

COMMENTARY

Co-creating developmental science

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Abstract

Co-creating science with members of the researched population improves the science being conducted. Here, we argue that developmental science would particularly benefit from incorporating co-creation into the scientific process given the unique strength of including the perspectives of young people with lived experiences in scientific research. We propose that developmental scientists approach co-created research similarly to other open science practices and provide considerations for working with young people and community organizations in co-created developmental science projects.

KEYWORDS

adolescence, co-creation, community science, inclusivity, PPI, YPAGS

1 | CO-CREATION CAN BENEFIT DEVELOPMENTAL SCIENCE

Community science, or public participation in scientific research, has picked up strength in recent decades and has taken on many forms. Some community science endeavors are fully operated by individuals unaffiliated with traditional research institutions, such as Public Lab (<https://publiclab.org/>), and some are organized by traditional research institutions with the goal of including members of the public in a research project. While crowdsourcing data collection is the most common form of community involvement in science, there are many opportunities for involving community members throughout the research process.

Here, we focus on the opportunities for including children and adolescents, or young people, in the co-creation process. Co-creation initiatives such as Young Persons' Advisory Groups, which include young people as research partners at multiple steps in the research process, have demonstrated that research co-created with young people benefits both scientists and young people alike and provides young people with opportunities to ensure that issues that they consider important and relevant to their lives are addressed in research (MacSweeney, Bowman, & Kelly, 2019).

By including young people in the scientific process at all stages, we can gain insights that go far beyond just what we see in the collected data. Including young people in the *design* and *interpretation* of scientific research increases the diversity of perspectives present in scientific discourse (Figure 1). Young people are the most informed about what it is

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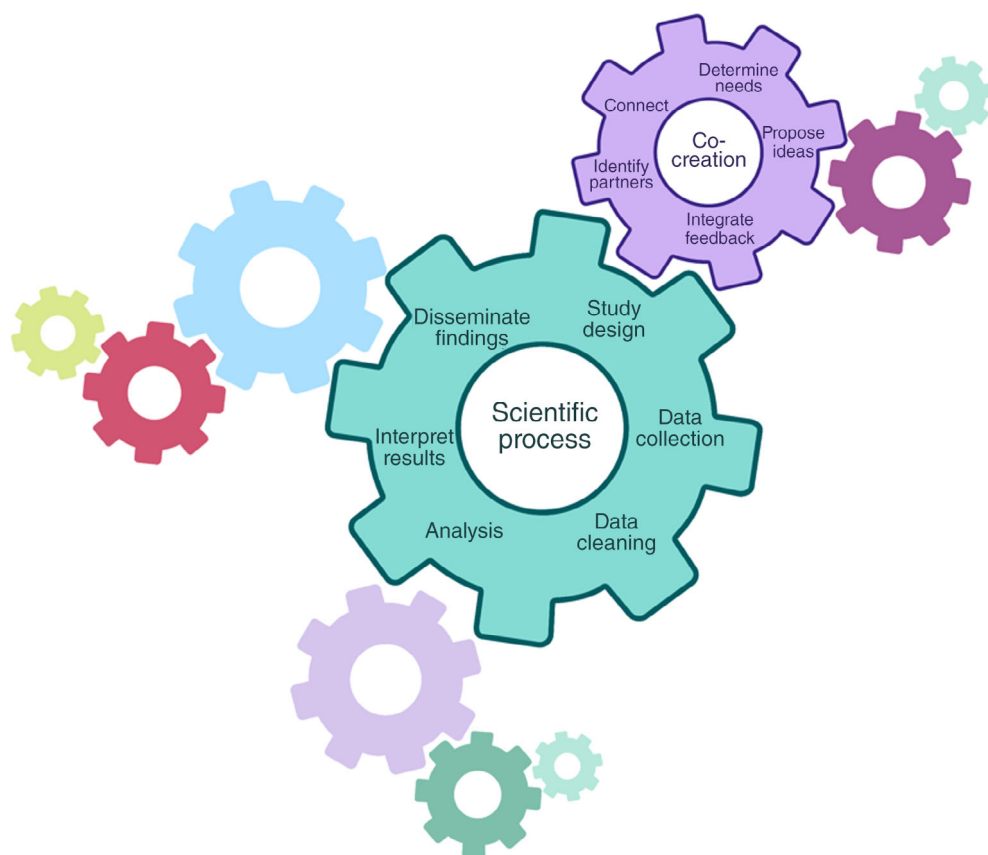


FIGURE 1 The scientific process is a cycle that includes study design, data collection, data cleaning, data analysis, interpretation, and dissemination (as illustrated in the central cog). We can include members of the researched population, or relevant community partners, at different points in the scientific process, but here we highlight an example for how co-created research can occur at the *design* stage of the scientific process (purple cog). The cycle of co-creation during the design stage can include identifying relevant community partners, connecting and establishing a means of communicating, determining needs, proposing ideas, soliciting and integrating feedback. We encourage developmental scientists to imagine what co-creation could look like at all stages of the scientific process, as it need not be limited to just the design stage. Image created with BioRender.com

actually like to be growing up during the time of a scientific study. The lived experiences of young people will differ from academic researchers, who are likely removed from both the experience of being a young person, as well as the unique experiences of the present cohort. Furthermore, it is important to include young people with diverse lived experiences to ensure that scientific research is designed to serve as many people as possible (Kellett et al., 2010).

Co-created research can be used for creating valid, impactful, and enduring research. Co-created designs have been used successfully with children and adolescents, where young people have provided clear and consistent recommendations on how to best engage the target population of the research or intervention (Peiris-John, Dizon, Sutcliffe, Kang, & Fleming, 2020). Co-creation can present opportunities for improved methodologies, such as in the case where it results in a design that differs from what researchers or clinicians initially assumed would be ideal for the target population/users (Nakarada-Kordic, Hayes, Reay, Corbet, & Chan, 2017). It should be noted that similarly to other methodologies used to improve the scientific process, such as preregistration, co-creation does require an investment of time, upfront and throughout the process. However, we believe this investment is well worth it for the gains that can be made in the quality and impact of the resulting work. Including members of the researched

population in the design stage of the scientific process can be particularly helpful for an intervention or resource context where there has been mixed success in the past due to low participant engagement, such as digital mental health interventions (Wadley, Lederman, Gleeson, & Alvarez-Jimenez, 2013).

Co-created research can also have a positive impact on science by increasing public trust in the scientific process. Including young people in the design and interpretation stages of the scientific process can serve as a powerful learning opportunity to see how science is really conducted. This could be especially empowering for adolescents, given that agency and purpose are central to achieving the developmental tasks of this formative period (Fuligni, 2019). Additionally, including young people in the interpretation and dissemination of the research can help to identify aspects of the results that are meaningful to the target populations and—given that young people are rarely the intended audience of scientific publications—provide insights into the avenues by which to communicate results to those who may be impacted.

We recommend finding approachable ways to inform young people involved in the co-creation of a project about the results, while making sure to keep everything unidentifiable if presenting results to the same population included in data collection. The interpretation and dissemination process can also be an ideal opportunity to get creative and present research findings in new and innovative ways, such as short videos or other platforms that are accessible regardless of reading level or zines (see e.g., of scientific zines at Two Photon Art; <https://twophotonart.com/collections/enamel-pins>). Trends come and go, and there is no better way to find out where young people get their information than from young people themselves.

2 | CO-CREATED RESEARCH CYCLE

Here we describe key considerations when engaging in co-created research for developmental scientists, as well as a concrete example of these approaches in action when engaging with schools as a community partner.

2.1 | Identifying community partners

In developmental science, our researched population can include infants, children, adolescents, and emerging adults. While it might be difficult to include infants and young children in the co-creation of research projects, we can invite relevant community partners into the scientific process, including caregivers, educators, and organizations (Table 1). The same considerations that we make to recruit participants who are representative of the broader population are needed when identifying community partners for co-created research projects. That is, identifying community partners requires paying attention to the needs, resources, and privileges of different groups. Are the demographics of the children involved in this organization or families attending this school different from the community at large? Are there groups that would be excluded if we worked only with individuals living in this neighborhood? Answering yes to these questions does not mean that the partnership is a bad idea, but rather can be a way to check to see if other community partners need to be identified as well. Identifying relevant community partners takes time, and it involves contacting more than the biggest schools near the research site if we want to identify means of recruiting underrepresented perspectives into science. For example, connecting with organizations that serve unhoused youth provides numerous opportunities to engage with children and adolescents who would likely otherwise be missed.

2.2 | Sparking interest and establishing communication

Outreach events are a perfect opportunity to begin the process of adopting a co-created scientific approach. These events provide an opportunity for community partners to learn about the science being conducted by the research

TABLE 1 A non-exhaustive list of potential community partnership opportunities organized by age periods

Partnership opportunities			
0–5 years	6–11 years	12–18 years	All ages
• Preschools	• Schools	• Schools	• Science museums
• Parenting groups	• Summer camps (particularly those focused on STEM engagement)	• Teen centres	• Children's museums
• HeadStart programs	• After-school programs	• Unhoused youth organizations	• Unhoused family organizations
• Library Reading groups		• Summer camps (particularly those focused on STEM engagement)	

Note: Created with BioRender.com.

lab and allow for more communication between groups before embarking on a co-created research project. We suggest that research labs bring their outreach event to the community partner's site rather than rely on community partners to visit the research lab unless that is the community partner's preference. This is because lab visits often rely on community partners to have available instructional time, money for transportation, and chaperones. A great example of an academic organization that adopts a needs-based outreach approach is NW Noggin (<https://nwnoggin.org/>).

Outreach can be a great low-stakes means to assess whether a partnership may be successful by getting a feel for whether the interests and values of the potential partner align well with that of the researchers. It can also be useful for establishing a relationship with a partner before asking them to contribute their own time to a research project, which may seem daunting.

2.3 | Cultivating a symbiotic relationship

If it appears that the community partnership will work, the next step is establishing a means of communication that works for both the researchers and community partners. Often, this involves traveling to the partners, instead of inviting them to meet in the lab, or scheduling meetings that can be held virtually. After establishing a sustainable means of contact, it is important to come to an understanding of the strengths, needs, and constraints of the community partner. Each of these elements will help shape potential research projects. For example, school staff might share that some students are struggling in a particular domain that might be related to the research project's main aims and including an additional measure to assess this domain would be of interest to both the school and the researchers. However, it is also important to keep in mind that community partners might not have the time or interest in diving into the research design process as we can do in our labs (e.g., finding that perfect task or questionnaire!). Furthermore, researchers should prepare for the possibility that the actual needs of community partners may differ from what the researchers anticipated.

One of the advantages of co-created science is that researchers may discover opportunities that never would have otherwise presented themselves. For example, it is likely that teachers and staff have questions that they would like examined and may have already been working towards that. The school may have data on student mental health that they are interested in expanding upon, and which may go back farther than researchers would otherwise have access to. Schools may also have an interest in the effects of new teaching methodologies or classroom technology that researchers may not otherwise know about.

Be prepared for the needs and interests of community partners to differ from those of the lab. We cannot expect students or schools to be up to date on all current developmental research, and they might be interested in a hypothesis that is not readily discoverable with current methods and tools, or that might be outside of the scope of the researchers' interests and expertise. This is where it is important to be clear about your resources and expertise, and work with community partners to find a solution that can meet the needs of both parties, something that may take multiple iterations through the design and feedback process.

2.4 | Sustainable partnership

Documenting the co-creation process in a way that is accessible to others can be invaluable to other researchers beginning the co-creation process and can improve the process for all involved. Just as with other aspects of the open science movement, we encourage developmental scientists to include details about their co-creation process within the Methods section of papers. Once data have been collected and analysed, returning to your community partner to discuss findings will allow for young people's perspectives to impact the interpretation of results. And, as mentioned in the first section, working with young people on dissemination projects can be a rewarding and fun way to nurture community partnerships (see an example in the Company Three's play *Brainstorm*; <https://www.nickhernbooks.co.uk/brainstorm>). Indeed, we hope that our writing this short article describing some lessons we have learned in our attempt to engage in co-created research will encourage collaborations and partnerships in the developmental science community. Consider sharing your outreach resources with other labs or community partners or create a network of partnerships. This could be in the form of a collaboration within your department, the creation of an outreach supply library, or making follow-up resources available to teachers.

3 | CHALLENGES AND LIMITATIONS OF CO-CREATED RESEARCH

While co-creation presents many valuable opportunities for improving research, there are several challenges and limitations that researchers should keep in mind. Co-creation requires a significant investment from researchers and community members. Both parties may face time constraints in terms of research timelines and availability to invest time throughout the co-creation process. Co-creation may also present difficulties for researchers with fewer resources, who may have less funding to compensate partners or pay research assistants to assist with coordination, and less time to travel to research sites or take on risky research projects. Additionally, many aspects of the research system (e.g., Institutional Review Boards) have not been designed with co-creation in mind, and there may be additional hurdles to jump through to get everyone on board (Goodyear-Smith, Jackson, & Greenhalgh, 2015). Finally, there is limited empirical evidence on best practices in co-creation, as methods are not always documented comprehensively (Larsson, Staland-Nyman, Svedberg, Nygren, & Carlsson, 2018). While these are significant challenges, we believe that as more researchers use co-creation as a tool and document their own experiences and lessons learned, the process will be improved for all.

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Lucy B. Whitmore: Conceptualization; investigation; visualization; writing original draft; writing review editing; supervision. **Kathryn L. Mills:** Conceptualization; investigation; writing original draft; writing review editing; supervision.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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