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Special Article

Assessing Representation and Perceived Inclusion Among Members of the Society for Epidemiologic Research

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Using Web-based survey data collected in June–August 2018 from members of the Society for Epidemiologic Research (SER), we characterized numerous dimensions of social identity and lived experience and assessed relationships between these characteristics and perceptions of inclusion and Society participation. We quantified associations between those characteristics and 3 outcomes: feeling very welcomed, high (top 25th percentile) self-initiated participation, and any (top 10th percentile) Society-initiated participation. Data for racial/ethnic and religious minority categories were blinded to preserve anonymity, and we accounted for missing data. In 2018, most SER members (n = 1,631) were White (62%) or female (66%). Females with racial/ethnic nonresponse were least likely to report feeling very welcomed, while White males were most likely. Members who did not report their race, identified with a specific racial/ethnic minority, or were politically conservative/right-leaning were less likely than White or liberal/left-leaning members to have high self-initiated participation. Women and persons of specific racial/ethnic minority or minority religious affiliations were less likely to participate in events initiated by the Society. These data represent a baseline for assessing trends and the impact of future initiatives aimed at improving diversity, inclusion, representation, and participation within SER.

continental population groups; cultural diversity; demography; ethnic groups; sex; social participation; societies

Abbreviations: CI, confidence interval; RR, relative risk; SER, Society for Epidemiologic Research.

Editor's note: *Invited commentaries on this article appear on pages 1011–1052, and the authors' response appears on page 1053.*

Diversity in science can result in measurable positive outcomes, like better research and innovation (1). Benefits of diverse scientific communities have been well documented and include increased productivity and innovation (2–5), generation of ideas from a wide variety of segments of the population (6), increased breadth of knowledge developed and studied (7), increased trust in science and scientific results (8), and ensuring that the next generation of scientists is able to address the varied and complex issues of our changing world (9). Increasing diversity is also a moral imperative to ensure more equitable footing within all fields of scientific discovery (10). Yet, the precise meaning of diversity in the scientific literature is not clear. While some definitions of diversity refer to it as a social force with the potential to change the structure and composition of society and social institutions (11), others refer to the variety in the attributes represented within a particular social group or structure on many axes, including but not limited to race, socioeconomic status, class, gender, sexual orientation, country of origin, ability, culture, politics, religion, etc. (12)—the latter of which we will utilize herein. Inclusion, a concept that

is related to and often made a goal alongside diversity, refers to the intentional engagement of all members of a particular group (13). Essential to achieving and sustaining diverse representation is creating a culture of inclusion and ensuring that resources and opportunities are equitably distributed. Systems that support access to opportunities for persons of some but not all identities result in inequities that perpetuate imbalances. Encouragement of diversity in the absence of inclusion may increase the variety of researchers in an organization without necessarily improving full or quality engagement among all people if some individuals do not feel included, welcomed, or valued (14).

Motivated to increase the representation of people from underrepresented identity groups and enhance scientific rigor, scientific researchers (15–19) and the professional societies that represent these disciplines (20–22) have enacted policies to promote diversity and inclusion. As the largest public funder of biomedical research in the world (23), the National Institutes of Health encourages funded institutions to "diversify their student and faculty populations to enhance the participation of individuals from groups identified as nationally underrepresented in the biomedical, clinical, behavioral and social sciences. These groups include: individuals from underrepresented racial and ethnic groups, individuals with disabilities, individuals from disadvantaged backgrounds, and women at senior faculty levels in biomedical-relevant disciplines" (24). Racial and ethnic categories for National Institutes of Health diversity programs and other reporting purposes include "American Indian or Alaska Native"*, "Asian," "Black or African American"*, "Hispanic or Latino"*, "Native Hawaiian or other Pacific Islander"*, and "White," whereby the asterisk (*) indicates a racial or ethnic minority group that is underrepresented in science in the United States (25).

As an example of the establishment of such a policy within a professional society, the Society for Epidemiologic Research (SER) has put forth a code of conduct for its activities, namely to uphold a "welcoming environment free from discrimination" (i.e., inclusion) with respect to an individual's "gender, sexual orientation, disability, race, ethnicity, religion, age, national origin, gender identity or expression, and veteran status" (26) (i.e., diversity). SER additionally created a standing Diversity and Inclusion Committee to increase diversity and inclusion within SER, such as the extent to which SER is diverse and inclusive based on early-life socioeconomic conditions, schools and institutions, and life experiences. However, the current state of diversity and inclusion within the Society has yet to be assessed.

Since the vast majority of existing literature on diversity and inclusion is limited to the dimensions of race and ethnicity (5, 7, 9, 11, 12, 19, 27–37) and/or gender (9, 12, 13, 27, 28, 30, 33, 38–48), we conducted a study aiming to characterize various dimensions of diversity among SER membership and quantify relationships of these characteristics with feeling welcomed and SER participation (inclusion). These data will establish a baseline for assessing longitudinal trends and the impact of future initiatives aimed at improving diversity and inclusion within SER, with the goal of improving discovery in public health.

METHODS

Available information in the SER member database consisted of data on an abbreviated set of demographic factors (including race, gender, and institutional affiliation) collected from SER members who had registered or renewed their membership for 2018 at the point of registration or renewal ($n = 1{,}631$).

We administered a small pilot survey of 9 SER members of diverse backgrounds to ensure that the survey questions we developed were clear and appropriate. These included 5 women and 4 men, 7 US states (California, Georgia, Maryland, Massachusetts, New York, Pennsylvania, and Rhode Island), 5 persons who were highly active in SER, 5 research portfolios focused on social determinants of health, 3 diverse countries of origin, 2 diverse racial/ethnic groups, 2 languages besides English, and 1 diverse sexual orientation. We incorporated feedback from these members into the survey, which was administered to all SER members. The cover letter inviting members to participate in the survey is provided in the Web Appendix (available at https://academic.oup.com/aje). We administered an anonymous Web-based survey without a response incentive to active SER members between June 2, 2018, and August 2, 2018, in order to collect detailed information on demographic characteristics, participation in SER activities, and perceptions of feeling welcomed within SER ($n = 631$).

Demographic data

The Web-based survey elicited demographic data that included age, duration of time since obtaining one's last advanced academic degree, duration of time in SER, gender, race, religion, sexual orientation, political affiliation, country of birth, country of residence, primary language spoken in the home, physical disabilities, public or private primary and secondary schooling, having obtained a doctoral degree, country of obtaining one's highest advanced degree, being the first generation to receive a bachelor's, master's, or doctoral degree in one's family, professional setting in academia, institutional representation in SER, having children in child care, number of dependents, and number of household full-time earners (Table 1). We dichotomized institutional representation as follows. We ranked institutions according to the number of SER members affiliated with them. The 8 institutions with the most members accounted for approximately 25% of SER membership. Members from these highly represented institutions were compared with members from institutions that had less representation in SER.

The above factors (Tables 1 and 2) were selected for inclusion as independent variables in regression analyses based on a priori hypothesized relationships (49, 50) with participation and feeling welcomed (51).

Extent of feeling welcomed

We operationalized inclusion through a survey question assessing the extent to which members felt welcomed at

Table 1. Race/Ethnicity, Gender, and Institutional Representativeness Among Members of the Society for Epidemiologic Research and Survey Respondents, June–August 2018

Measure	Member Database ($n = 1,631$)		Survey Respondents ($n = 631$)		Survey Response, %
	%[a]	No.	%[a]	No.	
Race/ethnicity					
Asian or South Asian	19.0	310	14.4	91	29
Black or African American	7.1	115	7.9	50	44
Hispanic	5.5	89	3.8	24	27
Multiracial[b]	1.5	24	9.2	58	242
White	61.7	1,007	57.8	365	36
Other race[b]	0.5	8	3.3	21	263
Missing data	4.8	78	3.5	22	28
Gender					
Female	65.7	1,071	69.3	437	41
Male	34.3	560	29.6	187	33
Other gender[b]	0.0	0	0.6	4	0
Missing data	0.0	0	0.5	3	0
Institutional representation					
Top 25%[c]	25.6	417	13.2	83	20
Bottom 75%	73.8	1,204	35.5	224	19
Missing data	0.6	10	51.4	324	

[a] Percentages may not sum to exactly 100.0% because of rounding to the tenths place.
[b] There were greater numbers of "multiracial," "other race," and "other gender" members who responded to the survey than were cited in the member database. This was probably the result of different response options for each data source, whereby the survey tended to include more, and more inclusive, options. While members could only select 1 option for race when signing up for membership, "multiracial" was a response option. In the survey, "multiracial" was not a response option, although members were instructed that multiple categories could be selected (24). "Other race" in the survey consisted of "American Indian or Alaska Native," "Pacific Islander," "Middle Eastern or North African," "other," and "some other race, ethnicity, or origin." However, since the latter 3 options were not available in the member database, "other race" in the member database consisted only of American Indian/Alaska Native and Pacific Islander, which were combined to preserve anonymity because of very small group strata. Similarly, the member database utilized only "female" and "male" options for gender, while "gender variant/nonconforming" was an additional response option in the survey.
[c] Johns Hopkins University, University of North Carolina, Harvard University, Columbia University, University of Iowa, Boston University, Emory University, and University of California, San Francisco.

SER-sponsored activities: "Thinking about your experience with SER, both at annual meetings and SER-sponsored activities outside of the annual meetings, what has been your perception of the extent to which you feel welcomed?". Response options were "very," "somewhat," "a little," and "not at all." Feeling "very" welcomed was examined in relation to a combined reference category of "not at all," "a little," and "somewhat."

Measures of participation

We additionally operationalized inclusion through measures of participation. Binary Society participation measures were summed to create indices of self-initiated and Society-initiated participation. The self-initiated participation index consisted ever having participated in the following 7 activities: submitting an abstract, submitting a symposium, volunteering and participating as a poster judge, volunteering for and reviewing abstracts, signing up for and attending an SERTalk, and signing up for and attending an SERDigital event. We defined high self-initiated participation as ever having participated in at least 3 of the 7 of the designated activities (top 25th percentile). We defined any Society-initiated participation as ever having been selected to participate in any of the following: being a spotlight chair, serving on a committee, and serving on an ad hoc committee.

Univariate descriptive analyses

Median values and interquartile ranges were calculated for continuous demographic factors; numbers and percentages were calculated for categorical demographic factors and for feeling welcomed (Tables 1 and 2). Modes, medians, and interquartile ranges were calculated for self- and Society-initiated participation scales (Table 2). To address potential bias from missing data, multiple imputation was

Table 2. Social and Professional Composition of Respondents to a Society for Epidemiologic Research Member Survey ($n = 631$), June–August 2018

Measure	%[a]	No.
Age, years[b]	36 (31–46)	
Time since receipt of last advanced degree, years		
≥8	30.1	190
<8	36.5	230
Missing data	33.4	211
Duration of membership in SER, years		
≥10	22.7	143
<10	68.6	433
Missing data	8.7	55
Children in child care		
Yes	22.8	144
No	65.1	411
Missing data	12.0	76
Dependents		
Yes	30.1	190
No	58.6	370
Missing data	11.3	71
At least 2 full-time wage earners in household		
Yes	51.0	322
No	40.7	257
Missing data	8.2	52
Lived in household with fewer than 2 parents in childhood		
Yes	18.1	114
No	71.0	448
Missing data	10.9	69
Received public assistance in childhood		
Yes	9.5	60
No	71.0	448
Missing data	19.5	123
Housing problems in childhood		
Yes	3.5	22
No	71.0	448
Missing data	25.5	161
Religion[c]		
Atheist/agnostic	37.7	238
Buddhist	2.7	17
Christian	33.4	211
Hindu	1.4	9
Jewish	8.9	56
Muslim	1.7	11
Other religion	5.1	32
Missing data	12.8	81

Table continues

Table 2. Continued

Measure	%[a]	No.
Sexual orientation		
Not heterosexual	13.3	84
Heterosexual	77.7	490
Missing data	9.0	57
Political affiliation[c]		
Liberal/left-leaning	72.4	457
Conservative/right-leaning	4.4	28
Centrist/independent	15.7	99
Other views	4.3	27
Missing data	12.2	77
Place of birth		
United States	65.8	415
Outside United States	29.3	185
Missing data	4.9	31
Place of residence		
United States	81.9	517
Outside United States	12.8	81
Missing data	5.2	33
Language besides English often spoken in home		
Yes	17.6	111
No	80.4	507
Missing data	2.1	13
Physical disability		
Yes	3.8	24
No	89.5	565
Missing data	6.7	42
Primary/secondary education		
All private schooling	14.1	89
Some private schooling	17.8	112
All public schooling	62.6	395
Missing data	5.6	35
Higher education		
Doctoral degree	66.6	420
No doctoral degree	28.8	182
Missing data	4.6	29
Place of obtaining advanced degree		
United States	75.6	477
Outside United States	12.5	79
Missing data	11.9	75
First-generation bachelor's degree		
Yes	12.8	81
No	86.2	544
Missing data	1.0	6

Table continues

Table 2. Continued

Measure	%[a]	No.
First-generation master's degree		
Yes	30.3	191
No	68.8	434
Missing data	1.0	6
First-generation doctoral degree		
Yes	55.6	351
No	43.4	274
Missing data	1.0	6
Occupational setting		
Academia	68.0	429
Not academia	17.0	107
Missing data	15.1	95
Feeling welcomed		
Very	40.7	257
Somewhat	32.3	204
A little	7.0	44
Not at all	1.1	7
Missing data	18.9	119
Participation		
Self-initiated[b,d]	2 (1–3)	
SER-initiated[b,e]	0 (0–0)	

Abbreviation: SER, Society for Epidemiologic Research.
[a] Percentages may not sum to exactly 100.0% because of rounding to the tenths place.
[b] Values are expressed as median (interquartile range).
[c] Percentages sum to more than 100.0% because survey respondents were able to select multiple categories.
[d] Self-initiated participation had a mode of 1 and was defined as ever having participated in each of the designated activities (1 point for each activity): abstract submitted, symposium submitted, workshop submitted, poster judge, abstract review, attended SERTalk, and attended SERDigital event.
[e] SER-initiated participation had a mode of 0 and was defined as ever having participated each of the designated activities (1 point for each activity): spotlight chair, committee member, or ad hoc committee member.

used to produce 20 imputed data sets. Demographic factors included in imputation models included all demographic variables shown in Tables 1 and 2. Using variables in Table 1, inverse-probability-of-response weights were constructed to account for potential differences between survey responders and nonresponders. These weights were based on factors associated with survey response, which we determined by contrasting the survey data with data from the SER member database. The overall weight for each individual within each imputation was calculated as the product of the inverse probabilities of response (inverse probability weights (IPWs)) for self-reported race/ethnicity, gender, and organizational representation ($IPW_{race} \times IPW_{gender} \times IPW_{orgrep}$).

Bivariate descriptive analyses

Using inverse-probability-of-response weights and multiple imputation to account for missing data, we computed proportions of persons who had been members of the SER for at least 10 years, were in the upper 25% of institutional representation, and reported feeling very welcomed, according to race/ethnicity (racial minority, White, or no response) and gender (female, male), along with 95% confidence intervals. Here, the term "racial minority" refers to all historically marginalized racial/ethnic groups (American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, Middle Eastern or North African, Native Hawaiian or other Pacific Islander, multiracial, and self-described other race/ethnicity).

Associations between personal characteristics, participation, and feeling welcomed

To evaluate model performance, we randomly divided the data into a training set and a validation set. With the training set of 75% ($n = 473$) of survey respondents, we

used log-binomial regression to estimate model parameters, relative risks, and 95% confidence intervals for relationships between demographic characteristics and the following outcomes: 1) high self-initiated participation, 2) any Society-initiated participation, and 3) feeling very welcomed. In these analyses, data for racial/ethnic and religious minority categories were blinded to preserve anonymity. Using parameters estimated from the training set model, we predicted outcomes for the 25% validation set ($n = 158$). Model performance was evaluated using the C statistic, which is equal to the area under the receiver operating characteristic curve and ranges from 0.5 (correct classification 50% of the time, analogous to a coin flip) to 1.0 (correct classification 100% of the time, i.e., perfect prediction).

Analyses were conducted in SAS, version 9.4 (SAS Institute, Inc., Cary, North Carolina).

RESULTS

Univariate descriptive analyses

Based on SER's membership roster data from 2018, most SER members were White (62%) or female (66%) (Table 1). The institutions collectively constituting the top 25% of SER membership were Johns Hopkins University (6.4% of SER members), the University of North Carolina (3.8%), Harvard University (3.5%), Columbia University (2.7%), the University of Iowa (2.7%), Boston University (2.7%), Emory University (2.1%), and the University of California, San Francisco (2.0%). All other affiliations reflected a mix of academic, government, private research institution/industry, or self-affiliation only.

Of the 1,631 active SER members, 631 (39%) completed the survey. Response rates were highest among multiracial persons; more people selected multiple racial/ethnic categories on the survey ($n = 58$) than had selected "multiracial" when registering for SER membership ($n = 24$). Women were more likely to complete the survey (41%) than men (33%). Most survey respondents identified as White (58%), female (69%), atheist or agnostic (38%), heterosexual (78%), and liberal or left-leaning (72%); most reported having a doctoral degree (67%) (Tables 1 and 2). Most respondents indicated having been an SER member for fewer than 10 years (69%) (Table 2). Survey respondents most often reported feeling very welcomed (41%) and most often reported having participated in at least 1 self-initiated event (median, 2 (interquartile range, 1–3)) and no Society-initiated events (median, 0 (interquartile range, 0–0)) (Table 2).

Bivariate descriptive analyses

Men (35.4%, 95% confidence interval (CI): 32.6, 38.2) were more likely than women (18.7%, 95% CI: 17.6, 19.9) to report having been in SER for at least 10 years, as were persons who were White (30.3%, 95% CI: 28.7, 31.9) compared with persons of racial/ethnic minority groups (15.3%, 95% CI: 14.0, 16.6) (Table 3). While males (30.4%, 95% CI: 25.6, 35.2) were more likely than females (24.0%, 95% CI: 21.9, 26.1) to be from a highly represented institution, White and racial/ethnic minority individuals were similarly likely to be from an institution with high SER representation. Further, White (56.1%, 95% CI: 52.3, 59.8) or male (55.2%, 95% CI: 51.8, 58.5) respondents were more likely to report feeling very welcome, as compared with racial/ethnic minority (42.7%, 95% CI: 39.6, 45.9) or female (45.5%, 95% CI: 42.3, 48.6) individuals, respectively (Table 3). Nonresponse with regard to race/ethnicity was associated with a greater prevalence of having been in SER for at least 10 years (40.4%, 95% CI: 29.0, 51.8) and being from a highly represented institution (63.7%, 95% CI: 34.7, 92.7) but a reduced prevalence of feeling very welcomed (13.1%, 95% CI: 2.7, 23.5).

Racial/ethnic minority females were least likely to report having been in SER for at least 10 years (10.0%, 95% CI: 8.6, 11.5), and males with racial/ethnic nonresponse (46.3%, 95% CI: 30.9, 61.7) were most likely. Racial/ethnic minority females were least likely to be from an institution with high SER representation (21.7%, 95% CI: 17.1, 26.3), and females with racial/ethnic nonresponse (65.9%, 95% CI: 30.6, 100.0) were most likely. Importantly, females with racial/ethnic nonresponse were least likely to report feeling very welcomed (10.8%, 95% CI: 0.3, 21.4), while White males were most likely (65.6%, 95% CI: 60.6, 70.6).

Associations between personal characteristics, participation, and feeling welcomed

Respondents who reported feeling very welcomed were 13% more likely to report high self-initiated participation in SER activities (relative risk (RR) = 1.13, 95% CI: 0.95, 1.31; Table 4, footnote "e"). Compared with White persons, persons who identified as being of minority race/ethnicity number 6 (blinded data) were more likely to report feeling very welcome (RR = 1.33, 95% CI: 0.41, 2.25), while persons who did not report their race/ethnicity were less likely to report feeling very welcome (RR = 0.53, 95% CI: 0.07, 0.99). Compared with Christians, persons of minority religious affiliation number 4 were less likely to report feeling very welcome (RR = 0.57, 95% CI: 0.08, 1.07) (Table 4).

Having been an SER member for at least 10 years (versus less time) and having minority religious affiliation number 4 (versus Christian) were the factors most strongly associated with high self-initiated participation (RR = 1.36 (95% CI: 1.11, 1.62) and RR = 1.51 (95% CI: 0.73, 2.29), respectively). In contrast, members who abstained from identifying their race (RR = 0.60, 95% CI: 0.32, 0.88), identified with racial/ethnic minority category 1 (RR = 0.72, 95% CI: 0.54, 0.91) or 5 (RR = 0.72, 95% CI: 0.44, 1.00), or were conservative/right-leaning (RR = 0.71, 95% CI: 0.37, 1.06) were less likely to have high self-initiated participation than members who were White or liberal/left-leaning, respectively.

Participation in Society-initiated events was more likely among respondents who had been SER members for 10 or more years (RR = 2.14, 95% CI: 1.67, 2.62), who were in the top 25% of institutional representation (RR = 1.30, 95% CI:

Table 3. Race and Gender Characteristics[a] of Respondents to a Society for Epidemiologic Research Member Survey, by Number of Years of Membership, Institutional Representation, and Extent of Feeling Welcomed, June–August 2018

Measure	≥10 Years in SER		Upper 25% of Institutional Representation		Feeling Very Welcomed	
	%	95% CI	%	95% CI	%	95% CI
Race/ethnicity						
Minority race or ethnicity[b]	15.3	14.0, 16.6	24.2	19.9, 28.6	42.7	39.6, 45.9
White	30.3	28.7, 31.9	25.0	21.6, 28.4	56.1	52.3, 59.8
Nonresponse	40.4	29.0, 51.8	63.7	34.7, 92.7	13.1	2.7, 23.5
Gender						
Female	18.7	17.6, 19.9	24.0	21.9, 26.1	45.5	42.3, 48.6
Male	35.4	32.6, 38.2	30.4	25.6, 35.2	55.2	51.8, 58.5
Race/ethnicity and gender						
Minority[b] female	10.0	8.6, 11.5	21.7	17.1, 26.3	39.6	35.3, 43.9
Minority[b] male	24.6	21.9, 27.4	28.7	22.2, 35.2	48.3	43.9, 52.7
White female	24.1	22.7, 25.6	23.4	19.4, 27.4	51.7	47.5, 55.8
White male	43.5	39.9, 47.0	28.5	20.6, 36.5	65.6	60.6, 70.6
Nonresponse female	34.8	20.0, 49.6	65.9	30.6, 100.0	10.8	0.3, 21.4
Nonresponse male	46.3	30.9, 61.7	61.8	34.1, 89.5	15.6	0.0, 32.5

Abbreviations: CI, confidence interval; SER, Society for Epidemiologic Research.
[a] Percentages and 95% CIs were weighted by the inverse probability of survey response. Missing data were imputed.
[b] American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, Middle Eastern or North African, Native Hawaiian or other Pacific Islander, multiracial, and self-described other race/ethnicity.

0.96, 1.63), and who identified with racial/ethnic minority group 6 (RR = 1.31, 95% CI: 0.00, 4.64; referent: Whites). Participation was less likely among female members (RR = 0.77, 95% CI: 0.56, 0.98), members identifying with racial/ethnic minority group 1 (RR = 0.70, 95% CI: 0.48, 0.92), and those with religious affiliation 2 (RR = 0.33, 95% CI: 0.00, 1.44) or 4 (RR = 0.62, 95% CI: 0.00, 1.61).

With the 25% validation data set, models performed at least as well as with the training data set in predicting high self-initiated participation, any Society-initiated participation, and feeling very welcome. The *C* statistic confidence intervals from the validation-data-set models substantially overlapped with those in the training-set models. Regression analyses run in the validation-set models classified outcomes concordantly 77%–78% of the time (Table 5).

DISCUSSION

In 2018, most SER members were White or female. We observed differences in feeling very welcomed by race, religious affiliation, and gender; differences in self-initiated participation by race and political affiliation; and differences in Society-initiated participation by gender, race, and religious affiliation.

While the vast majority of existing literature on diversity and inclusion is limited to the dimensions of race/ethnicity (5, 7, 9, 11, 12, 19, 27–37) and/or gender (9, 12, 13, 27, 28, 30, 33, 38–48), we acknowledge that diversity exists along many additional axes (2, 10, 52–55). We therefore characterized the composition of SER's membership on the basis of a broad set of social and professional variables and estimated the relationships of these variables with perceptions of inclusion and participation in the Society. Log-binomial regression models were highly predictive, concordantly classifying dichotomous outcomes (high self-initiated participation, any Society-initiated participation, and feeling very welcomed) in the validation set 77%–78% of the time. To reduce dimensionality and efficiently examine outcomes hypothesized to have similar motivating factors, we grouped participation events according to whether participation was initiated by members or Society leadership to create 2 separate composite outcome indices. We did not examine participation events that were the result of participant initiation followed by Society decision (e.g., poster presentation, oral presentation, symposium invitation or presentation, and workshop presentation).

Our findings could have been influenced by several limitations. Chief among these was the low survey response rate. While in line with those of many well-respected population-based surveys, including the California Health Interview Survey (56) and the Behavioral Risk Factor Surveillance System survey (57), it was particularly low for a survey of a contained specialty population, many of whose professional

Table 4. Relative Risks of Self-Initiated[a] and Society-Initiated[b] Participation and of Feeling Welcomed[c] in the Society for Epidemiologic Research Among Respondents to a Member Survey, According to Social and Other Characteristics (75% Training Set), June–August 2018

Measure	High Self-Initiated Participation		Any SER-Initiated Participation		Feeling Very Welcomed[d]	
	RR	95% CI	RR	95% CI	RR	95% CI
Race/ethnicity category[d] (referent: White)						
1	0.72	0.54, 0.91	0.70	0.48, 0.92	0.86	0.69, 1.04
2	0.86	0.71, 1.01	1.24	0.89, 1.60	0.82	0.60, 1.04
3	1.14	0.84, 1.44	1.25	0.74, 1.76	0.93	0.70, 1.16
4	1.00	0.87, 1.12	1.17	0.85, 1.50	0.97	0.88, 1.05
5	0.72	0.44, 1.00	1.19	0.13, 2.26	0.89	0.64, 1.14
6	1.45	0.43, 2.46	1.31	0.00, 4.64	1.33	0.41, 2.25
Nonresponse	0.60	0.32, 0.88	0.87	0.42, 1.33	0.53	0.07, 0.99
Gender: female vs. male	1.07	0.95, 1.20	0.77	0.56, 0.98	0.87	0.71, 1.02
Institutional representation: top 25% vs. other 75%	1.14	0.98, 1.30	1.30	0.96, 1.63	1.05	0.97, 1.14
Time in SER: ≥10 years vs. <10 years	1.36	1.11, 1.62	2.14	1.67, 2.62	1.12	0.97, 1.26
Higher education: doctoral degree vs. less	1.27	1.08, 1.46	1.13	0.86, 1.40	0.97	0.87, 1.07
Place of birth: United States vs. all other countries	0.97	0.82, 1.12	1.16	0.93, 1.39	0.99	0.93, 1.05
Sexual orientation: not heterosexual vs. heterosexual	0.83	0.71, 0.96	0.86	0.59, 1.12	0.80	0.61, 1.00
Religion category[d] (referent: Christian)[e]						
Atheist/agnostic	1.17	1.03, 1.31	1.09	0.83, 1.34	0.95	0.86, 1.05
1	1.23	0.73, 1.73	1.00	0.43, 1.57	1.10	0.80, 1.40
2	0.78	0.39, 1.17	0.33	0.00, 1.44	1.12	0.70, 1.53
3	1.09	0.91, 1.28	1.20	0.89, 1.51	1.03	0.92, 1.13
4	1.51	0.73, 2.29	0.62	0.00, 1.61	0.57	0.08, 1.07
5	1.17	0.89, 1.46	1.18	0.69, 1.67	1.05	0.89, 1.21
Political affiliation (referent: liberal/left-leaning)						
Conservative/right-leaning	0.71	0.37, 1.06	0.92	0.49, 1.35	0.85	0.65, 1.05
Centrist/independent	1.06	0.91, 1.20	1.10	0.88, 1.32	0.91	0.82, 1.01
Other views	1.17	0.97, 1.36	0.82	0.35, 1.28	1.13	0.96, 1.30

Abbreviations: CI, confidence interval; RR, relative risk; SER, Society for Epidemiologic Research.

[a] High self-initiated participation was defined as ever having participated in 3–7 of the designated activities: abstract submitted, symposium submitted, workshop submitted, poster judge, abstract review, attended SERTalk, and attended SERDigital event (median value, 2 of these activities).

[b] Any SER-initiated participation was defined as ever having participated as a spotlight chair or having served on a committee or ad hoc committee (median value, none of these activities).

[c] Feeling very welcomed versus a combined reference category of "not at all," "a little," and "somewhat."

[d] Data for racial/ethnic and religious minority categories were blinded to preserve anonymity.

[e] Relationship between feeling very welcomed and high self-initiated participation: RR = 1.13, 95% CI: 0.95, 1.31.

work utilizes survey data, and future efforts should endeavor to increase the response rate. This resulted in a small validation subsample (158 responses) and small strata among numerous racial and religious groups—the former producing imprecise estimates for feeling welcome and participation. Given that survey respondents had a different gender and

Table 5. *C* Statistics for Prediction of Self-Initiated and Society-Initiated Participation and of Feeling Welcomed in the Society for Epidemiologic Research Among Respondents to a Member Survey, According to Demographic Characteristics, June–August 2018

Data Set	High Self-Initiated Participation		Any SER-Initiated Participation		Feeling Very Welcomed	
	C Statistic	95% CI	*C* Statistic	95% CI	*C* Statistic	95% CI
Training (75%)	0.69	0.64, 0.75	0.73	0.64, 0.81	0.69	0.63, 0.76
Validation (25%)	0.78	0.68, 0.88	0.78	0.67, 0.89	0.77	0.67, 0.88

Abbreviations: CI, confidence interval; SER, Society for Epidemiologic Research.

racial/ethnic composition than organizational membership, it is possible that data from nonrespondents, had they responded, could have altered the results. We utilized inverse-probability-of-response weights in all regression analyses to account for the potential that survey respondents may have had different characteristics than nonrespondents, which could bias estimates when generalized to all SER membership. However, there remains the potential for other factors associated with probability of response to have not been captured in both the member database and survey. Since these factors could not be addressed through weighting, unmeasured or residual bias is possible.

This study was additionally limited by the nature of the data, specifically due to the study design. Because the design of this study was cross-sectional, the directionality of some relationships could not be confirmed, and identified relationships cannot be interpreted as causal. There are probably factors that were not captured in the survey that could explain the current findings. Interpretation of the findings related to inclusion is limited by how inclusion was operationalized in the survey as "feeling welcomed at SER-sponsored activities" and each of the participation scales. The former measure was intended to capture self-perceived inclusion, while the latter incorporates other aspects of inclusion, such as member engagement and the Society's engagement with members. Future iterations of the member survey will consider additional aspects of inclusion (e.g., structural, cultural, dimensions of power, shared decision-making, etc.) to capture the complexity of inclusion more comprehensively, and will integrate and utilize qualitative data to provide contextual explanations for study findings.

The cover letter inviting members to participate in the survey explicitly stated that the survey was focused on diversity and inclusion, which could have altered participation from members who did not think this issue pertained to or affected them. Data suggest that members of majority groups can perceive less value in and feel less comfortable with diversity (27) and so may have less of a tendency to engage in these types of assessments, particularly when an organization's diversity approach does not include them (29). Furthermore, the wording of survey question and response options may have influenced some responses. To the question ascertaining race, for example (see Web Appendix), 10 members selected the response option "declined" or "unavailable/unknown"; an additional 12 persons did not answer this question. Research in public opinion survey design indicates that offering "don't know" response options increases the proportion of item nondisclosure by underscoring the option to refuse (58–60). Our data further suggest that nondisclosure and lower self-initiated participation may be the result of not feeling very welcomed in the Society. Lastly, SER aims to foster diversity of research ideas from trained experts to solve public health problems. While the current data cannot be used to evaluate empirically whether enhanced participation among persons with different demographic characteristics would broaden the diversity of quality research ideas, or whether the enhanced range of ideas would address public health needs more effectively than otherwise, prior research shows that gender diversity can have a positive impact on the quality of science (38) and that published papers with higher impact factors and citation counts tend to have ethnically diverse coauthors (36).

The current data will establish a baseline for assessing longitudinal trends and future initiatives aimed at improving diversity and inclusion. On the basis of these data, some SER members feel marginalized, as evidenced by the correspondences of minority religious affiliation and females not disclosing their race with not feeling very welcomed. Further, there are disparities in SER participation by numerous social and cultural factors, with persons not disclosing their race also being less likely to have high self-initiated participation, as well as members who identify with a specific racial/ethnic minority or are conservative or right-leaning. Women and persons identifying with a specific racial/ethnic minority or religious affiliation were less likely to be invited to participate in Society-initiated events.

These data demonstrate that there are many different aspects of diversity within the Society that warrant deeper inquiry and that there are disparities in engagement that should be addressed. In one of several approaches to ensure that diverse voices are heard, we have invited SER members to write a series of commentaries offering perspectives on aspects of diversity within the Society, the disparities reported herein, and ideas for improvement. By drawing upon the variety of our collective experiences and perspectives, we can identify effective initiatives to address these disparities within the SER, with the goal of improving discovery in public health.

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