Demographics of Public Participation in Science: A Meta-Analytic Approach
Supplementary File

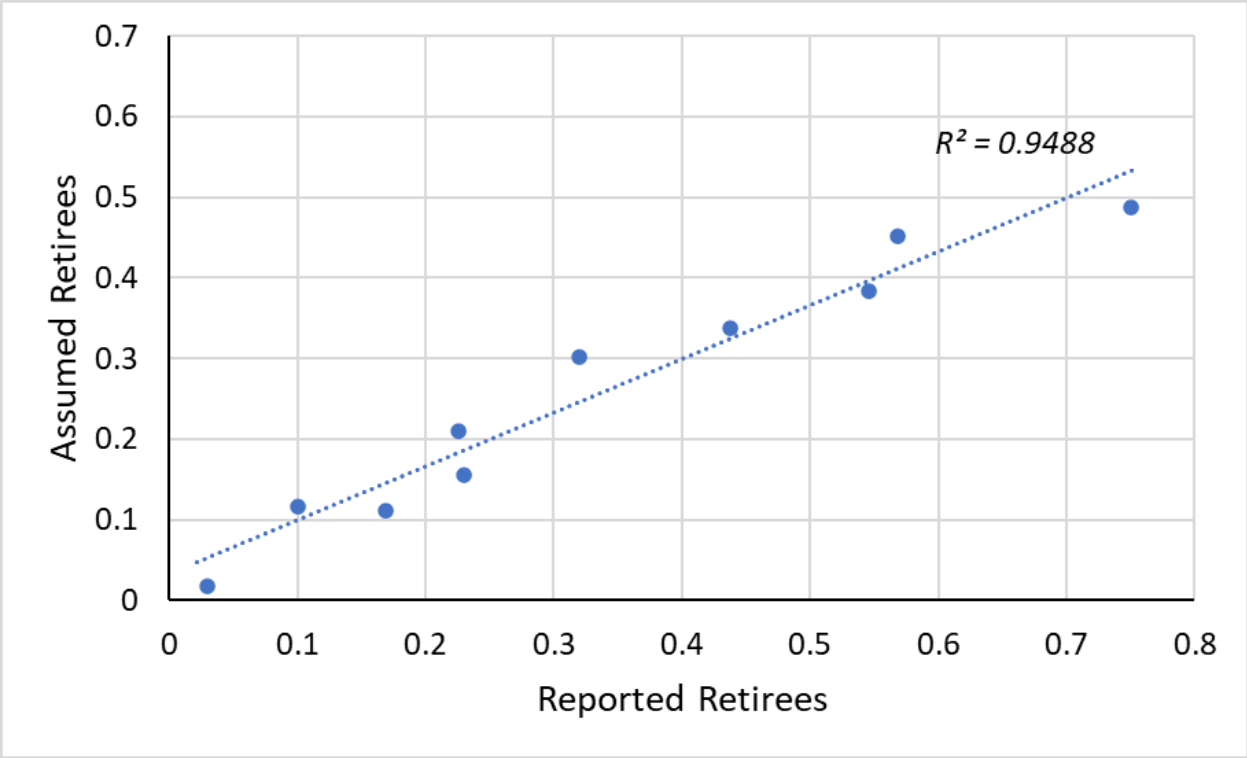
Demographic variables for which we collected data

Supplemental Table 1: Broad demographic categories for which we collected data ("Broad category"), the specific variables within those categories for which we collected data ("Specific variable"), and number of projects that reported that kind of data ("N").

Broad Category	Specific Variable	N
Gender	All data- all data related to gender	144
	Non-Cisgender Male/Female Data- all data for gender categories other than cisgender Male/ Female, including transgender, gender diverse, other, mixed, non-conforming and/or non-binary	12
	% F- % of participants that were female	143
Age	All data- all data related to age	150
	Mean or median- The mean and/or median age	52
	Average- Unspecified "average" age	22
	Minimum- The minimum age	35
	Maximum- The maximum age	34
	Range- The maximum- minimum age	34
Race/ Ethnicity	All data- all data related to race/ethnicity	30
	% White- % of participants that were white	17
Education	All data- all data related to education	88
	% College + - % of participants with some college education	58
	% Grad degree- % of participants with a graduate or professional degree	40

Occupation	Job- all data about participant jobs	40
	Income- all data about income	19
	Retiree- % of participants that were retired	65
Recreation	Frequent outdoor recreation- % of participants that frequently undergo outdoor recreation	1
Citizen science	Previous Citizen science- % of participants with previous Citizen science participation	12
Political views	All data- all data about political views	1
Residence	Living area- all data about what area participants lived in	14
	Dwelling type- all data about what type of dwelling the participants lived in, e.g. apartment	3
	Rural/Urban- all data about whether the participants lived in an urban or rural area	6
Family structure	Head of House- % of participants that were the head of their household	4
	Cohabitation- all data about number of people the participants lived with	6
	Marital Status- all data about marital status of the participants	3
	Children- all data about number of children the participants had	9
	Pets- all data about number of pets the participants had	3

Reported versus “assumed” retirees



Supplemental Figure 1: Relationship between reported % retirees (“Reported Retirees”) and estimated % retirees calculated based on reported age data (“Assumed Retirees”), with a trend-line added and R^2 provided.

Descriptive statistics of the five chosen demographic variables

Supplemental Table 2: For each demographic proportion (female, people with graduate degree (grad), white, retiree) or mean average (Age), the unweighted (UW) and weighted (W) mean, unweighted standard deviation (SD), minimum (Min), maximum (Max), range (maximum – minimum), number of projects (Project N), number of participants (Participant N), and comparison census data (U.S. Pop.).

Demo. Var.	Mean (UW)	Mean (W)	SD	Min	Max	Range	Proj. N	Part. N	U.S. Pop.
Female	0.45	0.51	0.20	0.03	0.94	0.91	143	129,681	0.51[a]
Grad	0.35	0.43	0.17	0.00	0.67	0.67	40	38,522	0.13[b]
White	0.88	0.87	0.17	0.42	1.00	0.58	17	37,699	0.64[c]
Retiree	0.21	0.16	0.19	0.00	0.76	0.76	65	62,231	0.17[d]
Age	48.1	51.5	9.5	16.6	64.0	47.4	52	27,985	38.8[e]

a- U.S. adults in 2020. Source: U.S. Census Bureau 2020 (https://data.census.gov/)
b- For 2019, percentage of U.S. aged 25+ that have a graduate or professional degree. Source: U.S. Census Bureau (https://www.census.gov/library/stories/2019/02/number-of-people-with-masters-and-phd-degrees-double-since-2000.html)
c- U.S. adults in 2020. Source: U.S. Census Bureau (https://www.census.gov/library/stories/2021/08/improved-race-ethnicity-measures-reveal-united-states-population-much-more-multiracial.html)
d- U.S. adults in 2021. Source: Administration on Aging 2021 (https://acl.gov/sites/default/files/Profile%20of%20OA/2021%20Profile%20of%20OA/2021ProfileOlderAmericans_508.pdf)
e- U.S. population in 2021. Source: U.S. Census Bureau (https://www.census.gov/newsroom/press-releases/2022/population-estimates-characteristics.html)

Detailed overview of project foci

Supplemental Table 3: For each category of project focus, the % of projects that we determined fell into that category (%), the number of projects in the category (N), a description of the category (description), and an example.

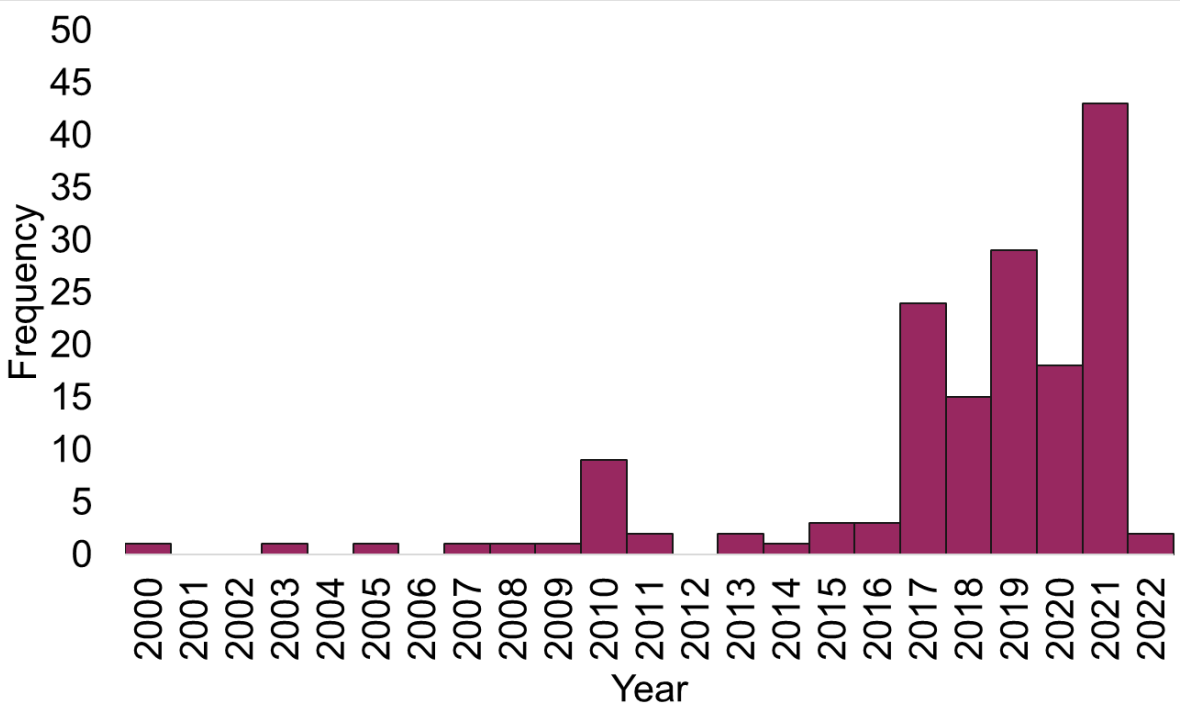
Category	%	N	Description	Example
Physical Science	8.3	13	the nonliving world but including molecular structure even if attached to biochemistry, as well as extra-terrestrial (e.g., astronomy)	amateur astronomy - Jones, M.G., Corin, E.N., Andre, T., Childers, G.M. and Stevens, V., 2017. Factors contributing to lifelong science learning: Amateur astronomers and birders. Journal of Research in Science Teaching, 54(3), pp.412-433.
Health	26.8	42	collection/monitoring of participant activity (e.g., steps, sleep) and/or health measures (e.g., heart rate); projects centering on data collection in service of determining whether human health is being affected (e.g., air pollution projects where the pollution is about people first)	Malaria Control Project - Asingizwe, D., Poortvliet, P.M., Koenraadt, C.J., van Vliet, A.J., Ingabire, C.M., Mutesa, L. and Leeuwis, C., 2020. Why (not) participate in citizen science? Motivational factors and barriers to participate in a citizen science program for malaria control in Rwanda. PloS one, 15(8), p.e0237396.
Biodiversity	56.7	89	the living natural world, including conservation projects	Candid Critters - Allf, B.C., Cooper, C.B., Larson, L.R., Dunn, R.R., Futch, S.E., Sharova, M. and Cavalier, D., 2022. Citizen science as an ecosystem of engagement: implications for learning and broadening participation. BioScience, 72(7), pp.651-663.
Other	6.4	10	a catch-all for projects focused on data and issues clearly outside of the three categories described above	Tomnod focused on digital imaging crowdsourcing- - Baruch, A., May, A. and Yu, D., 2016. The motivations, enablers and barriers for voluntary participation in an online crowdsourcing platform. Computers in Human Behavior, 64, pp.923-931.
Unknown	1.9	3	the project focus could not be determined from the publication, and website information was not available	Lake water quality - Bos, J.S., Nanayakkara, L., Hurlbert, M. and Finlay, K., 2019. Citizen science for Saskatchewan lakes: a pilot project. Lake and Reservoir Management, 35(1), pp.77-89.

Comparison between this study and SciStarter

Supplemental Table 4: Project attributes used in our study ("this study", N = 157), compared to SciStarter (N = 1,599). Data collected on 25 Sept 2022.

This Study	**This Study Project %**	**SciStarter**	**SciStarter Project %**
biodiversity	56.7	Ecology & Environment	54.9
human health	26.8	Health & Medicine	27.6
physical science	8.3	Astronomy & Space, Chemistry, Physics, Geology & Earth Science	5.6
other	6.4	remaining projects, after subtracting all the projects counted in other categories from the total projects on SciStarter	11.9
online	13.2	Online only	11.9
Hands-on	86.8	not Online	88.1

Project counts per year



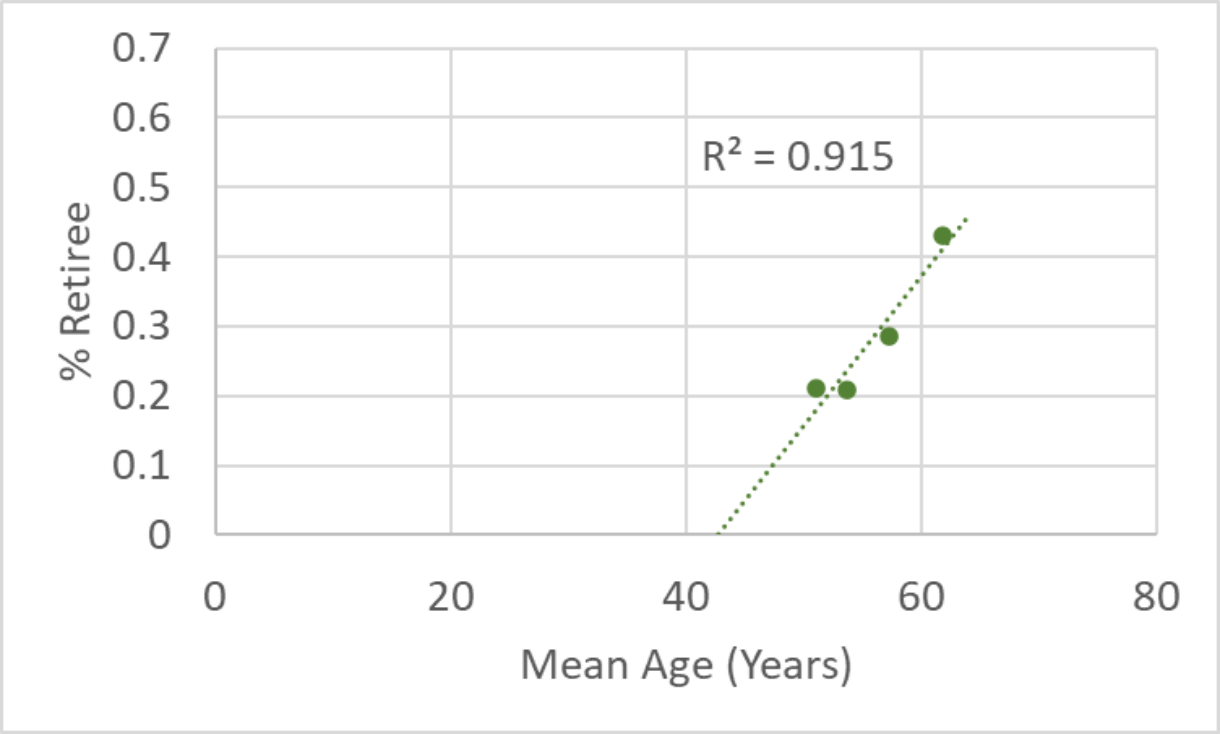
Supplemental Figure 2: Project count (“frequency”) as a function of publication year.

Effect of adding 2011-2016 data

Supplemental Table 5: Results of quasi-binomial GLMMs of the proportion of individuals in CS projects who fell into different demographic categories (being female, having a graduate degree, being a retiree, and being white). Here, data from 2011-2016 was not included. For each coefficient, variable estimates, standard error (SE), the lower (2.5% CI) and upper (97.5% CI) confidence intervals, and P-values for each variable in the final models are shown. Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1. Significance is assessed against hands-on for project access and biodiversity focus for focus.

Coefficient	Estimate	SE	2.5% CI	97.5% CI	P-value
Female (n = 106)					
Intercept	-511.33	109.24	-727.59	-298.79	8.73×10^{-6} ***
Year	0.25	0.05	0.15	0.36	8.85×10^{-6} ***
Project Access					4.21×10^{-5} ***
Online	0.63	0.14	0.35	0.91	1.13×10^{-5} ***
White (n = 13)					
Intercept	2.85	0.38	2.19	3.68	1.87×10^{-5} ***
Focus					0.01 **
Health	-1.14	0.38	-1.97	-0.46	0.01 *
Grad (n = 31)					
Intercept	-0.75	0.12	-0.99	-0.52	7.65×10^{-7} ***
Project Access					0.00 ***
Online	0.56	0.13	0.31	0.82	0.00 ***
Retiree (n = 49)					
Intercept	-0.73	0.11	-0.95	-0.51	4.23×10^{-8} ***
Focus					4.90×10^{-12} ***
Health	-1.50	0.14	-1.78	-1.22	9.86×10^{-14} ***
Physical Sciences	-0.19	3.05	-14.08	6.67	0.95

Relationship between age and retirees



Supplemental Figure 3: Relationship between mean age (years) and % retiree (n=4).

Effect of changing maximum weight for the linear models

Supplemental Table 6: Results of quasi-binomial GLMMs of the proportion of individuals in CS projects who fell into different demographic categories (being female, having a graduate degree, being a retiree, and being white). Here, the maximum weight a project can have is 75. For each coefficient, variable estimates, standard error (SE), the lower (2.5% CI) and upper (97.5% CI) confidence intervals, and P-values for each variable in the final models are shown. Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1. Significance is assessed against hands-on for project access and biodiversity focus for focus.

Coefficient	Estimate	SE	2.5% CI	97.5% CI	P-value
Female (n = 115)					
Intercept	-511.73	88.84	-687.84	-339.22	7.49×10^{-8} ***
Year	0.25	0.04	0.17	0.34	7.66×10^{-8} ***
Project Access					1.98×10^{-5} ***
Online	0.62	0.14	0.36	0.89	1.13×10^{-5} ***
White (n = 14)					
Intercept	2.94	0.40	2.24	3.83	1.36×10^{-5} ***
Focus					0.00 **
Health	-1.23	0.40	-2.12	-0.52	0.01 *
Grad (n = 33)					
Intercept	-0.75	0.12	-0.98	-0.52	4.15×10^{-7} ***
Project Access					0.00 ***
Online	0.55	0.13	0.31	0.80	0.00 ***
Retiree (n = 53)					
Intercept	-0.75	0.11	-0.97	-0.54	8.61×10^{-9} ***
Focus					2.64×10^{-12} ***
Health	-1.48	0.14	-1.76	-1.20	3.96×10^{-14} ***
Physical Sciences	-0.96	0.48	-2.00	-0.10	0.05 *

Supplemental Table 7: Results of quasi-binomial GLMMs of the proportion of individuals in CS projects who fell into different demographic categories (being female, having a graduate degree, being a retiree, and being white). Here, the maximum weight a project can have is 125. For each coefficient, variable estimates, standard error (SE), the lower (2.5% CI) and upper (97.5% CI) confidence intervals, and P-values for each variable in the final models are shown. Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1. Significance is assessed against hands-on for project access and biodiversity focus for focus.

Coefficient	Estimate	SE	2.5% CI	97.5% CI	P-value
Female (n = 115)					
Intercept	-522.55	88.67	-698.36	-350.42	4.06×10^{-8} ***
Year	0.26	0.04	0.17	0.35	4.15×10^{-8} ***
Project Access					1.84×10^{-5} ***
Online	0.62	0.13	0.36	0.88	1.04×10^{-5} ***
White (n = 14)					
Intercept	2.97	0.37	2.32	3.77	5.78×10^{-6} ***
Focus					0.00 **
Health	-1.25	0.37	-2.06	-0.59	0.01 **
Grad (n = 33)					
Intercept	-0.76	0.11	-0.98	-0.53	2.26×10^{-7} ***
Project Access					9.9×10^{-5} ***
Online	0.56	0.12	0.32	0.80	7.15×10^{-5} ***
Retiree (n = 53)					
Intercept	-0.74	0.11	-0.95	-0.54	7.32×10^{-9} ***
Focus					1.05×10^{-12} ***
Health	-1.49	0.14	-1.76	-1.21	1.53×10^{-14} ***
Physical Sciences	-0.98	0.47	-2.00	-0.14	0.04 *