

Measuring STEM Engagement and Advocacy of Older Adults (50+)

ASTC Conference Pittsburgh, PA 2022
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Acknowledgement

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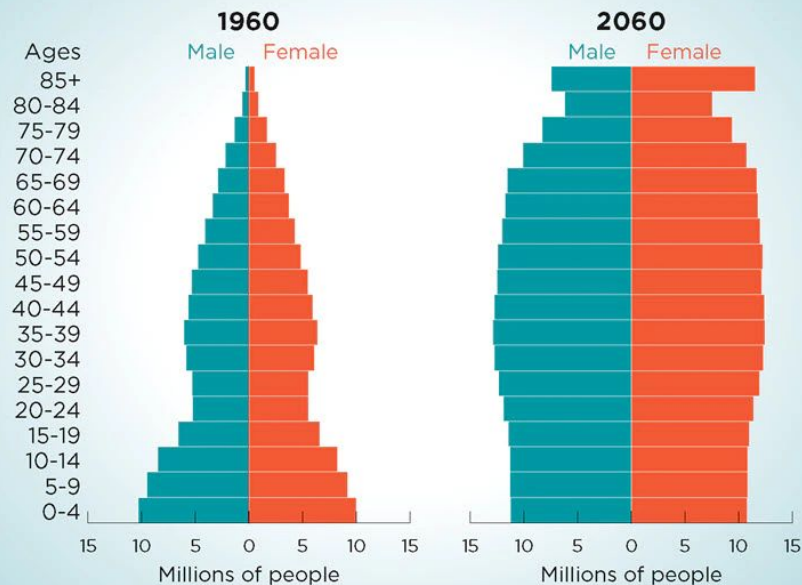
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This material is based upon work supported by the National Science Foundation under Grant No. 1906720. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.



From Pyramid to Pillar: A Century of Change

Population of the United States



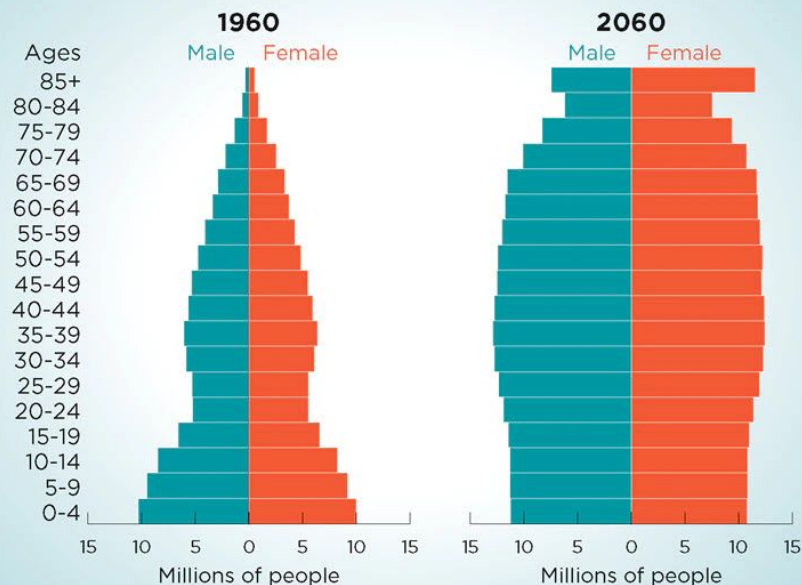
United States[™]
Census
Bureau

U.S. Department of Commerce
Economics and Statistics Administration
U.S. CENSUS BUREAU
[census.gov](https://www.census.gov)

Source: National Population
Projections, 2017
www.census.gov/programs-surveys/popproj.html

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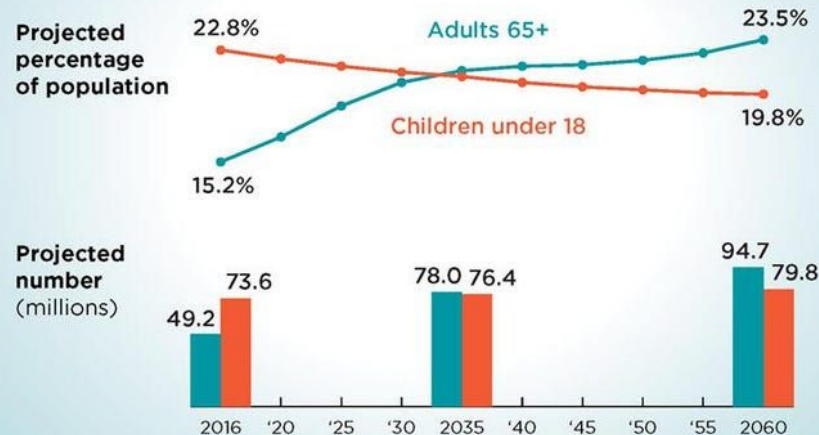
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An Aging Nation

Projected Number of Children
and Older Adults

For the First Time in U.S. History Older Adults Are
Projected to Outnumber Children by 2035



Note: 2016 data are estimates not projections.

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Census
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The Need to Engage Older Adults

- Growing segment of learners, yet limited evidence base of how best to engage older adults in informal STEM learning (Knutson, 2016)
- Improved health outcomes for older adults through lifelong learning (Todd, 2017)
- Develop public understanding of science (Greenwood, M.R.C., 2000)
- Civically-engaged age group can impact science policy (Corin et al., 2018)

Research Project Objectives

- Better understand older adult participation and engagement in informal STEM learning environments
- Develop new methods for measuring participation, engagement, and advocacy in this population

Key Constructs

Engagement

One's focus, participation, and persistence on a task

STEM Advocacy

Stance towards personal actions that support or promote a STEM cause or policy

Engagement Survey Development

1. Modified youth survey for older adults
2. Conducted Cog-Labs with older adults
3. Piloted survey and revised (x2)
4. Administered at informal learning events (2)
5. Final revision

Final Engagement Survey

Scale (Agree Strongly - Disagree Strongly):

1. I thought the activity was exciting
2. I enjoyed the activity
3. It was easy to stay focused
4. I was curious to find out what might happen next
5. I was fascinated
6. I was intrigued
7. I felt mentally stimulated
8. I paid attention most of the time
9. I found myself wanting to learn more

Advocacy Survey Development

1. Literature review
2. Conceptual model development
3. Conducted Cog-Labs with older adults
4. Pilot tested and revised (x2)
5. Administered at informal learning events (2)
6. Final revisions

STEM Advocacy Conceptual Model

Value of STEM for Society

A strong belief that STEM benefits society. Includes attitudes, perspective, awareness, and valuation of STEM and STEM Advocacy.



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STEM Advocacy Identification

A person perceives themselves and is perceived by others as a STEM advocate. They actively pursue activities and exhibit behaviors that align with this identity.

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One's perceptions of their ability to successfully advocate for STEM (self-efficacy), and the efficacy of STEM advocacy in general to affect change (solution-efficacy).

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Likelihood to Engage in STEM Advocacy Behaviors

- **Supporting** (donating, joining STEM orgs)
- **Communicating** (raising awareness, social media)
- **Learning** (attending classes, lectures, exhibits)
- **Teaching/Mentoring**
- **Civic Engagement** (voting, petitioning)
- **Public Participation** (volunteering, organizing)

Findings from Advocacy Survey (National Panel)

1. Each scale had excellent reliability ($\alpha < .9$)
2. No significant differences in advocacy based on age, gender, or education
3. ***STEM Advocacy Identification, Efficacy*** statistically significantly predicted likelihood to engage in STEM Advocacy behaviors ($\beta = .52, p = 0$; $\beta = .24, p = .04$).

Learning Events

- Engineering Design Challenge (1-2 days)
- Intergenerational (Fung Fellows + OLLI@Berkeley)



Findings from Learning Events

1. Older adults were highly engaged during the learning events, particularly by:
 - a. Intergenerational/collaborative learning
 - b. Engineering design process
 - c. Personal relevance of topics chosen
2. Engagement was strongly correlated with STEM advocacy identification
3. STEM advocacy did not change as a result of a weekend learning experience

Implications

- The engagement survey can be used by informal learning providers to compare, improve, & identify approaches for engaging older adults and build an evidence base
- The advocacy survey can be used to measure and understand older adults' stance toward STEM advocacy
- Developing STEM Advocacy Identification and Efficacy may be particularly important levers for encouraging STEM advocacy behaviors
- There is a relationship between engagement and identifying as a STEM advocate to be investigated further

Follow-up

- Download the surveys at:
lawrencehallofscience.org/olderadults
- Contact us at:
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 - Sarah Olsen: skolsen@berkeley.edu

References

- Corin, E.N., Jones, J.G., Andre, T., Childres, G.M., (2018). Characteristics of lifelong science learners: an investigation of STEM hobbyists, International Journal of Science Education, PargB, Vol. 8, NO 1, 53-75.
- Greenwood, M.R.C., (2000). Communication of Science and Technology in the Public Interest, report of the National Science Board.
- Knutson, K., (2016). Older Adults and Informal Learning, Knowledge Base, CAISE Informal Science.
<http://www.informalscience.org/news-views/older-adults-and-informal-learning>
- Todd, C., Camic, P. M., Lockyer, B., Thomson, L. J., & Chatterjee, H. J. (2017). Museum-based programs for socially isolated older adults: Understanding what works. Health & Place, 48, 47-55.