions (ADHD etc); Childcare and breastfeeding responsibilities
SEFI Person of Trust & Code of Conduct	Experiences of discrimination and problematic behaviour
Enacting SEFI values	Community norms that are insufficiently attentive to inclusion.
Increasing visibility of initiatives	Lack of awareness about inclusion

Note: For further details on the logistics and specifics of the initiatives, see Table S1, and for the timeline of implementation, see Figure 1. These initiatives were informed by reports and studies (see section 2.2), as well as previous initiatives put in place by other organisations (American Association for the Advancement of Science (AAAS), American Association of Geographers (AAG), American Society for Engineering Education (ASEE), Chemical Institute of Canada Conference (CIC), Ecological Society of America (ESA), International Ethological Congress (Behaviour), Joint conference of American Society of Naturalists, the Society of Systematic Biologists, and the Society for the Study of Evolution (Evolution), Society for the Advancement of Biology Education Research (SABER), The Professional and Organizational Development (POD) Network in Higher Education).

et al. 2023; Carter et al. 2018; Hauss 2021; Oester et al. 2017; O'Meara et al. 2019) with results being used to inform changes (Abernethy et al. 2020; Canfield et al. 2023).

The inclusion of open-ended questions allowed for the collection of qualitative, descriptive data aimed at providing a depth of understanding of the meaning respondents placed on their experiences. To protect the privacy of the respondents, both surveys were fully anonymous and included closed questions that provided broad categories as response options, and open-ended questions which explicitly reminded respondents to respond in a manner that did not compromise their anonymity. With the exception of the branching questions necessary for the structure, questions in the surveys were non-mandatory. Data was collected and managed online using REDCap electronic data capture tools hosted at EPFL (Harris et al. 2009, 2019). Approval for these studies was accorded by the EPFL institutional research ethics committee (HREC 082-2023).

Survey 1:

The first survey sought to identify perceived barriers to submission and attendance of the SEFI conference, as well as understand participants' previous experiences of attending either/both the 2022 and 2023 conferences, a timeframe chosen to anchor their responses to recent experiences. It was developed by the research team based on prior surveys conducted by other academic organisations (e.g. O'Meara et al. 2019), which were primarily used within the USA based context, and were thus adapted for the European context. The survey was finalised after incorporating the feedback received from the steering committee of the DEI SIG and the SEFI Person of Trust. It comprised five sections and included 20 multiple choice and seven open-ended questions which addressed: barriers to submission and attendance; perception of the effect of these barriers on the SEFI conference/community; witnessing and experiencing unwanted behaviours; sense of belonging at the SEFI conference; and detailed demographic information. The survey was estimated to take 7–15 min to complete.

The survey was conducted between 30 November 2023 and 10 January 2024. Responses to the online questionnaire were solicited via two announcements in SEFI HQ newsletters, one direct mailing to the SEFI membership list, and by hosting a SEFI@work webinar in early December

2024. At the time of survey distribution, there were approximately 800 people on the SEFI member-ship list, and 119 survey responses were recorded. The findings from this survey influenced the initiatives that were put in place for SEFI2024 (Figure 1).

Survey 2:

The second survey was designed to understand the impact of the inclusion initiatives (i.e. specific actions designed to increase inclusion), identify persistent barriers, collect immediate, in-the-moment experiences and impressions of SEFI2024 attendees, and was also intended to promote inclusivity and belonging by giving participants an opportunity to share their experiences of inclusion (or exclusion). This survey was primarily a shortened version of the first survey, focussing on in-the-moment experiences with fewer demographic questions. It consisted of 10 multiple choice and three open-ended questions, which asked for respondents' perspectives regarding initiatives to improve inclusion. The survey was estimated to take 3–10 min to complete.

In terms of the population, 559 individuals registered for the SEFI2024 conference.37 were regis-tered as industry professionals, 70 as PhD students, and 17 BSc/MSc students representing 40 countries from 5 continents. Half were first-time attendees, and 39 people required a visa to enter Switzerland. Data collection started on the morning of the second day of the conference (3 Septem-ber) and closed 24 h after the conclusion of the conference (6 September). The survey was accessible via a QR code, which was placed on posters positioned around the physical conference space and available made via the conference app. Participants were encouraged to complete the survey again if they had additional experiences to report, a practice which was facilitated via a branching logic that allowed people to avoid re-answering questions that would not have changed. 110 responses were collected, representing 99 initial & 11 'back again to add something' responses.

3.4 Data analysis

Survey data was downloaded from REDCap and imported into SPSS for quantitative analysis (version 28.0.0.0) and MAXQDA 2020 (VERBI Software 2020) for qualitative analysis. The diversity of demo-graphic profiles meant that quantitative analysis was primarily descriptive. Where possible, non-para-metric statistical tests were used to compare groups, including Chi squared, T tests, and multiple linear regressions to determine significance. For qualitative analysis, we employed Qualitative Content Analysis (Schreier 2014), which allows for a systematic yet flexible approach to text analysis. This method was chosen for its ability to condense large volumes of qualitative data while maintaining the depth of meaning. Using both deductive and inductive coding, the analysis followed a structured process starting with a coding frame based on the aspects targeted in the closed-ended questions, applying it systematically to the data, and refining codes iteratively as we encountered new ideas.

4. Results: Survey 1.

4.1 Demographics

Of the 119 respondents, 114 provided demographic information. While response numbers are low relative to attendance at the 2022 and 2023 conferences (∼400 each time, with many repeat atten-dees), engagement with the organisational leadership is evidenced by responses from 23 current or past SEFI board members.

In the past 10 years, each respondent had attended between 0 and 10 conferences (median = 2 conferences), with around 33% of respondents ($n = 40$) attending only 1 conference. While most of the respondents ($n = 70$) had attended between 1–3 conferences, only 5 respondents had attended more than 8 editions of the conference in the last 10 years. Most of the respondents had attended and submitted a contribution to either or both of the two previous editions of the conference (Table S2).

The majority of respondents were employed at European institutions ($n = 94$), with 51 people from Central Europe (including the UK), 24 from Northern Europe, 14 from Southern Europe and 5 from Eastern Europe. The remaining 20 respondents were distributed across 4 continents. Respondents' national identities were similar to their institutional affiliations, with two-thirds identifying as Central or Northern European ($n = 88$), with a further 8 people from Southern Europe and 2 from Eastern Europe. Most respondents were researchers or teachers on permanent contracts ($n = 69$), with PhD students being the second largest group ($n = 14$).

Fifty-seven respondents identified as female, 51 as male, and six as 'non-binary, fluid, neutral, non-conforming, or preferred not to specify' (Table S3). Respondents predominantly identified themselves as white or Caucasian ($n = 95$) and as heterosexual ($n = 94$). Almost half of the respondents reported having caring duties ($n = 57$), and almost one third as having dietary concerns ($n = 38$). Sixteen people identified as having a psychological, cognitive, or neurological condition with 14 having a chronic illness or disability. The majority of the respondents were thus gender-conforming, straight, white/Caucasian, teachers/researchers of Northern or Central Europe nationality on a permanent contract with a 50% chance of having caring responsibilities.

The large number of demographic facets (with small numbers in each category) meant that it was not possible to conduct detailed statistical tests. However, we report some results performed with binary categories created by collapsing identity facets, disregarding the respondents who did not reply to the demographic items for these analyses.

4.2 Perceived impact of barriers to submitting and attending on SEFI conferences

Some respondents reported experiencing organisational barriers to submitting and attending SEFI conferences and being a target of unwanted behaviours during the conference itself, which they percieved as having a major impact on the conference. Despite this, most of the respondents considered these factors to have only a negligible or small impact on the SEFI conference itself (65% for submitting a proposal, $n = 73$; 41% for attending, $n = 46$; 70% for unwanted behaviours, $n = 73$; Figure 2).

4.3 Barriers to submitting communications to SEFI conferences

Of the 87 people who reported having submitted work to either SEFI 2022 or 2023, 69 said that they had personally experienced barriers (Figure 3). Of the provided options, the review process was
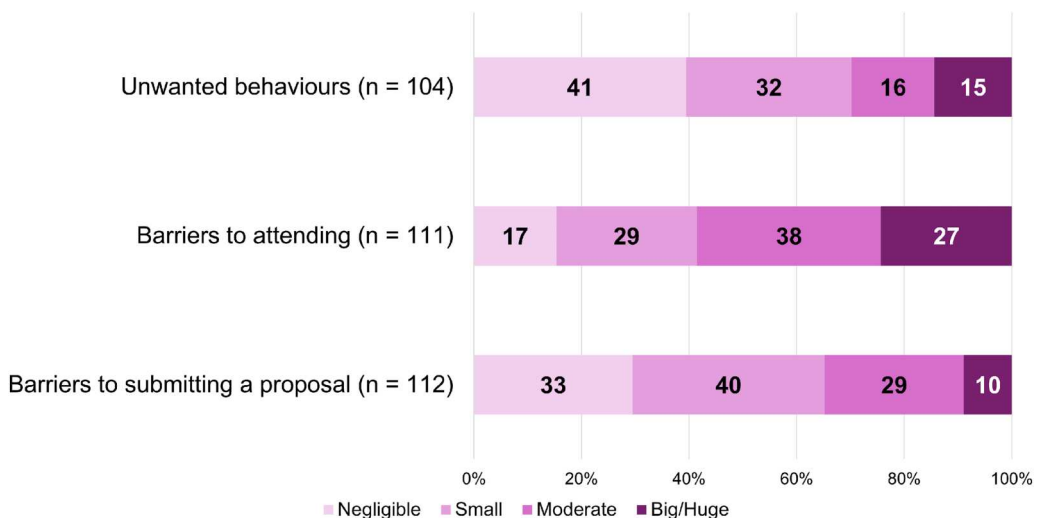

Figure 2. Respondents' perceptions of the impact that barriers to submitting and attending have on the SEFI conference itself.

Receiving non-constructive reviewer comments/feedback (n = 88)   52   28   8
Receiving offensive or ondescending reviewer comments/feedback (n = 88)   68   14   6
Establishing relevance of my context / experience for SEFI community (n = 89)   53   31   5
Navigating the submission process (n = 89)   63   22   4
Navigating the website to find submission related information (n = 89)   64   22   3
Scholarly presenting in English (n = 89)   74   13   2
Scholarly writing in English (n = 89)   72   16
Other barriers (n = 46)   31   4   11

0%   20%   40%   60%   80%   100%

■ not a barrier for me   ■ slight/small barrier for me   ■ significant/major barrier for me
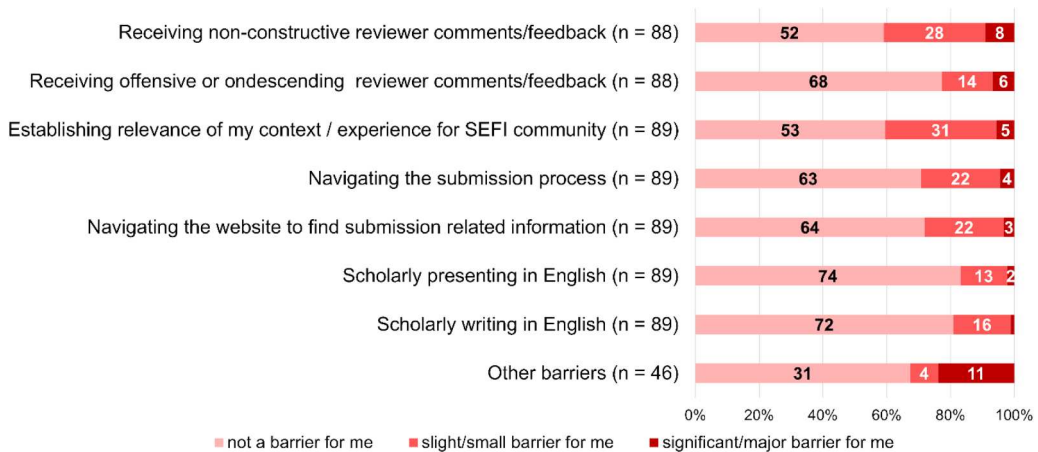
Figure 3. Barriers reported by survey 1 respondents to submitting contributions to SEFI 2022 and /or 2023 conferences.

identified as being a frequently encountered barrier (small or major), with respondents receiving nonconstructive or condescending reviewer comments ($n = 36$ and $n = 20$, respectively) or struggling to convince the reviewers of the relevance of their own context or experience to the EER community ($n = 36$). Navigating the website and submission process was identified as a barrier for 26 respondents, while scholarly writing or presenting in English were cited least frequently as a barrier ($n = 17$ and $n = 16$, respectively). In the 18 qualitative responses, eight people expressed frustration with a lack of clarity in the submission procedure and reported experiencing issues with the format of the paper template and shifting deadlines that hindered their planning. Additionally, respondents pointed to financial barriers associated with the anticipated costs of both registration fees and travel expenses ($n = 6$), as well as concerns about carbon footprint ($n = 2$), all of which influenced their decision on whether to submit a proposal to the conference.

4.4 Barriers to attending SEFI conferences

Cost, scheduling conflicts, and the environmental impact of travel were identified as the biggest barriers to participation by those who had attended ($n = 100$) either SEFI 2022 and/or SEFI 2023 (Figure
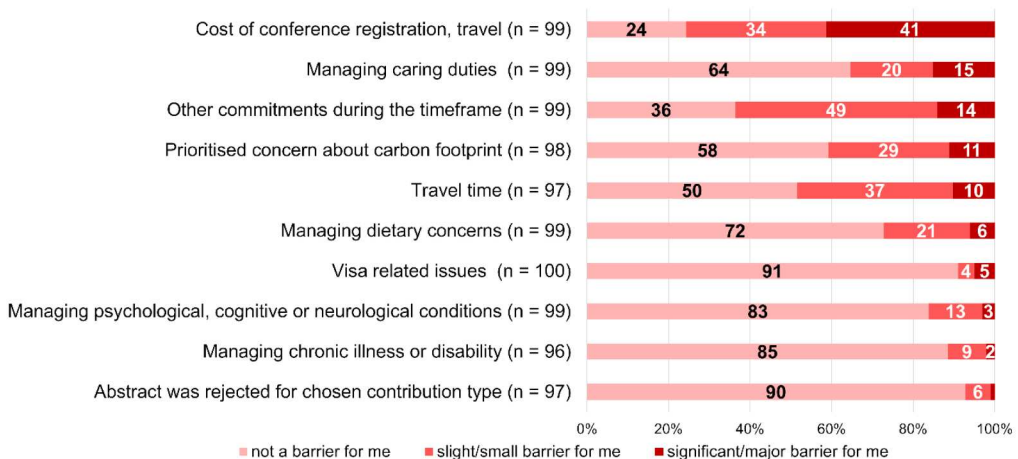
Cost of conference registration, travel (n = 99)   24   34   41
Managing caring duties (n = 99)   64   20   15
Other commitments during the timeframe (n = 99)   36   49   14
Prioritised concern about carbon footprint (n = 98)   58   29   11
Travel time (n = 97)   50   37   10
Managing dietary concerns (n = 99)   72   21   6
Visa related issues (n = 100)   91   4   5
Managing psychological, cognitive or neurological conditions (n = 99)   83   13   3
Managing chronic illness or disability (n = 96)   85   9   2
Abstract was rejected for chosen contribution type (n = 97)   90   6

0%   20%   40%   60%   80%   100%

■ not a barrier for me   ■ slight/small barrier for me   ■ significant/major barrier for me

Figure 4. Barriers reported by survey 1 respondents to attending SEFI 2022 and /or 2023 conferences.

4). Gender was not a significant predictor of respondents experiencing barriers to caring duties. However, males reported psychological, cognitive, or neurological conditions as a barrier more often than non-males (Chi sq. 6.657, df 2, $p = .036$, Cramer's V .262, $p = .036$), and non-Caucasians reported visa issues being a barrier more often than caucasians (Chi sq. 10.551, df 1, $p = .001$, Cramer's V .339, $p = .001$). Multiple linear regression of visa issues found statistically significant ($p < 0.05$) associations with ethnicity and nationality but not with region of employment or role (F $(4,87) = 11.181$, $p < 0.001$; Table S4).

Additional information regarding barriers to attendance was provided by 22 respondents in the form of free text. Of those, 11 cited high registration fees, travel, and accommodation expenses. This issue was particularly relevant for respondents from lower-income countries, as one respondent from Africa noted, "*I think that SEFI does invite participation of a range of scholars and scholarship, but the costs of attendance are high for developing countries.*" Lack of integration or the feeling of being welcomed and supported were other barriers mentioned by five respondents. This was especially true for first-time attendees and those planning to attend alone. One respondent who had attended three prior conferences questioned, "*How many people travel alone to their first SEFI conference and how actively welcomed are* they? *SEFI* have *their 'in' group and it does not always explain what it is doing.*" The timing of the conference, traditionally scheduled for early to mid-September when the start of the academic year occurs at many institutions, was identified as a barrier by four respondents. Additionally, concerns about the ecological impact of travel were raised by four respondents, with one respondent from Central Europe stating, "*environmental concern has kept me from attending conferences that can (realistically) only be reached by plane, even for those living on the European continent.*"

4.5 Witnessing and experiencing unwanted behaviours

There were 20 reported instances of unwanted behaviours during the conferences, with 76 people reporting neither seeing nor experiencing problematic behaviour. Unwanted behaviours were experienced by nine people, with eight small/slight instances and a single major/significant instance (related to academic title or position). Unwanted behaviours were witnessed 11 times, with two instances being certain and nine characterised by respondents as probably problematic.

Prior studies have shown that unwanted behaviours differentially impact conference participants, and participants with minoritised identities are more likely to experience discrimination, harassment, and feelings of being 'othered' (Dutta et al. 2024; Heaton et al. 2020; Oliver and Morris 2020; Sapiro and Campbell 2018). To further investigate who was experiencing (as opposed to observing) these behaviours, we split our data into two demographic profiles of respondents based on dominant engineering identity characteristics that are likely to remain stable over a person's lifetime. In determining these identity characteristics, we drew from data showing that between 2008–18 in the USA, 80% of engineering degrees went to males, of which 63% were white (National Center for Science and Engineering Statistics [NCSES] 2021), and from studies highlighting the dominance of white masculine culture in engineering (Eastman, Miles, and Yerrick 2019; Garriott et al. 2023; Secules and Turpen 2017). A global survey in 30 countries also showed that only 9% of the adults identified as being LGBT + (Ipsos 2024).

We found that individuals who identified with the dominant engineering identities of straight, white and male experienced unwanted behaviours as frequently as others. However, the two

Table 2. Respondents' perceptions of why they were targeted by unwanted behaviours.

Demographic	n	Sex or gender	Age	Race, ethnicity	Nationality	Academic title, position	Other
Straight, White Male	46	1		1	1	4	1
Other	67	2	2	1			1
Unknown	5					1	
Total		3	2	2	1	5	2

demographic groups' perception of why they were targeted varied, with 'academic title or position' being the most common for respondents from the dominant engineering identity of straight, white, and male (Table 2). While few instances of unwanted behaviours were reported in this survey, they did have a big impact for some people. Furthermore, most people appeared unaware that these behaviours have a major effect on the conference experience for some colleagues. Follow-up questions inquiring about the location of experienced or witnessed unwanted behaviours found that these occurred most often during SEFI conference events (Fig. S1).

Additional qualitative insights were provided by three respondents who do not identify as belonging to the dominant engineering identity. One respondent who identified as a straight white female and had attended 9 of the previous 10 SEFI conferences described heir concerns being dismissed, leading them to 'lose faith' in SEFI, stating

> I asked for a code of conduct and I objected to a keynote speaker for [a SEFI event] given his behavior but as he was paid and the host decided nothing was done. That was extremely hurtful to experience and hence I did not attend the [SEFI event] and I lost faith in SEFI standing up for their members as power and network clearly came before safety.

Respondents employed a range of strategies in response to witnessing or experiencing problematic behaviours at SEFI conferences (Fig. S2), reporting the use of proactive strategies such as warning others about potential harassers and checking in with colleagues more often than employing reactive strategies like calling out inappropriate behaviour and reporting it. Other respondents who identified as white and female described proactively avoiding situations, saying, "*I proactively avoid situations where unwanted* behaviour *could occur (e.g. small talk with unknown people).*"

4.6 Sense of belonging at SEFI conferences

The majority of respondents appeared to feel a sense of belonging at the conference, with 94% stating that they felt heard by colleagues, 94% that they felt comfortable being themselves, and 88% that they belonged at the conference (Figure 5). Multiple linear regression analysis found a significant positive relationship between the number of conferences people had attended and sense of belonging (F(1,90) = 15.037, $p = <0.001$), while aspects of people's identity were not found to influence their sense of belonging at SEFI. Despite this, 30% of the respondents indicated that the keynote speakers did not reflect the diversity of the SEFI community. These respondents spanned diverse demographic characteristics in terms of gender, ethnicity, sexual orientation, and academic roles. Parallel sessions, such as talks and workshops submitted by the community, were seen to better reflect the SEFI community.
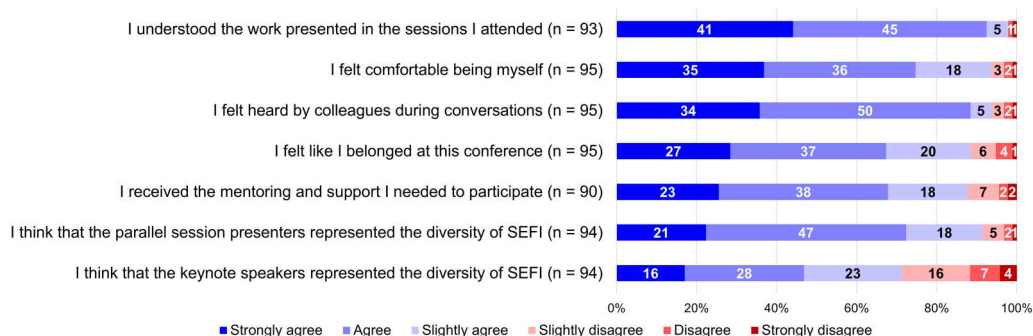

Figure. 5. Survey 1 respondents' perceptions of DEI climate at SEFI 2022 and/or 2023 conferences.

4.7 Community DEI priorities

All respondents were asked to share what they thought should be done to improve inclusion at SEFI conferences. Seven respondents highlighted the efforts that had been made, over the years, to make SEFI a more welcoming and diverse environment, with one respondent who had attended 8 of the previous 10 conferences stating

> I remember when I first came to SEFI, about 13 years ago. Then a lot of long-retired men were holding on to many of the posts and they were not going to let anyone in. It was absolutely awful. So we have come far!

Specific suggestions as to how to further improve inclusion at SEFI conferences were provided by 71 respondents. The majority of these suggestions focused on addressing the financial costs associated with attending the conference, such as accessible fees and lower accommodation costs. Additionally, some respondents who both identified with and did not identify with the dominant engineering identity of straight white male, requested clearer conference procedures to facilitate the participation of minoritised colleagues, *"let the 'minorities' speak*," and address unwanted behaviours, *"SEFI needs to take care of eventual unwanted behaviour with discreet and focused care."*

The importance of extending beyond the predominantly European focus and adopting a more global approach was emphasised by nine respondents, with one respondent from South America saying that there was a need for, "*Understanding that although SEFI is an European initiative, many are not 'Europeans' so it would be helpful if people giving a talk did not address exclusively the 'European colleagues' in the room."* Allowing for greater language diversity was another suggestion provided by a respondent from Central Europe who has had a leadership role in SEFI (board member, SIG chair, etc.)". They shared a personal experience of discrimination within the SEFI community due to their English proficiency, *"It would be nice to have more language diversity. There are some distinctive behaviors and attitudes between non-native and native (speakers) (…) I have experienced a hurtful discrimination in the SEFI community because of my average English level."* Two respondents highlighted concerns regarding the visa requirements of the host country, suggesting that more support and information be provided to help attendees navigate these processes. The provision of more diverse food options, and consideration for dietary restrictions, was also mentioned by seven respondents.

11 respondents requested the provision of sensory-friendly spaces and adequate breastfeeding rooms, with 5 suggesting alternative formats for networking, 4 focused on the experience of those attending for the first time, with one non-academic respondent who had attended the conference stating that,

> (as a newcomer) I felt that people did not listen or include me in their conversations because they did not know who I am and there was no opportunity for us to get to know each other (…) for someone who is alone from an institution, unless there is specific action for integration, conferences can be very lonely and alienating.

3 respondents emphasised the need to be vigilant about accessibility for individuals with disabilities, ensuring that all conference facilities and activities are fully accessible. Respondents also encouraged conference organisers to consider strategies to lower other barriers such as providing childcare.

5. Results: survey 2

5.1 Demographics

This data was collected during the SEFI2024 conference. 110 responses were collected, 99 from those responding for the first time, and 11 who were returning to report something specific in addition to their existing response. Three quarters of respondents reported having submitted a contribution to the conference (Table S5) and almost half had not previously attended SEFI, while about a third had attended between 1 and 3 previous conferences. This is consistent with registrant data for SEFI2024 which revealed that 280 of the 539 registrants were attending the conference for the first time.

In contrast to Survey 1, minimal demographic data was requested in the hope that more attendees would take time to participate in the moment. Most of the respondents were female (66), and almost half (47) considered at least one aspect of their identity as being under-represented in engineering or engineering education (Table S6).

5.2 Barriers to submitting communications to SEFI2024 conference

The barriers reported by respondents (Fig. S3) are quite similar to those reported in survey 1 and include issues with submission and formatting instructions, as well as reviewer feedback. Compared to survey 1, we see a small decrease in the difficulty posed by unconstructive reviewer feedback (Mann–Whitney U, $p < 0.04$, effect size 0.16) with small-medium decreases in difficulties posed by offensive reviewer feedback or establishing relevance (Mann–Whitney U, $p < 0.008$, effect size 0.20 and 0.28, respectively; Table S7).

5.3 Barriers to participating in SEFI2024

Respondents reported similar impressions of the barriers to participating in SEFI conferences (Fig. S4) as those highlighted by survey 1. Cost was considered to be slightly less of a barrier than in survey 1 (small effect size) despite the 2024 conference not being appreciably cheaper than previous years. Visa issues were a marginally bigger problem in 2024 than for prior conference attendees (Table S8). Our reduced demographic data in survey 2, compared to the detailed information in survey 1, precludes investigating if ethnicity or nationality influenced visa barriers.

5.4 Unwelcome behaviours at SEFI2024

A total of 12 experiences of unwelcome behaviour were reported, occurring equally often during the less formal moments of the SEFI conference (e.g. poster and coffee sessions) and social events (e.g. social events, meals) (Figure 6). All the people who reported unwanted behaviours identified as being underrepresented within engineering or engineering education. The total number of instances of witnessing/experiencing unwelcome behaviours is higher than reported by the larger survey 1 population. Comparing the location of these events between the two studies shows
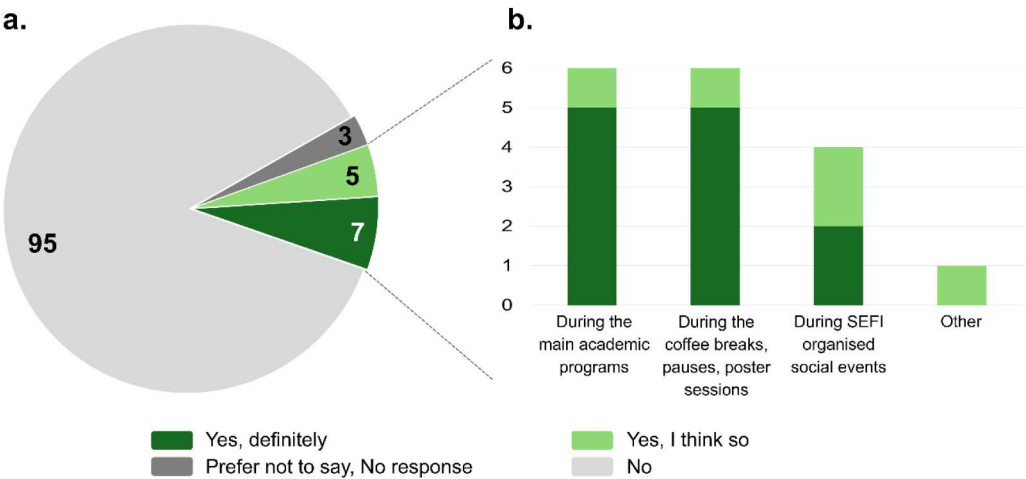

Figure 6. Survey 2 respondents' encounters with unwelcome behaviours at SEFI2024 a. Frequency of respondents who witnessed or experienced such behaviours. b. Locations where these behaviours were witnessed or experienced.

unwelcome behaviours were proportionally constant during the formal conference program but were more likely to occur at social events in 2024.

5.5 Inclusion & belonging at SEFI2024

Several initiatives were put in place to foster inclusion and belonging (ally training, morning wellness activities) at SEFI2024, including some directly informed by the findings of survey 1 (childcare, scholarships, structured networking). Responses to the statements related to belonging and equity in survey 2 (Figure 7) generally suggest the perception of greater equity at SEFI2024 than at previous conferences referred to in survey 1. Comparing the measures of inclusion in survey 2 with survey 1, we see large effect sizes (>.5 per Mann–Whitney U tests, Table S9) for all three items in the direction of increased perception of inclusion at SEFI2024. Respondents' written comments about the initiatives implemented were largely positive, with few respondents expressing negative views.

Respondents were asked to provide their opinion about the various initiatives related to inclusion that were implemented for the first time at SEFI2024. Of the 77 respondents who wrote a comment, 54 were female. Of the 54, 31 identified as being under-represented in engineering or engineering education. A majority of those who wrote comments (48 of 77 comments) expressed their gratitude for the initiatives. It is interesting to note that comments included those from respondents who did not personally benefit from the initiatives (16 respondents): *excellent! I didn't need most of them but appreciated that they were there.* For many, SEFI2024 was the first time they had experienced/witnessed such initiatives, *first time* I see *this at a conference, f*antastic initiatives!, and saw such initiatives as an important tool for creating an inclusive atmosphere and setting the climate of the conference, *I think these are excellent additions and something that sends a clear message about the intention of the community*.

The 12 respondents who specifically mentioned the free childcare that was provided as a direct result of the findings from survey 1 included both those who had themselves made use of the service, "*For the first time during my PhD I don't feel ashamed or guilty of bringing my baby with me for a conference. I am a non-European student, so I don't have family around me to look after him*", as well as those who had not, "*I don't have children myself, but I can see how useful it is for parents.*" The former comment suggests that the respondent not only benefits from the ability to attend but also an increased sense that the community understands and accepts their position, thus reducing 'shame'.

Respondents also expressed their appreciation for the wellness activities that were conducted every morning (7 people), "*Wellness activities I attended and liked very much*," and for the scholarships that were made available for conference participants (4 people), "*I appreciated them as they provided financial assistance to people from [low and middle income countries].*"
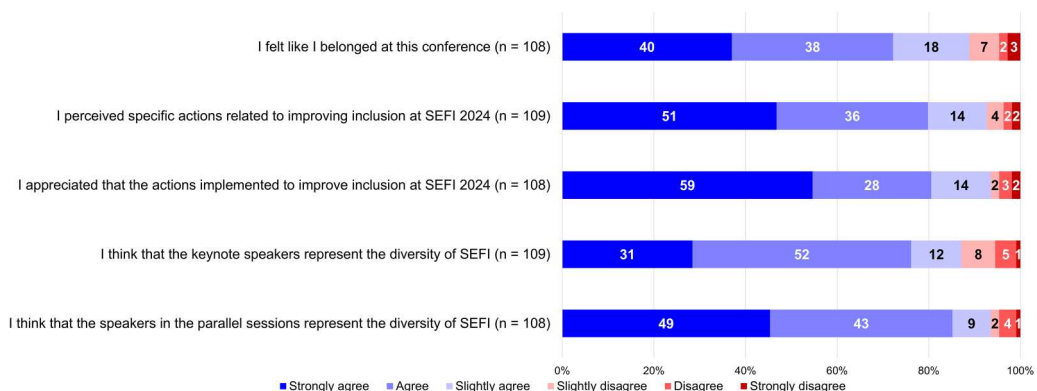

Figure 7. Survey 2 respondents' perceptions of DEI climate at the SEFI2024 conferences.

Other responses referred to the presence of visual cues such as ribbons and wristbands (5 people) that could facilitate integration, *"I would like to expand the ribbons! They are a great way to find kinship in the big community of SEFI and work as a conversation-starter"*, as well as the presence of the code of conduct (3 people), vegetarian food (3 people), ally training, democratic questions during plenaries (online questions that could be upvoted), and the provision for live translation of the plenaries along with live subtitles.

Furthermore, 10 respondents expressed their enthusiasm for seeing the inclusion activities continued and expanded in future conferences, with one respondent writing, *"I genuinely hope that this sets the benchmark for subsequent SEFIs – it would be an absolute shame for the future organisers to not repeat these initiatives."*

5.6 Inclusion and belonging beyond SEFI2024

With consideration for the sustainability of inclusion initiatives, survey 2 asked respondents 'What do you think should be done to improve inclusion at SEFI conferences?', to which 70 respondents provided their opinions. As with the previous question, most of the respondents were female (51 people) and identified as being under-represented (31 people).

Many of these opinions were related to strengthening of initiatives that were already implemented at SEFI2024 (5 people), as suggested by one respondent who had attended 3 of the previous 5 conferences *"I did not find out early enough about the wellness activities and that you'd have to sign up."* 10 respondents indicated that there was a need for dedicated and accessible quiet spaces to help participants with their sensory and religious needs. Nine respondents highlighted the need for additional financial help *"Based on geographic origin award not only scholarship but also make different tiers of participation fees."* Reflecting on the newly instated SEFI code of conduct, two respondents expressed desire for additional clarity and transparency, *"Introducing consequences for code of conduct violations – and then being transparent about violations/consequences,"* a sentiment which echoes the views expressed in survey 1. Although not explicitly mentioning the code of conduct, many other suggestions were aligned with SEFI values and were related to building a more inclusive community and conference experience. Eight respondents suggested the importance of training SIG chairs and session chairs to promote inclusive environments and constructive interaction with the audience, with one respondent who had attended all five previous conferences saying, *"More guidance for session chairs on managing aggressive questions and how to set constructive tone."*

Other suggestions highlighted the need to facilitate networking (6 respondents) as *"some people may still feel like it's not their place to speak, perhaps some further 'ice-breakers' like the special lunches or at least being able to choose to go to thematic lunches* to *get people more comfortable/confident to share."*

Respondent comments also showed that members of the community have diverse needs that make participating in conferences challenging including neurodivergence, *"Please next year invest more* on *what can be done to have a safer and more understanding climate for neurodiverse people"*; dietary needs *"For those with food allergies, it can be daunting and difficult to express clearly what your allergy is as well as the anxiety that this creates"*; and linguistic/auditory needs *Perhaps someday there can be interpretive/translation tools in all the conference rooms that can help people with language or hearing impairment."*

Despite the extensive efforts to increase inclusivity at SEFI2024, some respondents reported experiencing exclusion and discrimination at the conference, *"I was told that I should stop referring to the colonial history of certain countries – and I found myself apologising so that white people could feel better."* Another respondent who identified as male and under-represented, shared,

> I was talking to two participants (who come from the same region of the world, let's say) and their 'mentor' cut us in the middle of the conversation because they had to go talk to 'researchers from the US' as the mentor put it.

Although most of the comments that we received were either positive or constructive, two comments expressed opposing views: *"too much fluff, stop all the wellbeing stuff. It's a conference. It's totally over the top"* from a respondent who identified as being under-represented, and *"it feels like a therapy conference and not about engineering"* from a female respondent.

6. Discussion

The findings show that the majority of respondents do not view barriers as having a significant impact on SEFI conferences, but a few respondents reported experiencing significant barriers to participation. These contrasting perspectives highlight concerns regarding the awareness levels of the community around issues of inequity (Custer 2019).

Our study populations, while not large, do appear representative of the SEFI demographic. Over half of respondents were in Central Europe, with most of the remainder also employed within Europe (survey 1). It is, however, important to consider the greater diversity in nationality of conference participants in the context of the reported issues with visas and other obstacles which pose additional barriers to some EER community members. The institutional roles and experiences of participants, as well as their individual identities, will have influenced the barriers and proposals captured in the surveys.

Barriers to submission identified in both surveys are consistent with previous work, including those associated with peer review (Benson et al. 2022). The observed reduction in issues pertaining to the provision of unconstructive and offensive reviewer feedback or in establishing the relevance of work is consistent with efforts to reduce barriers at SEFI2024, particularly in relation to submission deadlines, formats, and the introduction of a meta-review process. This decrease is encouraging given that survey 2 respondents were likely to be less familiar with the requirements as many were attending the SEFI conference for the first time. Issues with reviewing may be exacerbated by the interdisciplinary nature of EER, which draws upon different disciplinary paradigms, terminology, publishing traditions, and norms which can lead to disagreement regarding aspects such as review and publication procedures and types of submission (Jesiek, Newswander, and Borrego 2009). For example, Beddoes (2012) found that those making use of feminist approaches received 'rude' and 'nasty' reviews on EER conference papers, and reported difficulty in finding ways and opportunities to challenge problematic discourses or events in a constructive manner within the existing structures. Such findings are of particular concern given that conferences are particularly important in developing fields such as EER, where they play an important role in capacity building (Borrego and Streveler 2014; Jesiek, Newswander, and Borrego 2009), identity formation, and providing a community, especially for those who lack institutional support (Gardner and Willey 2018).

It is interesting to note that several respondents identified anticipated registration and travel expenses as barriers to submission. Attendance barriers thus seem to act pre-emptively as barriers to submission, suggesting that initiatives to support attendance, such, childcare, visa assistance, and other financial measures should be communicated with the call for submissions.

Barriers to SEFI conference attendance reflect broader patterns such as financial costs (Abbott 2020; Niner and Wassermann 2021), particularly for individuals from low-income countries (Aracri et al. 2024; Arend and Bruijns 2019; Velin et al. 2021), as well as issues associated with visa costs or restrictions (Abbott 2020; Chugh and Joseph 2024; Recchi et al. 2021; Velin et al. 2021; Waruru 2018). Indeed, respondents' suggestions for future improvements focused on these issues. Respondents also expressed concern about being away from home, for example, for those with caregiving responsibilities (Abbott 2020; Niner and Wassermann 2021), the carbon footprint associated with travel (Abbott 2020; Achten, Almeida, and Muys 2013; Coroama, Hilty, and Birtel 2012), and the perceived presence of cliques reducing inclusion for first-time attendees and early career academics (O'Meara et al. 2019).

The relatively low number of reported instances of unwanted behaviour may be associated with response bias such that people are far less likely to agree to participate in counterproductive

workplace behaviour research, which tends to lead to the underreporting of negative experience (Greco, O'Boyle, and Walter 2015). As reported elsewhere, aspects influencing conference inclusion were organisational culture or behaviour of attendees (Clancy et al. 2017; King et al. 2018) including experiencing and observing instances of harassment (Custer 2019). It is interesting to note that respondents appeared to take individual responsibility for preventing such instances, this pointing towards a lack of faith or trust in the organising body, as alluded to by one respondent. Unfortunately, as seen in other studies, these strategies also include distancing oneself from the community and its events (Clancy et al. 2017). The dominance of English (Amano, González-Varo, and Sutherland 2016, 2023; de Lima et al. 2024) and mismatch between the diversity of key-note speakers and the diversity of the SEFI community (Bano and Zowghi 2019; Cheeke et al. 2018; Graesser et al. 2021; Schroeder et al. 2013) were also considered to reduce sense of belonging. We attribute at least part of the relative increase in witnessed/experienced unwelcome behaviours reported in survey 2 to result from its framing, which encouraged people to report small things related to inclusion and the nearly simultaneous data collection.

The perception of a greater inclusion at SEFI2024 is noteworthy given both the high proportion of first-time attendees and the survey 1 results (see Section 4.6), which found a correlation between the number of conferences attended and sense of belonging. It is encouraging that praise for the initiatives implemented at SEFI2024 came from both those who made use of the initiatives such as childcare and scholarships and those who did not. This indicates that respondents recognise the value of these initiatives for building the community, despite the relatively low perceived impact of said barriers on the SEFI community. Appreciation for low-cost initiatives such as ribbons and an ally training workshop demonstrates low-barrier opportunities to sustain inclusive initiatives for future SEFI conferences. Building a culture of inclusion would also involve ensuring that the demographically evolving SEFI community is represented in the keynote speakers and has equitable opportunities to participate, network, build collaborations, and benefit from the conference.

Qualitative data obtained during survey 2 suggests the need for further efforts in relation to advertising initiatives in a timely manner, the provision of accessible spaces, a greater variety of financial support, clarity in the consequences of breaking the code of conduct, and training of SIG chairs. The suggestions, alongside the reported instances of exclusion and discrimination at SEFI2024, remind us of the challenging and ongoing nature of work in this area, and the ongoing learning required. Despite numerous prior studies documenting that discrimination occurs more often for marginalised identities in academia, straight white men reported experiencing a higher level of unwanted behaviours, and some participants expressed explicit views against inclusion efforts. These findings highlight the need for deeper community-level conversations about the goals and experience of an engineering conference, the values of the SEFI community, and how these values are, or are not, enacted by SEFI conference activities.

Survey respondents praised progress made with respect to DEI within the last decade, yet reported a tendency to use individual approaches to harm reduction rather than expecting action from the community. Advances towards a positive organisational culture, such as introduction of the person of trust and the code of conduct, have not yet sufficiently permeated into individual practices and perceptions. Thus, many respondents did not perceive inequality to be an issue at SEFI conferences, with over half considering barriers to have had only a small or negligible impact on the conference, and a general lack of awareness of the impact of unwanted behaviour. For some, there appeared to be a culture that discouraged speaking out, with one respondent finding themselves apologising for raising issues, and another claiming that efforts to increase diversity and inclusion were 'over the top', a view that may deter others from action in the area. Together, these findings point to a perception of a situation lacking urgency for change and, therefore, indicate a risk for the persistence of inequities.

We now turn to discussing our findings in relation to the concepts of gendered organisations and inequality regimes (Acker 1990, 2006, 2012), which are primarily situated within capitalist organisational structures, and which are based around the idea of the abstract worker (who is implicitly

white and male). We extend this analysis by situating inequality regimes within broader historical and ongoing structures of coloniality, thus emphasising the intertwined nature of capitalism and colonialism. This approach allows for interrogation of how conferences function, not only as organisational spaces, but as sites of colonial knowledge production that privilege Western epistemologies and marginalise scholars from the Global South, and reproduce structural exclusion.

There is evidence in our data of organising processes acting to unintentionally reinforce inequalities and messages regarding who belongs within the community. For example, several respondents described issues associated with the formatting of submissions, the required level of English, and receiving unconstructive and offensive reviewer comments. Although our research did not explicitly focus on the documentation (e.g., policies, memos, and guides) which shape aspects of organising processes, it is interesting to note the comments highlighting a lack of guidance around what to do in the case of challenging situations, inadequate responses to issues raised, and a lack of clarity regarding the consequences of breaking the code of conduct, indicate a disconnect between value statements and actual practice. One example is the tendency towards individual responsibility in instances of experiencing or observing unwanted behaviour, such as avoiding certain situations, which may be attributed to the aforementioned lack of clear consequences in cases of misconduct. This disconnect was further alluded to in comments regarding the way in which the organisation outwardly welcomes diverse participation, but where other mechanisms such as registration costs and difficulties obtaining visas acted to exclude.

Inequality regimes thus appear to support visa restrictions, high travel costs, dominance of the English language and focus on European audiences (eurocentrism), through the adoption of 'neutral' policies that ignore global asymmetries. For example, the funding disparities highlighted by some participants typically mean that institutions in the Global North have more resources to subsidise travel, registration fees, and research, allowing their academics to dominate attendance and visibility, something which is often compounded by restrictive visa regimes which act to reproduce global hierarchies of mobility. Such findings are emblematic of postcolonial structures that reproduce hierarchies of knowledge production, epistemologies, language, and access and which are inherited from colonial histories. Indeed, the account of one participant who found themselves ''*apologising so that white people could feel better*'' when told not to refer to colonial history, suggests that this is an issue which, at least for the SEFI community, still requires further work.

There is evidence that interactions between those at different levels of the perceived hierarchy acted to exclude individuals, particularly newcomers to the conference, with one respondent alluding to some people being considered more worthy of time and conversation. Some considered SEFI to consist of cliques, with there being a lack of clarity and transparency as to the way the organisation works and the activities involved.This speaks to the way in which academic conferences act to communicate organisational logics. Together, the perceived exclusion of newcomers, the presence of cliques, and lack of transparency appear to act to prevent integration into the community, thus maintaining the status quo and allowing for the maintenance of power structures that exist.

During the course of this work, the different levels at which inequality regimes operate became evident. For example, participants from lower-income countries were offered scholarships aimed at alleviating the financial burden of attending SEFI2024. However, in many cases awardees could not benefit from the scholarships because they were unable to obtain visas, thus demonstrating the role of inequality regimes at both the national and international level.

6.1 Limitations and future research

A limitation of the sampling method is that respondents were self-selected and may not fully represent the diversity of the SEFI community. This is particularly relevant for the second survey which could only be completed by those in attendance at SEFI2024, thus omitting the perspectives of those most likely to be impacted by exclusion from the conference. It is probable that those who feel more committed to the SEFI community were more likely to respond. This introduces a potential

source of non-response bias in both data sets and limits the meaning that can be inferred from some items, such as those related to sense of belonging. The lack of demographic data on SEFI members and conference attendees precluded analysis of potential demographic trends of response bias for each survey. However, as detailed demographics, including sexual orientation and ethnicity, are not typically collected by non-UK institutions in Europe, the results of this study do offer new insight into the demographic diversity of SEFI participants. Thus, while the lack of an internal baseline presents an internal limitation in this study, the demographic profile of respondents may serve as a rough baseline for other European academic associations. Further, the relatively small sample size limited our capacity to identify statistically significant patterns or trends in the data and reduces the generalisability of findings to other contexts.

Viewing the findings in relation to the theoretical frameworks of gendered organisations and inequality regimes allows for the identification of avenues for future work. For example, our research did not focus explicitly on the processes and decision-making involved in conference organisation, for example, in relation to submission processes, peer review, keynote speakers, selection of host institutions ,and funding. It would thus be interesting to explore the way in which organising processes contribute towards inequality at conferences. Analysis of such findings could be used in conjunction with those obtained by documentation (e.g. policies, memos, and guides) that shape aspects of organising processes and which may highlight contradictions in value statements and actual practice. It would also be beneficial to gain insight into how participants understand representation in relation to EER more broadly. This would allow for an understanding of the way in which decisions such as the selection of keynote speakers, act to communicate common understandings of the social order of academic disciplines, in turn allowing for further claims regarding organisational logic of the conference.

Finally, although this work primarily focuses on the inequality experienced by academics and scholars (not) attending conferences as participants, we also wish to acknowledge the role that the academic community and professional societies play in the (re)production of social inequity more widely. In so doing, we highlight the work of Major (2020), who describes their experience of crossing the picket line as an attendee of an EER conference and reflects upon the conditions of workers within the hotels and conference centres utilised for such events.

7. Conclusions & recommendations

The results of this work, alongside the initiatives implemented at SEFI2024, demonstrate the need for, and feasibility of, implementing concrete actions that support multiple dimensions of diversity. In this section, we first reflect on our experience of the implementation of these initiatives at SEFI2024. In so doing, we highlight those learnings which cannot be inferred from the data presented. This is followed by conclusions, suggestions for future work to improve diversity, equity and inclusion at SEFI conferences and more general recommendations applicable to those interested in implementing initiatives within their own professional conferences.

7.1 Reflections on the implementation of inclusion initiatives at SEFI2024

- Our experience has shown us that anticipating barriers to contributing and attending conferences influences academics' intentions very early. Given that a decision to invest in preparing a submission occurs 6–10 months before a conference, we believe ensuring their timely integration into the overall conference organisation (e.g. budget decisions, dissemination of information) was key to their success. These views are reinforced by our experience attending conferences (the author team includes authors originally from the global south and with children) and from conversations with colleagues (one author was asked about the possibility of daycare at the 2024 conference during the closing ceremony of the 2023 conference, while another author

was told by a 2024 recipient of childcare that they decided to submit a paper only because of the guaranteed childcare).

- While several conferences offer scholarships, many require applicants to submit a statement describing their need and merit. In our preparation, we sought to avoid these increased cognitive and emotional barriers by using a short objective process based on the three criteria (career stage, country of the institution, and submission to the current conference). This reduced our workload while improving transparency of the decision making and enabling rapid confirmation for applicants. With reflection, we realised that the country of the institution overlooks some major barriers, and it may be relevant to also consider the country of citizenship.

- We found that the use of generic letters to support visa applications were not sufficient for people applying at consulates in the global south and several people had their visa requests rejected. This meant several participants were reapplying for visas in the weeks immediately after the conference acceptances were communicated, needing extensive help and personalised letters.

- We started by gathering data to identify the needs within the community through survey 1. In hindsight, we notice that some of the survey questions did not work as we had intended and that providing many options for the demographic items led to an intractable number of categories. This led us to adapt the questions for survey 2. While we did not get everything right the first time, we accept that this is an ongoing and continuous process; and as the community continues to evolve, so will the survey questions.

- Our data shows we were successful in making people aware of the variety of new inclusion activities at SEFI2024, and private communications showed that people saw a coherent inclusion narrative even when their personal pain points were not addressed. This would not have been possible without the integrated approach to conference organisation, which allowed for an active coalition of people including SEFI leadership, local organisers, the DEI SIG, and local vendors. These collaborations amplified inclusion efforts via a simplified submission process designed to produce more constructive and actionable feedback from reviewers, technological support, menu options, and carbon concerns including sustainable options for food, transport, and lodging. Having this broad support was a significant amplifier, and helpful to reduce the potential impact from a couple people who found the inclusion efforts excessive or irrelevant.

7.2 Recommendations for organising international conferences to support inclusion

Based on our experiences and our data, we present some recommendations.
Local organisers of an individual conference event:

- Planning DEI initiatives should start early, and the local organising team should seek to involve different partners, including the central/parent organisational leadership (e.g., SEFI board and administrative staff) and past conference hosts. Starting early will also ensure that these initiatives are appropriately reflected in the budget for the conference.

- Ensure that information regarding initiatives such as scholarships and childcare is communicated in advance (at the latest, as part of the call for submissions). This helps to ensure that limited resources do not act as a barrier to submission. Additionally, confirming to beneficiaries that they have secured the service (e.g. daycare) must occur early enough to access early registration rates. Wellness activities and multilingual subtitling offers can be announced closer to the conference date, ensuring participants have the relevant information as and when they need it without being overwhelmed.

- Visa letters provided by local organising teams should emphasise the capacity of the attendee to contribute to the conference (e.g., we are delighted to welcome you … .) and be tailored to the person (e.g., to present your talk titled … .). Bilingual letters are recommended in cases where the conference language and the official language of the host country are different. Organisers could

also consider whether it would be beneficial to inform the host country immigration authority about the conference, with the aim of reducing the potential for issues to occur later.

- Implement multiple initiatives targeting multiple barriers. Anticipate that several initiatives working in tandem will lower several additional barriers and therefore further increase inclusion.

    Central/parent organisational leadership:

- *Encourage sustainability through centralised support.* The uptake for diversity and inclusion initiatives keeps increasing as they become well-established and expected (Ogden 2024). However, the local host typically changes, this posing risks to the continuity of initiatives. Sustainability and consistency across editions of the conference should thus be facilitated by the organisation with whom the conference is associated (i.e. SEFI). This consistency could be enhanced by making the expectations related to required inclusion initiatives more explicit in the conference handbook. Additionally, the organisation should facilitate knowledge transfer from previous to current hosts.

- *Monitor the diverse needs of a changing community, consider multiple perspectives, take inspiration from other academic communities, pilot new initiatives, and fine-tune existing initiatives based on feedback.* Such feedback should be obtained by collection of systematic longitudinal data to ensure continued understanding of community demographics and associated challenges, to tailor initiatives to meet the evolving needs, and to determine the impact of initiatives on the conference climate.

- *Develop and enact policies which require potential conference hosts to demonstrate their understanding of historic initiatives, as well as their commitment to future inclusive conferences.* Policies could also be enacted through strategic decision making. For example, organisations may choose to support co-hosting of conferences between smaller universities located in affordable locations, and larger universities that have resources and organisational experience. Such initiatives would simultaneously enhance institutional capacities and lower barriers to participation, including cost. As issues of financial cost and environmental impact are posed to increase significantly, measures to address these should be a high priority.

- *Implement policies that visibly and practically support and champion diversity, equity and inclusion at an organisational level.* This may include the organisational leadership endorsing and giving visibility to initiatives, supporting initiatives with financial and material resources, and the development of a code of conduct with explicit expectations and consequences.

- *Identify metrics to measure progress and set targets depending on the context of your organisation and initial benchmarking with respect to identified needs.* Relevant metrics may include the number of people who are aware of or have benefited from a specific initiative (such as those reported in Table 1), the range of initiatives included during an event, the diversity of participants that benefited from the various initiatives, and surveys addressing topics similar to those reported here about participants' awareness of inclusion, sense of belonging and barriers to participation. Additional metrics could include the percentage of participants who are aware of the organisational policies and procedures such as the code of conduct and mechanisms for reporting violations.

7.3 Parting thoughts

Organising initiatives to support inclusion involved both a small core group and support from across SEFI and EPFL. As these initiatives were new for SEFI2024, the structures and strategies that would facilitate implementations were not initially apparent and had not been previously tested. But we were ambitious, set goals, found collaborators, and built coalitions with willing partners in various roles. When we encountered colleagues who had not previously considered barriers at conferences, our conversations helped build awareness, and finding solutions in collaboration contributed to building an inclusive community. We gratefully acknowledge the support, creativity, and encouragement that we received in implementing these initiatives from colleagues across SEFI and EPFL.

An inclusive academic environment benefits everyone. Reduced barriers support a richer, more diverse range of voices and perspectives, enhancing the overall quality and depth of academic discussions. A lack of diversity in conference participants, and subsequently a narrow scope of published work, has implications for the global and culturally inclusive nature of EER. Mitigating barriers can pave the way for more global and diverse collaborations that arise during the conference, which subsequently could promote further interdisciplinary and cross-cultural research endeavours. Dismantling inequality regimes requires moving beyond merely increasing diversity toward actively cultivating inclusive environments. It is no longer sufficient to focus solely on diversity metrics; instead, we must deliberately enact and embody the values our organisations espouse. Transforming academic conferences, like SEFI, is a way to ensure that our values are in our actions.

Note

1. For more information of SEFI SIGs please visit: https://www.sefi.be/activities/special-interest-groups/

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Joelyn de Lima: Conceptualisation, Methodology, Formal analysis, Investigation, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualisation, Supervision, Project administration; **Siara Isaac:** Conceptualisation, Methodology, Formal analysis, Investigation, Data Curation, Writing – Original Draft, Writing – Review & Editing; **Natalie Wint:** Conceptualisation, Methodology, Writing – Original Draft, Writing – Review & Editing; **Inês Direito**: Writing – Original Draft, Writing – Review & Editing.

Disclosure statement

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References

Abbott, A. 2020. "Low-carbon, Virtual Science Conference Tries to Recreate Social Buzz." *Nature* 577 (7788): 13–13. https://doi.org/10.1038/d41586-019-03899-1.

Abernethy, E. F., I. Arismendi, A. G. Boegehold, C. Colón-Gaud, M. R. Cover, E. I. Larson, E. K. Moody, et al. 2020. "Diverse, Equitable, and Inclusive Scientific Societies: Progress and Opportunities in the Society for Freshwater Science." *Freshwater Science* 39 (3): 363–376. https://doi.org/10.1086/709129.

Achten, W. M. J., J. Almeida, and B. Muys. 2013. "Carbon Footprint of Science: More than Flying." *Ecological Indicators* 34:352–355. https://doi.org/10.1016/j.ecolind.2013.05.025.

Acker, J. 1990. "Hierarchies, Jobs, Bodies: A Theory of Gendered Organizations." *Gender & Society* 4 (2): 139–158. https://doi.org/10.1177/089124390004002002.

Acker, J. 2006. "Inequality Regimes: Gender, Class, and Race in Organizations." *Gender & Society* 20 (4): 441–464. https://doi.org/10.1177/0891243206289499.

Acker, J. 2012. "Gendered Organizations and Intersectionality: Problems and Possibilities." *Equality, Diversity and Inclusion: An International Journal* 31 (3): 214–224. https://doi.org/10.1108/02610151211209072.

Adams, J. S., A. Tashchian, and T. H. Shore. 2001. "Codes of Ethics as Signals for Ethical Behavior." *Journal of Business Ethics* 29 (3): 199–211. https://doi.org/10.1023/A:1026576421399.

AlShebli, B. K., T. Rahwan, and W. L. Woon. 2018. "The Preeminence of Ethnic Diversity in Scientific Collaboration." *Nature Communications* 9 (1): 5163. https://doi.org/10.1038/s41467-018-07634-8.

Amano, T., J. P. González-Varo, and W. J. Sutherland. 2016. "Languages Are Still a Major Barrier to Global Science." *PLOS Biology* 14 (12): e2000933. https://doi.org/10.1371/journal.pbio.2000933.

Amano, T., V. Ramírez-Castañeda, V. Berdejo-Espinola, I. Borokini, S. Chowdhury, M. Golivets, J. D. González-Trujillo, et al. 2023. "The Manifold Costs of Being a non-native English Speaker in Science." *PLOS Biology* 21 (7): e3002184. https://doi.org/10.1371/journal.pbio.3002184.

American Society for Engineering Education [ASEE]. 2009. *Creating a Culture for Scholarly and Systematic Innovation in Engineering Education: Ensuring U.S. Engineering has the Right People with the Right Talent for a Global Society*. American Society for Engineering Education [ASEE]. https://www.asee.org/publications/ASEE-Publications/ASEE-Reports/CCSSIE.

American Society for Engineering Education [ASEE]. 2012. *Innovation with Impact: Creating a Culture for Scholarly and Systematic Innovation in Engineering Education*. American Society for Engineering Education [ASEE]. https://www.asee.org/publications/asee-publications/asee-reports/innovation-with-impact.

American Society for Engineering Education [ASEE], & European Society for Engineering Education [SEFI]. 2020. *ASEE & SEFI Joint Statement on Diversity, Equity, and Inclusion*. https://www.sefi.be/publication/asee-sefi-joint-statement-on-diversity-equity-and-inclusion/.

Aracri, S., J. Hughes, C. Della Santina, J. Jovanova, S. Hoh, D. S. Garcia Morales, R. Barcaro, et al. 2024. "Soft Robotics: A Route to Equality, Diversity, and Inclusivity in Robotics." *Soft Robotics* 11 (6): 903–910. https://doi.org/10.1089/soro.2023.0225.

Arcila Hernández, L., N. Chodkowski, and K. Treibergs. 2022. "A Guide to Implementing Inclusive and Accessible Virtual Poster Sessions." *Journal of Microbiology & Biology Education* 23 (1): e00237–21. https://doi.org/10.1128/jmbe.00237-21.

Arend, M.-E., and S. R. Bruijns. 2019. "Disparity in Conference Registration Cost for Delegates from low- and Middle-Income Backgrounds." *African Journal of Emergency Medicine* 9 (3): 156–161. https://doi.org/10.1016/j.afjem.2019.01.016.

Bano, M., and D. Zowghi. 2019. "Gender Disparity in the Governance of Software Engineering Conferences." *2019 IEEE/ACM 2nd International Workshop on Gender Equality in Software Engineering (GE)*: 21–24. https://doi.org/10.1109/GE.2019.00016.

Barreto, J. R., I. Romitelli, P. C. Santana, A. P. A. Assis, R. Pardini, M. Leite, and S. de. 2024. *Is the Audience Gender-Blind? Smaller Attendance in Female Talks Highlights Imbalanced Visibility in Academia.* https://ecoevorxiv.org/repository/view/7175/.

Barrows, A. S., M. A. Sukhai, and I. R. Coe. 2021. "So, You Want to Host an Inclusive and Accessible Conference?" *FACETS* 6:131–138. https://doi.org/10.1139/facets-2020-0017.

Beddoes, K. D. 2012. "Feminist Scholarship in Engineering Education: Challenges and Tensions." *Engineering Studies* 4 (3): 205–232. https://doi.org/10.1080/19378629.2012.693932.

Benson, L., K. Edström, K. Jensen, G. Lichtenstein, R. Bates, C. Finelli, and E. Ko. 2022. "Equity and Inclusion in Peer Reviewing: Grand Challenges for Engineering Education Researchers." *2022 IEEE Frontiers in Education Conference (FIE)*: 1–2. https://doi.org/10.1109/FIE56618.2022.9962423.

Biggs, J., P. H. Hawley, and M. Biernat. 2018. "The Academic Conference as a Chilly Climate for Women: Effects of Gender Representation on Experiences of Sexism, Coping Responses, and Career Intentions." *Sex Roles* 78 (5): 394–408. https://doi.org/10.1007/s11199-017-0800-9.

Blackman, R. C., A. Bruder, F. J. Burdon, P. Convey, W. C. Funk, S. C. Jähnig, M. A. Kishe, et al. 2020. "A Meeting Framework for Inclusive and Sustainable Science." *Nature Ecology & Evolution* 4 (5): 668–671. https://doi.org/10.1038/s41559-020-1190-x.

Borrego, M., and R. A. Streveler. 2014. "Preparing Engineering Educators for Engineering Education Research." In A. Johri & B. M. Olds (Eds.), *Cambridge Handbook of Engineering Education Research*. Cambridge University Press. https://www.cambridge.org/universitypress/subjects/engineering/engineering-general-interest/cambridge-handbook-engineering-education-research

Bos, A. L., J. Sweet-Cushman, and M. C. Schneider. 2019. "Family-Friendly Academic Conferences: A Missing Link to fix the "Leaky Pipeline"?" *Politics, Groups, and Identities* 7 (3): 748–758. https://doi.org/10.1080/21565503.2017.1403936.

Calisi, R. M. & a Working Group of Mothers in Science. (2018). How to Tackle the Childcare–Conference Conundrum. *Proceedings of the National Academy of Sciences*, 115(12), 2845–2849. https://doi.org/10.1073/pnas.1803153115

Callus, A.-M. 2017. "Making Disability Conferences More Actively Inclusive." *Disability & Society* 32 (10): 1661–1665. https://doi.org/10.1080/09687599.2017.1356059.

Campbell, L. G., S. Mehtani, M. E. Dozier, and J. Rinehart. 2013. "Gender-Heterogeneous Working Groups Produce Higher Quality Science." *PLoS One* 8 (10): e79147. https://doi.org/10.1371/journal.pone.0079147.

Campos, R., F. Leon, and B. McQuillin. 2018. "Lost in the Storm: The Academic Collaborations That Went Missing in Hurricane Issac." *The Economic Journal* 128 (610): 995–1018. https://doi.org/10.1111/ecoj.12566.

Canfield, K. N., A. R. Sterling, C. M. Hernández, S. N. Chu, B. R. Edwards, D. N. Fontaine, J. M. Freese, et al. 2023. "Building an Inclusive Wave in Marine Science: Sense of Belonging and Society for Women in Marine Science Symposia." *Progress in Oceanography* 218:103110. https://doi.org/10.1016/j.pocean.2023.103110.

Carter, A. J., A. Croft, D. Lukas, and G. M. Sandstrom. 2018. "Women's Visibility in Academic Seminars: Women ask Fewer Questions than men." *PLoS One* 13 (9): e0202743. https://doi.org/10.1371/journal.pone.0202743.

Casad, B. J., A. L. Chang, and C. M. Pribbenow. 2016. "The Benefits of Attending the Annual Biomedical Research Conference for Minority Students (ABRCMS): The Role of Research Confidence." *CBE—Life Sciences Education* 15 (3): ar46. https://doi.org/10.1187/cbe.16-01-0048.

Casadevall, A. 2015. "Achieving Speaker Gender Equity at the American Society for Microbiology General Meeting." *mBio* 6 (4): e01146–15. https://doi.org/10.1128/mbio.01146-15.

Chance, S., I. Direito, and P. Pale. 2023, March 20. *SEFI 2023 Birds of a (Different) Feather – SEFI.* https://www.sefi.Be/2023/03/20/sefi-2023-birds-of-a-different-feather/.

Cheeke, T. E., S. Branco, D. Haelewaters, D. O. Natvig, M. Maltz, S. Cantrell-Rodriguez, M. Cafaro, and G. May. 2018. "Diversity in the Mycological Society of America." *Inoculum*: 1–10. https://msafungi.org/wp-content/uploads/2019/04/inoculum-march-2018-Diversity-in-the-Mycological-Society-of-America.pdf.

Chen, R. S., T. Rizvi, A. L. Berthelsen, A. J. Paijmans, A. L. Maune, B. A. Caspers, B. Sepers, et al. 2025. "How Can We Make Scientific Events More Inclusive? Insights from Q&A Sessions and Surveys from an International Conference." *Ecology and Evolution* 15 (7): e71588. https://doi.org/10.1002/ece3.71588.

Chugh, M., and T. Joseph. 2024. "Citizenship Privilege Harms Science." *Nature* 628 (8008): 499–501. https://doi.org/10.1038/d41586-024-01080-x.

Clancy, K. B. H., K. M. N. Lee, E. M. Rodgers, and C. Richey. 2017. "Double Jeopardy in Astronomy and Planetary Science: Women of Color Face Greater Risks of Gendered and Racial Harassment." *Journal of Geophysical Research: Planets* 122 (7): 1610–1623. https://doi.org/10.1002/2017JE005256.

Coroama, V. C., L. M. Hilty, and M. Birtel. 2012. "Effects of Internet-Based Multiple-Site Conferences on Greenhouse gas Emissions." *Telematics and Informatics* 29 (4): 362–374. https://doi.org/10.1016/j.tele.2011.11.006.

Crenshaw, K. 1991. "Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color." *Stanford Law Review* 43 (6): 1241–1299. https://doi.org/10.2307/1229039.

Cretchley, P. C., S. L. Edwards, P. O'Shea, J. Sheard, J. Hurst, and W. Brookes. 2014. "Research and/or Learning and Teaching: A Study of Australian Professors' Priorities, Beliefs and Behaviours." *Higher Education Research & Development* 33 (4): 649–669. https://doi.org/10.1080/07294360.2013.863836.

Custer, S. 2019, May 21. *Twitter responses show sexual harassment is rife at academic conferences*. The Times Higher Education. https://www.timeshighereducation.com/blog/twitter-responses-show-sexual-harassment-rife-academic-conferences.

Débarre, F., N. O. Rode, and L. V. Ugelvig. 2018. "Gender Equity at Scientific Events." *Evolution Letters* 2 (3): 148–158. https://doi.org/10.1002/evl3.49.

de Leon, F. L. L., and B. McQuillin. 2020. "The Role of Conferences on the Pathway to Academic Impact." *Journal of Human Resources* 55 (1): 164–193. https://doi.org/10.3368/jhr.55.1.1116-8387R.

de Lima, J., S. Isaac, N. Wint, F. Truscott, and T. Kilamo. 2024. Enacting Our Values – Steps Towards a More Sustainable and Inclusive SEFI Community. *Proceedings of the 52nd Annual Conference of SEFI*. 52nd SEFI Annual Conference, Lausanne, Switzerland. https://doi.org/10.5281/zenodo.14260979

Díaz-García, C., A. González-Moreno, and F. Jose Sáez-Martínez. 2013. "Gender Diversity within R&D Teams: Its Impact on Radicalness of Innovation." *Innovation* 15 (2): 149–160. https://doi.org/10.5172/impp.2013.15.2.149.

Douglas, H. M., I. H. Settles, K. Spence Cheruvelil, G. M. Montgomery, K. C. Elliott, E. A. Cech, T. M. Davis, G. Ma, A. K. Hawkins, and L. R. Nadolsky. 2025. "The Importance of Inclusive Climate within the Research Group, Department, and Profession for Marginalized Science Scholars' Career Outcomes." *Journal of Diversity in Higher Education* 18 (Suppl 1): S559–S572. https://doi.org/10.1037/dhe0000589.

Dutta, I., M. Bishop, J. C. Rayner, T. Creavin, S. Ahmed, H. Clissold, T. Cornish, et al. 2024. "Exploring the Experiences of Minoritised Groups at Life Sciences Conferences in the UK: New Perspectives and Actions to Improve Inclusivity in the Sector." *Wellcome Open Research* 9:166. https://doi.org/10.12688/wellcomeopenres.20868.3.

Eastman, M. G., M. L. Miles, and R. Yerrick. 2019. "Exploring the White and Male Culture: Investigating Individual Perspectives of Equity and Privilege in Engineering Education." *Journal of Engineering Education* 108 (4): 459–480. https://doi.org/10.1002/jee.20290.

Edström, K., A. Kolmos, L. Malmi, J. Bernhard, and P. Andersson. 2018. "A Bottom-up Strategy for Establishment of EER in Three Nordic Countries – the Role of Networks." *European Journal of Engineering Education* 43 (2): 219–234. https://doi.org/10.1080/03043797.2016.1190956.

Egri, C. P. 1992. "Academic Conferences as Ceremonials: Opportunities for Organizational Integration and Socialization." *Journal of Management Education* 16 (1): 90–115. https://doi.org/10.1177/105256299201600107.

Else, H. 2019. "How to Banish Manels and Manferences from Scientific Meetings." *Nature* 573 (7773): 184–186. https://doi.org/10.1038/d41586-019-02658-6.

Equal Opportunity Office, EPFL. 2021. *Equal Opportunity & Diversity Action Plan*. EPFL. https://www.epfl.ch/about/equality/actionplan/.

European Society for Engineering Education [SEFI]. 2018. *SEFI Position Paper on Diversity, Equality and Inclusiveness in Engineering Education*. European Society for Engineering Education [SEFI]. https://www.sefi.be/publication/sefi-position-paper-on-diversity-equality-and-inclusiveness-in-engineering-education/.

European Society for Engineering Education [SEFI]. 2024. *SEFI Values*. https://www.sefi.be/about/what/.

Favaro, B., S. Oester, J. A. Cigliano, L. A. Cornick, E. J. Hind, E. C. M. Parsons, and T. J. Woodbury. 2016. "Your Science Conference Should Have a Code of Conduct." *Frontiers in Marine Science* 3: Article 103. https://doi.org/10.3389/fmars.2016.00103.

Ford, J., and N. Harding. 2010. "Get Back into That Kitchen, Woman: Management Conferences and the Making of the Female Professional Worker." *Gender, Work & Organization* 17 (5): 503–520. https://doi.org/10.1111/j.1468-0432.2009.00476.x.

Foxx, A. J., R. S. Barak, T. M. Lichtenberger, L. K. Richardson, A. J. Rodgers, and E. Webb Williams. 2019. "Evaluating the Prevalence and Quality of Conference Codes of Conduct." *Proceedings of the National Academy of Sciences* 116 (30): 14931–14936. https://doi.org/10.1073/pnas.1819409116.

Gardner, A., and K. Willey. 2013, December 1. *The Response of Emerging Engineering Education Researchers to Peer Review of Conference Papers*. Research in Engineering Education Symposium, REES 2013. https://opus.lib.uts.edu.au/handle/10453/27600.

Gardner, A., and K. Willey. 2018. "Academic Identity Reconstruction: The Transition of Engineering Academics to Engineering Education Researchers." *Studies in Higher Education* 43 (2): 234–250. https://doi.org/10.1080/03075079.2016.1162779.

Garriott, P. O., A. Carrero Pinedo, H. K. Hunt, R. L. Navarro, L. Y. Flores, C. D. Desjarlais, D. Diaz, et al. 2023. "How Latiné Engineering Students Resist White Male Engineering Culture: A Multi-Institution Analysis of Academic Engagement." *Journal of Engineering Education* 112 (3): 695–718. https://doi.org/10.1002/jee.20536.

Gernsbacher, M. A. 2015. "Video Captions Benefit Everyone." *Policy Insights from the Behavioral and Brain Sciences* 2 (1): 195–202. https://doi.org/10.1177/2372732215602130.

Godfrey, E., and R. Hadgraft. 2009. "Engineering Education Research: Coming of age in Australia and New Zealand." *Journal of Engineering Education* 98 (4): 307–308. https://doi.org/10.1002/j.2168-9830.2009.tb01028.x.

Goring, S. J., K. S. Whitney, and A. L. Jacob. 2018. "Accessibility Is Imperative for Inclusion." *Frontiers in Ecology and the Environment* 16 (2): 63–63. https://doi.org/10.1002/fee.1771.

Gould, J. 2018. "How Conferences Are Getting Better at Accommodating Child-Caring Scientists." *Nature* 564 (7736): S88–S89. https://doi.org/10.1038/d41586-018-07782-3.

Graesser, L., A. Faust, H. Kress-Gazit, L. Tapia, and R. Ulinski. 2021. "Gender Diversity of Conference Leadership [Women in Engineering]." *IEEE Robotics & Automation Magazine* 28 (2): 126–130. https://doi.org/10.1109/MRA.2021.3071897.

Greco, L. M., E. H. O'Boyle, and S. L. Walter. 2015. "Absence of Malice: A Meta-analysis of Nonresponse Bias in Counterproductive Work Behavior Research." *Journal of Applied Psychology* 100 (1): 75–97. https://doi.org/10.1037/a0037495.

Harris, P. A., R. Taylor, B. L. Minor, V. Elliott, M. Fernandez, L. O'Neal, L. McLeod, et al. 2019. "The REDCap Consortium: Building an International Community of Software Platform Partners." *Journal of Biomedical Informatics* 95:103208. https://doi.org/10.1016/j.jbi.2019.103208.

Harris, P. A., R. Taylor, R. Thielke, J. Payne, N. Gonzalez, and J. G. Conde. 2009. "Research Electronic Data Capture (REDCap)—A Metadata-Driven Methodology and Workflow Process for Providing Translational Research Informatics Support." *Journal of Biomedical Informatics* 42 (2): 377–381. https://doi.org/10.1016/j.jbi.2008.08.010.

Hauss, K. 2021. "What Are the Social and Scientific Benefits of Participating at Academic Conferences? Insights from a Survey among Doctoral Students and Postdocs in Germany." *Research Evaluation* 30 (1): 1–12. https://doi.org/10.1093/reseval/rvaa018.

Heaton, B., D. Streszoff, C. H. Fox, E. A. Kaye, C. M. Gebel, L. M. Quintiliani, and R. I. Garcia. 2020. "Survey of Dental Researchers' Perceptions of Sexual Harassment at AADR Conferences: 2015 to 2018." *Journal of Dental Research* 99 (5): 488–497. https://doi.org/10.1177/0022034520908504.

Hinsley, A., W. J. Sutherland, and A. Johnston. 2017. "Men ask More Questions than Women at a Scientific Conference." *PLoS One* 12 (10): e0185534. https://doi.org/10.1371/journal.pone.0185534.

Hong, L., and S. E. Page. 2004. "Groups of Diverse Problem Solvers Can Outperform Groups of High-Ability Problem Solvers." *Proceedings of the National Academy of Sciences* 101 (46): 16385–16389. https://doi.org/10.1073/pnas.0403723101.

Ipsos. 2024, December 13. *Pride Month 2023: 9% of Adults Identify as LGBT+ Ipsos*. https://www.ipsos.com/en-ch/pride-month-2023-9-of-adults-identify-as-lgbt.

Isbell, L. A., T. P. Young, and A. H. Harcourt. 2012. "Stag Parties Linger: Continued Gender Bias in a Female-Rich Scientific Discipline." *PLoS One* 7 (11): e49682. https://doi.org/10.1371/journal.pone.0049682.

Jackson, S. E., and A. Joshi. 2011. "Work Team Diversity." In *APA Handbook of Industrial and Organizational Psychology, Vol 1. Building and Developing the Organization*, edited by S. Zedeck, 651–686. American Psychological Association. https://doi.org/10.1037/12169-020

Jesiek, B. K., L. K. Newswander, and M. Borrego. 2009. "Engineering Education Research: Discipline, Community, or Field?" *Journal of Engineering Education* 98 (1): 39–52. https://doi.org/10.1002/j.2168-9830.2009.tb01004.x.

Joo, R., A. Sánchez-Tapia, S. Mortara, Y. B. Saibene, H. Turner, D. H. Peter, N. S. Morandeira, et al. 2022. "Ten Simple Rules to Host an Inclusive Conference." *PLOS Computational Biology* 18 (7): e1010164. https://doi.org/10.1371/journal.pcbi.1010164.

King, L., L. MacKenzie, M. Tadaki, S. Cannon, K. McFarlane, D. Reid, and M. Koppes. 2018. "Diversity in Geoscience: Participation, Behaviour, and the Division of Scientific Labour at a Canadian Geoscience Conference." *FACETS* 3 (1): 415–440. https://doi.org/10.1139/facets-2017-0111.

Langin, K. (2018, December 13). "Are Conferences Providing Enough Child Care Support? We Decided to Find Out." *Science*, https://doi.org/10.1126/science.caredit.aaw3741.

Larson, A. R., K. M. Sharkey, J. A. Poorman, C. K. Kan, S. M. Moeschler, R. Chandrabose, C. M. Marquez, D. G. Dodge, J. K. Silver, and R. M. Nazarian. 2020. "Representation of Women among Invited Speakers at Medical Specialty Conferences." *Journal of Women's Health* 29 (4): 550–560. https://doi.org/10.1089/jwh.2019.7723.

Levitis, E., C. D. G. van Praag, R. Gau, S. Heunis, E. DuPre, G. Kiar, K. L. Bottenhorn, et al. 2021. "Centering Inclusivity in the Design of Online Conferences—An OHBM–Open Science Perspective." *GigaScience* 10 (8): giab051. https://doi.org/10.1093/gigascience/giab051.

Major, J. C. 2020. "To Cross the Picket Line or Join It: Facing Engineering Education's Role in the Socioeconomic Exploitation of Marginalized Peoples to Further a Discipline." *Journal of Engineering Education* 109 (2): 164–169. https://doi.org/10.1002/jee.20313.

Martin, J. L. 2014. "Ten Simple Rules to Achieve Conference Speaker Gender Balance." *PLOS Computational Biology* 10 (11): e1003903. https://doi.org/10.1371/journal.pcbi.1003903.

Martin, D. A., A. Gwynne-Evans, A. A. Kazakova, and Q. Zhu. 2023. "Developing a Global and Culturally Inclusive Vision of Engineering Ethics Education and Research." In *International Handbook of Engineering Education Research*, edited by A. Johri, 87–114. New York, NY: Routledge. https://doi.org/10.4324/9781003287483-6

National Academies of Sciences, Engineering, and Medicine [NASEM]. 2018. "Changing the Culture and Climate in Higher Education." In *Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine*, 121–168. Washington, DC: The National Academies Press. https://doi.org/10.17226/24994.

National Center for Science and Engineering Statistics [NCSES]. 2021. *Women, Minorities, and Persons with Disabilities in Science and Engineering:* 2021 (No. NSF 21-321). Article NSF 21-321. https://ncses.nsf.gov/pubs/nsf21321/.

Nielsen, M. W., S. Alegria, L. Börjeson, H. Etzkowitz, H. J. Falk-Krzesinski, A. Joshi, E. Leahey, L. Smith-Doerr, A. W. Woolley, and L. Schiebinger. 2017. "Gender Diversity Leads to Better Science." *Proceedings of the National Academy of Sciences* 114 (8): 1740–1742. https://doi.org/10.1073/pnas.1700616114.

Niner, H. J., and S. N. Wassermann. 2021. "Better for Whom? Leveling the Injustices of International Conferences by Moving Online." *Frontiers in Marine Science* 8: Article 638025. https://doi.org/10.3389/fmars.2021.638025.

NumFOCUS Diversity & Inclusion in Scientific Computing (DISC) Program [NumFOCUS DISC]. 2022. *NumFOCUS DISCOVER Diversity and Inclusion Cookbook*. https://discover-cookbook.numfocus.org.

Oester, S., J. A. Cigliano, E. J. Hind-Ozan, and E. C. M. Parsons. 2017. "Why Conferences Matter—An Illustration from the International Marine Conservation Congress." *Frontiers in Marine Science* 4. https://doi.org/10.3389/fmars.2017.00257.

Ogden, L. E. 2024, January 3. *Conference childcare for scientists is starting to show signs of improvement*. University Affairs. https://universityaffairs.ca/features/conference-childcare-for-scientists-is-starting-to-show-signs-of-improvement/.

Olds, B. M., M. Borrego, M. Besterfield-Sacre, and M. Cox. 2012. "Continuing the Dialog: Possibilities for Community Action Research in Engineering Education." *Journal of Engineering Education* 101 (3): 407–411. https://doi.org/10.1002/j.2168-9830.2012.tb00055.x.

Oliver, C., and A. Morris. 2020. "(dis-)Belonging Bodies: Negotiating Outsider-ness at Academic Conferences." *Gender, Place & Culture* 27 (6): 765–787. https://doi.org/10.1080/0966369X.2019.1609913.

O'Meara, B., A. Case, J. Wiggins, K. Zamudio, R. Baucom, and S. Strauss. 2019. *Unwelcome Behaviors at the Evolution Meetings: Survey Results*. https://doi.org/10.6084/m9.figshare.8311595.v2

Page, S. 2008. *The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies*. Oxford: Princeton University Press. https://doi.org/10.1515/9781400830282

Penaluna, B. E., I. Arismendi, C. M. Moffitt, and Z. L. Penney. 2017. "Nine Proposed Action Areas to Enhance Diversity and Inclusion in the American Fisheries Society." *Fisheries* 42 (8): 399–402. https://doi.org/10.1080/03632415.2017.1345549.

Pless, N., and T. Maak. 2004. "Building an Inclusive Diversity Culture: Principles, Processes and Practice." *Journal of Business Ethics* 54 (2): 129–147. https://doi.org/10.1007/s10551-004-9465-8.

Potvin, D. A., E. Burdfield-Steel, J. M. Potvin, and S. M. Heap. 2018. "Diversity Begets Diversity: A Global Perspective on Gender Equality in Scientific Society Leadership." *PLoS One* 13 (5): e0197280. https://doi.org/10.1371/journal.pone.0197280.

Puritty, C., L. R. Strickland, E. Alia, B. Blonder, E. Klein, M. T. Kohl, E. McGee, et al. 2017. "Without Inclusion, Diversity Initiatives May Not Be Enough." *Science* 357 (6356): 1101–1102. https://doi.org/10.1126/science.aai9054.

Ramírez-Castañeda, V. 2020. "Disadvantages in Preparing and Publishing Scientific Papers Caused by the Dominance of the English Language in Science: The Case of Colombian Researchers in Biological Sciences." *PLoS One* 15 (9): e0238372. https://doi.org/10.1371/journal.pone.0238372.

Recchi, E., E. Deutschmann, L. Gabrielli, and N. Kholmatova. 2021. "The Global Visa Cost Divide: How and why the Price for Travel Permits Varies Worldwide." *Political Geography* 86:102350. https://doi.org/10.1016/j.polgeo.2021.102350.

Reshef, O., I. Aharonovich, A. M. Armani, S. Gigan, R. Grange, M. A. Kats, and R. Sapienza. 2020. "How to Organize an Online Conference." *Nature Reviews Materials* 5 (4): 253–256. https://doi.org/10.1038/s41578-020-0194-0.

Rushworth, C. A., R. S. Baucom, B. K. Blackman, M. Neiman, M. E. Orive, A. Sethuraman, J. Ware, and D. R. Matute. 2021. "Who Are We Now? A Demographic Assessment of Three Evolution Societies." *Evolution* 75 (2): 208–218. https://doi.org/10.1111/evo.14168.

Sanz-Cobena, A., R. Alessandrini, B. L. Bodirsky, M. Springmann, E. Aguilera, B. Amon, F. Bartolini, et al. 2020. "Research Meetings Must Be More Sustainable." *Nature Food* 1 (4): 187–189. https://doi.org/10.1038/s43016-020-0065-2.

Sapiro, V., and D. Campbell. 2018. "Report on the 2017 APSA Survey on Sexual Harassment at AnnualMeetings." *PS: Political Science & Politics* 51 (1): 197–206. https://doi.org/10.1017/S1049096517002104.

Sarabipour, S., A. Khan, Y. F. S. Seah, A. D. Mwakilili, F. N. Mumoki, P. J. Sáez, B. Schwessinger, H. J. Debat, and T. Mestrovic. 2021. "Changing Scientific Meetings for the Better." *Nature Human Behaviour* 5 (3): 296–300. https://doi.org/10.1038/s41562-021-01067-y.

Sardelis, S., and J. A. Drew. 2016. "Not "Pulling up the Ladder": Women Who Organize Conference Symposia Provide Greater Opportunities for Women to Speak at Conservation Conferences." *PLoS One* 11 (7): e0160015. https://doi.org/10.1371/journal.pone.0160015.

Sardelis, S., S. Oester, and M. Liboiron. 2017. "Ten Strategies to Reduce Gender Inequality at Scientific Conferences." *Frontiers in Marine Science* 4: Article 231. https://doi.org/10.3389/fmars.2017.00231.

Schreier, M. 2014. "Qualitative Content Analysis." In *The SAGE Handbook of Qualitative Data Analysis*, edited by U. Flick, 170–183. SAGE Publications, Inc. https://doi.org/10.4135/9781446282243.n12

Schroeder, J., H. L. Dugdale, R. Radersma, M. Hinsch, D. M. Buehler, J. Saul, L. Porter, … N. P. C. Horrocks. 2013. "Fewer Invited Talks by Women in Evolutionary Biology Symposia." *Journal of Evolutionary Biology* 26 (9): 2063–2069. https://doi.org/10.1111/jeb.12198.

Secules, S., and C. Turpen. 2017. *The Construction of Competitive White Masculinity as Engineering Educational Culture*. Washington, DC: American Anthropological Association.

SEFI DEI SIG. 2023. *Diversity, Equity and Inclusion – SEFI*, European Society for Engineering Education. https://www.sefi.Be/activities/special-interest-groups/gender-and-diversity/.

Segarra, V. A., L. R. Vega, C. Primus, C. Etson, A. N. Guillory, A. Edwards, S. C. Flores, et al. 2020. "Scientific Societies Fostering Inclusive Scientific Environments through Travel Awards: Current Practices and Recommendations." *CBE—Life Sciences Education* 19 (2): es3. https://doi.org/10.1187/cbe.19-11-0262.

Serrato Marks, G. 2018, November 8. How to Make Professional Conferences More Accessible for Disabled People: Guidance from Actual Disabled Scientists. *The Equation*. https://blog.ucsusa.org/science-blogger/how-to-make-professional-conferences-more-accessible-for-disabled-people-guidance-from-actual-disabled-scientists/.

Serrato Marks, G., C. Solomon, and K. Stack Whitney. 2021. "Meeting Frameworks Must Be Even More Inclusive." *Nature Ecology & Evolution* 5:552. https://doi.org/10.1038/s41559-021-01437-9.

Shawcross, J. K., and T. W. Ridgman. 2013. *Publishing Engineering Education Research Advance HE*. The Higher Education Academy. https://www.advance-he.ac.uk/knowledge-hub/publishing-engineering-education-research.

Shishkova, E., N. W. Kwiecien, A. S. Hebert, M. S. Westphall, J. E. Prenni, and J. J. Coon. 2017. "Gender Diversity in a STEM Subfield – Analysis of a Large Scientific Society and Its Annual Conferences." *Journal of the American Society for Mass Spectrometry* 28 (12): 2523–2531. https://doi.org/10.1007/s13361-017-1803-z.

Solomon, C. 2021. "An Often Overlooked Element of Diversity: Disability." *Limnology and Oceanography Bulletin* 30 (1): 20–21. https://doi.org/10.1002/lob.10425.

Tulloch, A. I. T. 2020. "Improving sex and Gender Identity Equity and Inclusion at Conservation and Ecology Conferences." *Nature Ecology & Evolution* 4 (10): 1311–1320. https://doi.org/10.1038/s41559-020-1255-x.

Velin, L., J.-W. Lartigue, S. A. Johnson, A. Zorigtbaatar, U. S. Kanmounye, P. Truche, and M. N. Joseph. 2021. "Conference Equity in Global Health: A Systematic Review of Factors Impacting LMIC Representation at Global Health Conferences." *BMJ Global Health* 6 (1): e003455. https://doi.org/10.1136/bmjgh-2020-003455.

VERBI Software. 2020. *MAXQDA 2020 [computer software]* [Computer software]. VERBI Software. maxqda.com.

Walters, T. 2018. "Gender Equality in Academic Tourism, Hospitality, Leisure and Events Conferences." *Journal of Policy Research in Tourism, Leisure and Events* 10 (1): 17–32. https://doi.org/10.1080/19407963.2018.1403165.

Walters, T., N. Hassanli, and W. Finkler. 2022. "The Role of Academic Conferences in the [re]Production of Gender Inequality in Business Disciplines: Not Just a STEM Problem." *International Journal of Event and Festival Management* 13 (1): 107–123. https://doi.org/10.1108/IJEFM-07-2021-0065.

Waruru, M. 2018. "African and Asian Researchers Are Hampered by Visa Problems." *Nature*, September 19, 2018. https://doi.org/10.1038/d41586-018-06750-1.

Wint, N., and A. Nyamapfene. 2023. "The Development of Engineering Education Research: A UK Based Case Study." *European Journal of Engineering Education* 48 (2): 197–220. https://doi.org/10.1080/03043797.2022.2121686.

Woodcock, K., M. J. Rohan, and L. Campbell. 2007. "Equitable Representation of Deaf People in Mainstream Academia: Why Not?" *Higher Education* 53 (3): 359–379. https://doi.org/10.1007/s10734-005-2428-x.