

Data Science for Social Good Volunteer Motivations and Limitations: An Exploratory Survey

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Supplementary Materials

Table 1: Summary Of Respondents' Backgrounds

Measure	Number	Percent
Self-identified gender		
Male	125	52.3%
Female	107	44.8%
Non-binary	3	1.3%
Education		
Bachelors	47	19.7%
Masters	137	57.3%
Doctoral	50	20.9%
Decline to answer	4	1.16%
Dependents (e.g., Children)		
Yes	77	32.2%
No	155	64.9%
Decline to answer	7	2.9%
Years of data science experience		
0	10	4.2%
<2	20	25.1%
2-4	62	25.9%
5-9	59	24.7%
10+	48	20.1%
Employment status		
Student (full-/part-time)	14	5.8%
Employed part-time	11	4.6%
Employed full-time	172	72%
Self-employed	15	6.3%
Looking for work	9	3.8%
Retired	7	2.9%
Not employed	5	2.1%
Region		
U.S./Canada	163	68.49%
Europe	34	14.29%
Asia-Pacific	30	12.6%
Latin America	8	3.36%
Africa	1	0.42%
Middle East	2	0.84%

Self-identified underrepresented group

Yes	76	31.9%
No	117	49.15%
Unsure	34	14.28%
Decline to answer	11	4.62%

Table 2: Mean and Median of Respondent's age According to Geography

Country	Count	Mean/Median Age
USA/Canada		
USA	148	38.46/35
Canada	15	36.33/34
Latin America		
Brazil	1	76/76
Colombia	1	24/24
Mexico	1	28/28
Peru	4	28/28
Europe		
Denmark	1	44/44
France	2	46/46
Germany	7	32.43/31
Sweden	2	28.5/28.5
Italy	1	32/32
Portugal	3	32.67/33
Spain	1	48/48
UK	15	32.13/29
Ireland	1	35/35
Asia-Pacific		
Australia	2	32.5/32.5
India	15	29.57/28.5

Thailand	1	43/43
China	1	31/31
Japan	1	42/42
Malaysia	1	26/26
Singapore	8	37.63/37.5
Philippines	1	40/40
Middle East/Africa		
Pakistan	1	39/39
UAE	1	27/27
Nigeria	1	29/29

Table 3: Confirmatory Factor Analysis for the six latent variables

Variable	Estimate	Std.lv	std.all	Std. Err	z-value	p-value
Protective_1	1.000	0.819				1.536
Protective_2	0.870	1.337	0.708	0.077	11.335	0.000
Protective_3	0.840	1.291	0.679	0.078	10.781	0.000
Protective_4	0.973	1.495	0.769	0.077	12.556	0.000
Protective_5	0.965	1.483	0.797	0.073	13.133	0.000
Values_1	1.000	0.790				1.094
Values_2	1.009	1.104	0.729	0.086	11.755	0.000
Values_3	0.982	1.075	0.891	0.065	15.002	0.000
Values_4	0.709	0.776	0.832	0.051	13.843	0.000
Values_5	0.682	0.746	0.717	0.059	11.517	0.000
Career_1	1.000	0.790				1.695

Career_2	0.905	1.104	0.729	0.056	16.210	0.000
Career_3	1.019	1.075	0.891	0.064	15.875	0.000
Career_4	0.894	0.776	0.832	0.059	15.092	0.000
Career_5	0.797	0.746	0.717	0.065	12.187	0.000
Social_1	1.000	0.644				1.082
Social_2	1.050	1.136	0.676	0.116	9.030	0.000
Social_3	1.612	1.743	0.876	0.146	11.049	0.000
Social_4	1.679	1.816	0.892	0.150	11.184	0.000
Social_5	1.541	1.666	0.861	0.141	10.921	0.000
Understanding_1	1.000	0.675				1.023
Understanding_2	0.984	1.007	0.777	0.096	10.220	0.000
Understanding_3	0.971	0.993	0.851	0.089	10.906	0.000
Understanding_4	1.055	1.079	0.774	0.104	10.189	0.000
Enhancement_1	1.000	0.852				1.603
Enhancement_2	1.091	1.748	0.924	0.059	18.360	0.000
Enhancement_3	0.639	1.025	0.644	0.059	10.848	0.000
Enhancement_4	0.966	1.549	0.823	0.062	15.485	0.000
Enhancement_5	0.506	0.811	0.443	0.073	6.902	0.000

Table 4: Model Fit Statistics for Confirmatory Factor Analysis

Metrics	
CFI	0.87
RMSEA	0.071
90% CI	0.066 and 0.077
Chi-Square	0.001

Table 5: R² for Regression Results

Factor	R ²
Values	0.003
Protective	0.021
Social	0.017
Enhancement	0.05
Understanding	0.102
Career	0.147

Table 6: Parameter Estimates for Regression

Group	Estimate	Std.lv	std.all	Std. Err	z-value	p-value
Protective						
25-34	-0.646	-0.420	-0.139	0.346	-1.866	0.062
35-44	-0.041	-0.027	-0.013	0.272	-0.152	0.880
45-54	0.263	0.172	0.066	0.412	0.640	0.522
55-64	-0.373	-0.243	-0.068	0.600	-0.621	0.534
65+	0.013	0.008	0.002	0.732	0.018	0.986
Gender (Male)	0.096	0.063	0.031	0.219	0.439	0.660
Values						

25-34	-0.557	-0.510	-0.169	0.242	-2.308	0.021
35-44	-0.070	-0.064	-0.031	0.189	-0.369	0.712
45-54	0.158	0.144	0.056	0.286	0.552	0.581
55.64	0.125	0.114	0.032	0.418	0.299	0.765
65+	-0.150	-0.137	-0.027	0.509	-0.295	0.768
Gender (Male)	-0.039	-0.036	-0.018	0.152	-0.255	0.798

Career

25-34	-0.621	-0.366	-0.121	0.351	-1.769	0.077
35-44	-0.656	-0.387	-0.191	0.277	-2.368	0.018
45-54	0.382	0.225	0.087	0.418	0.915	0.360
55.64	-1.692	-0.998	0.280	0.613	-2.763	0.006
65+	0.159	0.094	0.018	0.743	0.213	0.831
Gender (Male)	-0.178	-0.105	-0.053	0.223	-0.801	0.423

Social

25-34	-0.044	-0.040	-0.013	0.237	-0.184	0.854
35-44	-0.028	-0.026	-0.013	0.187	-0.150	0.881
45-54	0.155	0.144	0.055	0.283	0.549	0.583
55.64	-0.243	-0.225	-0.063	0.413	-0.589	0.556
65+	0.748	0.692	0.134	0.507	1.475	0.140
Gender (Male)	0.083	0.076	0.038	0.151	0.548	0.584

Understanding

25-34	-0.474	-0.464	-0.153	0.225	-2.106	0.035
35-44	-0.415	-0.406	-0.200	0.178	-2.330	0.020
45-54	0.511	0.499	0.192	0.268	1.905	0.057
55.64	-0.157	-0.153	-0.043	0.388	-0.404	0.686
65+	-0.139	-0.136	-0.026	0.473	-0.294	0.769

Gender (Male)	-0.301	-0.294	-0.147	0.143	-2.102	0.036
	Enhancement					
25-34	-0.685	-0.428	-0.141	0.347	-1.973	0.049
35-44	-0.118	-0.074	-0.036	0.273	-0.432	0.666
45-54	0.067	0.042	0.016	0.413	0.162	0.871
55-64	-0.160	-0.100	-0.028	0.603	-0.265	0.791
65+	-1.109	-0.692	-0.134	0.737	-1.505	0.132
Gender (Male)	0.149	0.093	0.046	0.220	0.678	0.498

Table 6: Confirmatory Factor Analysis

Variable	Estimate	Std.lv	std.all	Std. Err	z-value	p-value
Protective_1	1.000	0.819				1.536
Protective_2	0.870	1.337	0.708	0.077	11.335	0.000
Protective_3	0.840	1.291	0.679	0.078	10.781	0.000
Protective_4	0.973	1.495	0.769	0.077	12.556	0.000
Protective_5	0.965	1.483	0.797	0.073	13.133	0.000
Values_1	1.000	0.790				1.094
Values_2	1.009	1.104	0.729	0.086	11.755	0.000
Values_3	0.982	1.075	0.891	0.065	15.002	0.000
Values_4	0.709	0.776	0.832	0.051	13.843	0.000
Values_5	0.682	0.746	0.717	0.059	11.517	0.000
Career_1	1.000	0.854				1.695
Career_2	0.905	1.534	0.850	0.056	16.210	0.000
Career_3	1.019	1.726	0.839	0.064	15.875	0.000
Career_4	0.894	1.515	0.813	0.059	15.092	0.000
Career_5	0.797	1.351	0.704	0.065	12.187	0.000
Social_1	1.000	0.644				1.082
Social_2	1.050	1.136	0.676	0.116	9.030	0.000

Social_3	1.612	1.743	0.876	0.146	11.049	0.000
Social_4	1.679	1.816	0.892	0.150	11.184	0.000
Social_5	1.541	1.666	0.861	0.141	10.921	0.000
Understanding_1	1.000	0.675				1.023
Understanding_2	0.984	1.007	0.777	0.096	10.220	0.000
Understanding_3	0.971	0.993	0.851	0.089	10.906	0.000
Understanding_4	1.055	1.079	0.774	0.104	10.189	0.000
Enhancement_1	1.000	0.852				1.603
Enhancement_2	1.091	1.748	0.924	0.059	18.360	0.000
Enhancement_3	0.639	1.025	0.644	0.059	10.848	0.000
Enhancement_4	0.966	1.549	0.823	0.062	15.485	0.000
Enhancement_5	0.506	0.811	0.443	0.073	6.902	0.000

Table 7: Covariances Among Latent Variables

Variable	Estimate	Std.lv	std.all	Std. Err	z-value	p-value
Protective ~						
Values	0.545	0.333	0.333	0.131	4.162	0.000
Career	0.655	0.275	0.275	0.185	3.536	0.000
Social	0.346	0.212	0.212	0.125	2.759	0.006
Understanding	0.341	0.232	0.232	0.118	2.897	0.004
Enhancement	1.262	0.531	0.531	0.206	6.112	0.000
Values ~						
Career	0.196	0.116	0.116	0.124	1.582	0.114
Social	0.460	0.398	0.398	0.098	4.679	0.000
Understanding	0.434	0.416	0.416	0.091	4.746	0.000
Enhancement	0.484	0.288	0.288	0.129	3.754	0.000
Career ~						
Social	0.513	0.305	0.305	0.133	3.840	0.000

Understanding	0.736	0.485	0.485	0.137	5.350	0.000
Enhancement	1.038	0.424	0.424	0.198	5.254	0.000
Social ~						
Understanding	0.366	0.352	0.352	0.090	4.074	0.000
Enhancement	0.600	0.358	0.358	0.137	4.389	0.000
Understanding ~						
Enhancement	0.570	0.376	0.376	0.128	4.466	0.000

Table 8: Factor Variances

Variable	Estimate	Std.lv	std.all	Std. Err	z-value	p-value
Protective_1	1.159	1.159	0.329	0.149	7.775	0.000
Protective_2	1.783	1.783	0.499	0.191	9.313	0.000
Protective_3	1.946	1.946	0.539	0.204	9.530	0.000
Protective_4	1.547	1.547	0.409	0.179	8.654	0.000
Protective_5	1.258	1.258	0.364	0.153	8.200	0.000
Values_1	0.723	0.723	0.377	0.080	8.988	0.000
Values_2	1.074	1.074	0.468	0.112	9.564	0.000
Values_3	0.301	0.301	0.207	0.045	6.634	0.000
Values_4	0.268	0.268	0.308	0.032	8.322	0.000
Values_5	0.526	0.526	0.486	0.055	9.648	0.000
Career_1	1.069	1.069	0.271	0.132	8.129	0.000
Career_2	0.904	0.904	0.278	0.110	8.214	0.000
Career_3	1.255	1.255	0.296	0.149	8.439	0.000
Career_4	1.180	1.180	0.340	0.133	8.869	0.000
Career_5	1.860	1.860	0.505	0.189	9.822	0.000
Social_1	1.649	1.649	0.585	0.163	10.125	0.000
Social_2	1.531	1.531	0.543	0.153	10.002	0.000

Social_3	0.922	0.922	0.233	0.121	7.633	0.000
Social_4	0.846	0.846	0.204	0.120	7.070	0.000
Social_5	0.965	0.965	0.258	0.120	8.047	0.000
Understanding_1	1.249	1.249	0.544	0.132	9.487	0.000
Understanding_2	0.665	0.665	0.396	0.079	8.381	0.000
Understanding_3	0.375	0.375	0.275	0.056	6.668	0.000
Understanding_4	0.778	0.778	0.401	0.092	8.429	0.000
Enhancement_1	0.970	0.970	0.274	0.119	8.168	0.000
Enhancement_2	0.523	0.523	0.146	0.098	5.340	0.000
Enhancement_3	1.480	1.480	0.585	0.146	10.130	0.000
Enhancement_4	1.143	1.143	0.323	0.130	8.763	0.000
Enhancement_5	2.693	2.693	0.804	0.255	10.554	0.000
Protective	2.309	0.979	0.979	0.319	7.242	0.255
Values	1.158	0.967	0.967	0.166	6.990	0.000
Career	2.451	0.853	0.853	0.313	7.842	0.000
Social	1.150	0.983	0.983	0.216	5.330	0.000
Understanding	0.940	0.898	0.898	0.171	5.498	0.000
Enhancement	2.442	0.951	0.951	0.310	7.876	0.000

Sample of Volunteer Survey: Motivation Section (Adapted from Clary, et al. 1998)

The Data for Good (D4G) movement is broadly understood as the application of data science and AI approaches to address a range of high-impact social issues (Varshney and Mojsilovik. 2019). One example of D4G volunteering is DataKind, a global nonprofit that is a collaborative global network of **volunteer data scientists** and organizations leveraging data and analytics for social impact.

A. (Protective)

In this section, you'll be asked about what motivates *you* to volunteer for D4G projects. For each question, select your response between 1 (not at all important/accurate) and 7 (extremely important/accurate).

1. No matter how bad I've been feeling, volunteering on a DG4 project helps me to forget about it.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

2. By volunteering on a D4G project, I feel less lonely.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

3. Doing volunteer D4G projects work makes me feel less guilty for being more fortunate than others.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

4. Volunteering on a D4G project helps me put my personal problems into perspective.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

5. Volunteering on a D4G project is a good escape from my own troubles.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

B. Values

In this section, you'll be asked about your values like compassion and empathy. Please select your response from 1 (not at all important/accurate) to 7 (extremely important/accurate) for the following questions.

1. I'm concerned about those less fortunate than myself.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

2. I'm genuinely concerned about the particular group I'm serving.
(not at all important/accurate) (extremely important/accurate)

1 2 3 4 5 6 7

3. I feel compassion toward people in need.
(not at all important/accurate) (extremely important/accurate)

1 2 3 4 5 6 7

4. I feel it's important to help others.
(not at all important/accurate) (extremely important/accurate)

1 2 3 4 5 6 7

5. I can do something for a cause that's important to me.
(not at all important/accurate) (extremely important/accurate)

1 2 3 4 5 6 7

C. Career

In this section, you'll answer questions related to D4G volunteering and your career. Please select your response from 1 (not at all important/accurate) to 7 (extremely important/accurate) for the following questions.

1. Volunteering on a D4G project can help me to get my foot in the door where I'd like to work.

(not at all important/accurate) (extremely important/accurate)

1 2 3 4 5 6 7

2. I can make new contacts that might help my business or career through D4G projects.
(not at all important/accurate) (extremely important/accurate)

1 2 3 4 5 6 7

3. Volunteering on a D4G project allows me to explore different career options.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

- 4. Volunteering on a D4G project will help me to succeed in my chosen profession.**
(not at all important/accurate) *(extremely important/accurate)*

1 2 3 4 5 6 7

- 5. The D4G volunteering experience will look good on my resume.**
(not at all important/accurate) *(extremely important/accurate)*

1 2 3 4 5 6 7

D. Social

The following questions relate to people in your life, including friends, colleagues, family members, among others, who volunteer in general. Please select your response from 1 (not at all important/accurate) to 7 (extremely important/accurate) for the following questions.

- 1. My friends volunteer in similar capacities.**
(not at all important/accurate) *(extremely important/accurate)*

1 2 3 4 5 6 7

- 2. People I'm close to want me to volunteer.**
(not at all important/accurate) *(extremely important/accurate)*

1 2 3 4 5 6 7

- 3. People I know share an interest in community service.**
(not at all important/accurate) *(extremely important/accurate)*

1 2 3 4 5 6 7

- 4. Others with whom I'm close place a high value on community service.**
(not at all important/accurate) *(extremely important/accurate)*

1 2 3 4 5 6 7

- 5. Volunteering is an important activity to the people I know best.**
(not at all important/accurate) *(extremely important/accurate)*

1 2 3 4 5 6 7

1 2 3 4 5 6 7

E. Understanding

In this section, you'll answer questions related to D4G volunteering and the ways in which it gives you understanding of the world and yourself. Please select your response from 1 (not at all important/accurate) to 7 (extremely important/accurate) for the following questions.

1. I can learn more about the cause for which I'm working in D4G projects.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

2. Volunteering on D4G projects allows me to gain a new perspective on things.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

3. Volunteering on D4G projects lets me learn through direct, hands-on experience.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

4. I can explore my own strengths on D4G projects.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

5. I can learn how to deal with a variety of people.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

F. Enhancement

In this section, you'll answer questions related to D4G volunteering and the ways in which it may enhance parts of your life and personal development. Please select your response from 1 (not at all important/accurate) to 7 (extremely important/accurate) for the following questions.

1. Volunteering on D4G projects makes me feel important.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

1 2 3 4 5 6 7

2. Volunteering on D4G projects increases my self-esteem.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

3. Volunteering on D4G projects makes me feel useful.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

4. Volunteering on D4G projects makes me feel better about myself.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7

5. Volunteering on D4G projects is a way to make new friends.

(not at all important/accurate)

(extremely important/accurate)

1 2 3 4 5 6 7