



THE UNIVERSITY OF  
WESTERN  
AUSTRALIA

# Evaluating the social impact of Scitech on the Western Australian community

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Research report for Scitech  
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# Acknowledgement of Country

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Scitech respectfully acknowledges the Whadjuk people of the Noongar nation, who are the traditional owners of the land on which our Discovery Centre and offices are located. We are honoured to be welcomed as guests on lands in regional and remote areas across Western Australia.

We recognise Aboriginal and Torres Strait Islander peoples as the first STEM practitioners, and value their knowledge as engineers, problem-solvers and innovators of this land.

We pay our respects to the Elders past, present and emerging.



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## Executive Summary

Science centres are a common offering amongst cultural experiences worldwide and provide hands-on, interactive experiences to promote science engagement, interest and life-long learning. Many rely on external funding from sponsors, grants and governments, with the expectation of ongoing evaluation to demonstrate performance against KPIs and, more recently, social impacts. However, many science centres face barriers to conducting evaluations, with most being done ad-hoc and focusing on single programs or experiences, so cannot account for all the factors that can influence visitors' science learning experiences.

Science capital is a framework that was developed to holistically understand the multitude of potential factors that influence young people's relationship with science and the formation of their science identity. Science capital has successfully been used to explore patterns of engagement in youth and adults with science communication activities, but not in a science centre context.

We developed a methodological approach to explore the relationship between an individual's engagement with Scitech and their overall science capital. The study had two key aims: firstly, pilot-testing our methods to determine if science capital was a valid evaluation approach for measuring science centre impact; secondly, to understand what role Scitech played in individuals' science capital development or reinforcement. Drawing on Scitech's database of email subscribers, 658 people completed the survey to measure science capital and recent engagement with Scitech; 17 then participated in follow-up interviews to explore their relationship with science and Scitech in further detail.

Through the survey, we found people who visit Scitech Discovery Centre possess a range of science capital scores, highlighting that Scitech is not just "preaching to the converted". The relationships between science capital and demographic variables were consistent with findings from other studies, reinforcing the validity of using science capital methods with adults. Follow-up interviews provided further detail about how people with different levels of science capital engage with and conceptualise science: People with 'High' science capital are passionate about science, see the relevance of it everywhere in their lives and actively encourage others to become involved; people with 'Medium' science capital are more pragmatic, and while being interested in science are equally motivated by their children's science interests to engage with science activities; people with 'Low' science capital are less likely to see the relevance of science in their daily lives, and engage with science for the sake of their children, to nurture or spark their children's interests, despite being less interested in science themselves.

Recently visiting Scitech, having a Scitech membership, seeing Scitech at community events and engaging with Scitech's online content and Adults Only events all correlated with having higher science capital. Encouragingly, the more people engaged with Scitech as a child through visits to the Discovery Centre, school excursions and incursions, and seeing Scitech activations at community events, the higher their science capital was likely to be.

Follow-up interviews highlighted that people visit Scitech to engage children (including their own children, grandchildren or school students) to provide them with opportunities to learn about science in a fun, hands-on environment. However, science capital plays an important role in *how* and *why* they engage with Scitech. People with 'High' science capital bring their children to Scitech because they are passionate about science and want to instil that passion in the next generation. People with 'Medium' science capital are interested in science and want their children to be interested in science, using Scitech as a vehicle to develop children's science interests and learning. People with 'Low' science capital view Scitech as a "science space", where they can nurture their children's science interests in a fun and safe environment.

Interviews also highlighted the universal joy Scitech brings and the value people in Western Australia place on having such a resource; not only for now, but as an asset for the future. Several people we interviewed expressed desires for Scitech to grow beyond its current capacity, upgrading experiences in the Discovery Centre, reaching more communities around the state and continuing to provide valuable learning experiences to inspire engagement in science, technology, engineering and maths.

We recommend that Scitech develops multiple Theories of Change to explore potential engagement and learning pathways for different audience segments with different levels of science capital. Future iterations of this research should include children as well as adults and compare the context of Scitech and the WA community with the science capital-building role of science centres in other states of Australia and countries around the world.



## Introduction

Science Centres are a common cultural experience worldwide, with most established to promote science engagement and understanding among their local communities. Science centres that receive government or corporate-sponsor funding, usually as part of a STEM (science, technology, engineering and mathematics) engagement strategy, are often asked to report on their contribution to STEM engagement within their communities (McKenzie, 2014; Pellegrini, 2014). However, there is little consensus in both the scholarly literature and amongst practitioners about how to measure the impact that science centres have on public engagement with science, at both the level of the individual and communities (Fischer et al., 2024; McKenzie, 2014; Ziegler et al., 2021).

Additionally, there have been calls to resist requests for assessments of impact that do not reflect current thinking on the diverse range of experiences and influences people encounter while their identities and attitudes develop (Volk & Schäfer, 2024). Evaluations that reduce the value of science centres to a simple metric, such as increasing the number of university STEM graduates, do little to fully describe the range of different social impacts of science centres, nor do they reveal the role science centres play alongside parents, schools, peer groups, and other extra-curricular activities in enabling a life-long relationship with science (Staus et al., 2021; Volk & Schäfer, 2024).

Evaluation of science communication activities is typically not conducted, being perceived as “too difficult” (Allen & Peterman, 2019; Busch et al., 2023; Volk & Schäfer, 2024). Evaluation efforts within science centres and museums typically face obstacles such as lack of funding or internal expertise, resulting in poor research design and outcomes that are difficult to compare across programs and institutions (Jensen, 2014; Volk & Schäfer, 2024). There is an urgent need to develop evaluation frameworks that are ‘fit for purpose’; that is, frameworks that empower science centres and similar cultural institutions to evaluate in a way that is meaningful to them, meaningful to their communities, and that can be completed with limited expertise and resources.

### Context: Scitech

Scitech is a not-for-profit informal science learning organisation based in Perth that has operated since 1988 (Scitech, 2024). Scitech’s purpose is “to inspire engagement by all Western Australians in science, technology, engineering and mathematics,” and offers a wide range of programs, across multiple locations and platforms, for different audiences. The Discovery Centre in West Perth typically welcomes students on school excursions and family groups, while the travelling Statewide team tours to regional and remote towns to engage schools, libraries, and playgroups, and participates in community events and agricultural shows. A team of Professional Learning consultants upskill teachers to improve their confidence and capability in teaching STEM, and the Digital Content team produces a range of online content, including videos, podcasts, science articles and at-home activities. Although the Discovery Centre caters mainly to toddlers through to teenagers, adults including teachers, parents, and university students also access their programs. As a not-for-profit organisation with limited resources for evaluation, Scitech typically focuses MEL (monitoring, evaluation and learning) efforts on measuring short-term outcomes of programs and experiences to provide data for continuous improvement and KPI reporting. To expand our research capability, Scitech approached the Science Communication unit at the University of Western Australia (UWA) to assist with conducting a holistic evaluation of the social impact of Scitech in the West Australian community.

## Social Impact Measurement of Science Centres

There are a range of methods used for evaluating museums and science centres, as described in the scholarly literature. These can be broken down into the following three main approaches:

1. *Basic, summative evaluations that focus on a single visit, program or science centre.* As discussed by Volk & Schäfer (2024), these studies often focus on visitor's overall experience, learning outcomes, changes in attitudes to science (e.g. Falk & Needham, 2011; Shaby & Vedder-Weiss, 2021), or social return on investment (e.g. Bankwest Curtin Economics Centre, 2020; Deloitte Access Economics, 2024; Groves, 2005). Their application to understanding broader social impacts is limited as they often do not consider other contextual factors that influence people's relationship with science, do not consider medium to long-term effects, and use bespoke approaches that make comparisons across science centres, programs and visits difficult.
2. *Logic Models and Theory of Change.* Logic Models are a visual representation of how a program or social intervention is predicated to work, by creating a flow-chart indicating required resources, key activities, outputs and expected outcomes over time (Wholey et al., 2004). A Theory of Change extends a Logic Model to map how these activities (such as visiting a science centre) can lead to longer-term desired impacts, by providing a way to determine causal links between inputs and outcomes, and can be used during strategic planning activities and predict their effectiveness. Although not commonly used in the evaluation of science centres, Theory of Change approaches have been applied to other social problems such as homelessness, and within science education to identify pathways to science careers (Davenport et al., 2020). However, they typically assume that processes are linear; evaluators must also consider the broader contextual factors and external influences beyond the scope of intervention that can affect the desired outcomes.
3. *Science capital.* Science capital draws on Bourdieu's theory of social, symbolic and cultural capital (Bourdieu, 1986) to account for broader contextual factors that influence young people's relationship with science. It has been used in some studies to evaluate the impact of science communication activities, such as long-term STEM engagement programmes (Padwick et al., 2023), maker workshops (Christidou et al., 2021), and science festivals (Gathings & Peterman, 2021), and more broadly to explore patterns in science engagement among youth (Jones et al., 2022; Nicolaisen et al., 2023; Padwick et al., 2016; Stahl et al., 2021) and adults (Godec et al., 2024; Suorti et al., 2023; Turnbull et al., 2020). While science capital alone does not provide insight into the causal relationships between activities and outcomes required for evaluation, it can be used as a conceptual tool to understand and predict patterns of science engagement, especially amongst young people.

Of these evaluation approaches, Scitech typically conducts summative evaluations of single programs, for internal monitoring and external reporting for government and corporate sponsors, and has developed a preliminary Theory of Change to broadly explain the potential science learning journeys of children, parents and teachers when engaging with Scitech's programs and content. However, as outlined above, there are limitations to both. Single-program, summative evaluations do not capture the full picture of how different experiences work together to contribute to an individual's science learning and participation. Theories of Change and Logic Models provide a useful guide for identifying relationships between science engagement activities and predicted outcomes, but are weakened if they do not bear in mind external factors that can influence the success of intended long-term impacts. Therefore, we have chosen to use science capital as a theoretical framework to guide this research, as it considers all of a person's science-related experiences, influences and knowledge, creating a more holistic understanding of an individual's relationship with science.



## Science capital

Science capital, as described by Archer et al. (2015), is a conceptual tool that was developed to understand why young people did (and didn't) pursue science studies or careers after finishing high school. By considering the science-related aspects of cultural, social and symbolic capital, science capital accounts for all of an individual's science-related resources, attitudes and ways of thinking (Godec et al., 2017). Science capital is a useful tool for explaining why some people feel more comfortable and confident within science 'spaces' (physical or figurative), while others do not.

Archer et al. (2015) identified eight key dimensions that contribute to science capital, including:

- Science literacy,
- Science-related attitudes and values,
- Knowledge about transferrable science skills and knowledge,
- Science media consumption,
- Participation in extra-curricular science activities and informal science learning,
- Family science skills, qualifications and knowledge,
- Knowing people in science-related roles, and
- Talking about science as part of everyday life.

As an organisation delivering programs and content across multiple locations and platforms, Scitech may influence multiple dimensions of science capital – not just participation in informal science learning.

## Objectives of this study

This study aimed to use science capital as a lens to understand how engaging with Scitech, across programs and experiences in the Discovery Centre, in the community and online, contributes to people's relationship with science. We anticipated that people from lower socio-economic backgrounds (who may also have lower science capital) would benefit from interacting with Scitech in a different way than those from higher socio-economic backgrounds. This study was designed as a pilot to test these methods and to provide insight into whether this approach could be applied on a larger scale.

# Methods

## Data collection

We conducted this study in two parts: an online quantitative-focused survey, and qualitative interviews. An invitation to participate in the survey was sent (in April 2024) to approximately 33,000 contacts in Scitech's email database, including Members, Educators and the Customer Reference Group (recent visitors who have opted-in to receive further information about research at Scitech). Participants were required to be 18 years or older, and current residents of Western Australia. A target sample of adults was a pragmatic decision; research with children requires additional research ethics committee approvals, and we wanted to simplify the process to allow us to focus on testing the validity of these methods for the pilot study within a relatively short time frame.

The survey was hosted on Qualtrics, under license to UWA, and anonymously collected information about participants' demographics, science capital and engagement with Scitech. Open-response questions, including childhood memories of Scitech and describing how science related (or didn't rate) to the participant's current occupations were also included. Science capital questions were adapted from the survey used by Moote et al. (2020). The wording of some questions was adjusted to be suitable for adults and an Australian context; for example, 'My teachers have specifically encouraged me to continue with science after GCSEs' was changed to 'At school, my teachers specifically encouraged me to continue with science after high school.' We also included additional answer options for questions relating to who they talk about science with or people they know who work in a science-related role; for example, 'My partner or spouse' and 'My children'. By completing the survey, participants could enter a prize draw to win one of ten \$50 Visa prepaid gift cards. The survey questions can be found in [Appendix 1](#).

Semi-structured interviews were conducted following the survey (between May and July 2024). Interviewees were recruited from survey participants who indicated their interest in taking part in a follow-up interview. Following analysis of science capital scores, interview participants were randomly selected from 'High', 'Medium' and 'Low' science capital groups using a random number generator<sup>1</sup>. Potential participants from Perth and Regional WA were added to the interview target sample, ensuring we were reaching a range of people with diverse experiences and perspectives.

Most interviews were conducted virtually via Microsoft Teams, with a few facilitated over the phone or face-to-face, depending on the participant's preference. They explored participants' everyday activities, hobbies and science experiences, attitudes towards science, other science capital influences, and recent and childhood memories of Scitech in more detail. Interviews took between 15 to 47 minutes, averaging 27 minutes. Interviewees were given either a \$50 Scitech Discovery Shop gift card (or a \$50 Australian Geographic online shop gift card for regional participants) in exchange for their time. All interviews were audio-recorded and transcribed to "intelligent verbatim", as described by McMullin (2023). The interview protocol can be found in [Appendix 2](#).

This research was approved by the UWA Ethics Committee to ensure ethical conduct during data collection (HREC-2023/ET000797).

## Data analysis

Science capital scores for survey participants were calculated by assigning numerical values to answers to the science capital questions, as described by Moote et al. (2020). Answer options such as 'My children' and 'My partner or spouse' added to the survey were coded in alignment with the analysis of answers as described by

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<sup>1</sup> [RANDOM.ORG - Sequence Generator](https://www.random.org)

Moote et al. (2020). For example, 'My children' and 'My partner or spouse' were assigned a value of 2 when survey respondents described who they knew who worked in a science role, in alignment with the coding of 'Parents or guardians' from the original survey, assuming adult participants would have a similarly close relationship with their partners and children.

The overall science capital scores were calculated by adding the sum of the individual scores together, creating a range from -18 to 31. As described by Moote et al. (2020), respondents were assigned categories of 'Low', 'Medium' and 'High' science capital by dividing the range of scores into equal thirds, with the lowest third being assigned 'Low', the middle third being assigned 'Medium' and the highest third being assigned as 'High' science capital.

Quantitative survey data were analysed using a combination of descriptive and inferential statistics. Descriptive statistics included percentages to calculate the relative proportions of subsamples to compare with ABS Census data. Inferential statistics were calculated using R version 4.4.1, by external statistics consultant Kenneth Sim<sup>2</sup>. Spearman and Pearson correlations were used to compare relationships between science capital scores and demographic variables (including age, gender, parents' education and jobs, participants' education, and geographic location), recent Scitech engagements (including visits to Scitech Discovery Centre, Adults Only Events at Scitech, participating in incursions, seeing Scitech at community events, engaging with Scitech's digital content) and historic Scitech engagements. To further examine the relationship between statistically significant correlations, Bootstrapped ANOVA tests (using 10,000 case resamples) were conducted to test the relationship between science capital and the following variables:

- Gender (including Male, Female and Prefer to self-identify)
- Current occupation
- Current postcode
- Childhood postcode or town
- Time since the last visit to Scitech.

Effect sizes (r-values) of less than 0.3 indicated small effects, 0.3 to 0.5 suggested medium effects and 0.5 or greater indicated large effects (Pallant, 2011).

Responses to open-response questions in the survey were coded by summarising or paraphrasing and the identification of keywords to create descriptive summative codes (Hsieh & Shannon, 2005).

Qualitative interview data were coded inductively, where codes were developed by identifying core themes and categories in the data (rather than based on a set of pre-existing codes), using NVivo 14. Codes described themes (as described by Braun & Clarke (2012)) and functional categories, such as 'Frequency of visits.' The full codebook can be found in [Appendix 3](#).

## Sample

We received 658 complete and 94 partial responses to the survey, with 379 respondents opting in to be contacted for interviews. Table 1 provides an overview of survey participant demographics, compared with ABS Census data where relevant. As shown in Table 1, women, people in Professional-type occupations and teachers were proportionally over-represented, compared to the Western Australian population.

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<sup>2</sup> Kenneth (Kenny) Sim has recently completed a PhD in psychology at UWA, and is currently completing a Post-Doctoral Fellowship with the ARC Centre of Excellence in Plants for Space at Flinders University.

**Table 1 – Survey respondents' demographics**

Demographic variable	n	Percentage of sample (%)	ABS Census, WA comparison (%)
Age			
18 to 25	19	2.9	
26 to 35	108	16.4	
36 to 45	355	54.0	
46 to 55	102	15.5	
56 to 65	40	6.1	
66 to 75	27	4.1	
76 to 85	7	1.1	
Gender			
Male	128	19.5	49.7
Female	518	78.7	50.3
Prefer to self-identify	6	0.9	<i>Not available</i>
Prefer not to say	6	0.9	<i>Not available</i>
Location			
Perth Metro	589	89.5	78.7
Inner Regional	43	6.5	8.8
Outer Regional	8	1.2	6.9
Remote	5	0.75	3.3
Very Remote	8	1.2	2.3
Not answered	5	0.75	
Household Income			
Below median (Less than \$1750 per week)	168	25.5	50.1*
Near median (\$1750 to \$1999 per week)	201	30.5	5.9*
Above median (\$2000 or more per week)	289	43.9	44.1*
First Nations Status			
Aboriginal or Torres Strait Islander	4	0.6	3.3
Not Aboriginal or Torres Strait Islander	650	98.8	91.4
Prefer not to say	4	0.6	5.3
Cultural and Linguistic Diversity			
Speaks another language at home	177	26.9	24.7
Speaks English only	481	73.1	75.3
Highest Level of Education			
Primary School	12	0.3	
High School	305	5.5	41.9
TAFE	31	10.2	30.6
Bachelor's Degree	174	36.3	18.5
Post-graduate Diploma or Certificate	54	21.3	2.6
Master's Degree	56	21.1	4.6
PhD	26	5.3	1.0
Occupation			
Clerical or Administrative worker	34	5.2	12.1
Community or Personal Service worker	42	6.4	11.8
Labourer	1	0.15	9.4
Machinery Operations or Driver	4	0.6	7.7
Manager	43	6.5	12.3

Demographic variable	n	Percentage of sample (%)	ABS Census, WA comparison (%)
Professional	354	53.8	21.9
Sales worker	9	1.4	7.8
Technical or Trades worker	29	4.4	15.3
Stay-at-home parent	69	10.5	
Student	42	6.2	7.04*
Retired	32	4.9	14.8*
Educators			
Teachers	170	25.9	4.25*
Not teachers	488	74.1	95.7*

All Census comparisons indicate the proportion of the WA population<sup>3</sup>, except for percentages marked \*, indicating proportion of the Australian population where WA-specific data are unavailable

Initially, 30 survey respondents who had indicated their interest in being interviewed were contacted via email; 16 interviews were arranged and conducted. Following this, six more people who indicated they had visited Scitech frequently during their childhood were contacted to participate in interviews; one extra interview was conducted, bringing the total to 17. A summary of demographic variables for interview participants can be found in Table 2.

**Table 2 – Interview participants**

Variable	n
Science capital range	
Low	6
Medium	6
High	5
Gender	
Male	6
Female	11
Location	
Perth Metro	15
Regional WA	2
Cultural and Linguistic Diversity	
Speaks another language at home	4
Speaks English only	13
Average household income	
Below median (Less than \$1750 per week)	7
Near median (\$1750 to \$1999 per week)	3
Above median (\$2000 or more per week)	7
Educators	
Teachers	6
Not teachers	11

<sup>3</sup> (Australian Bureau of Statistics, 2021h, 2021f, 2021g, 2021e, 2021c, 2021d, 2021b, 2021a, 2024)

## Results

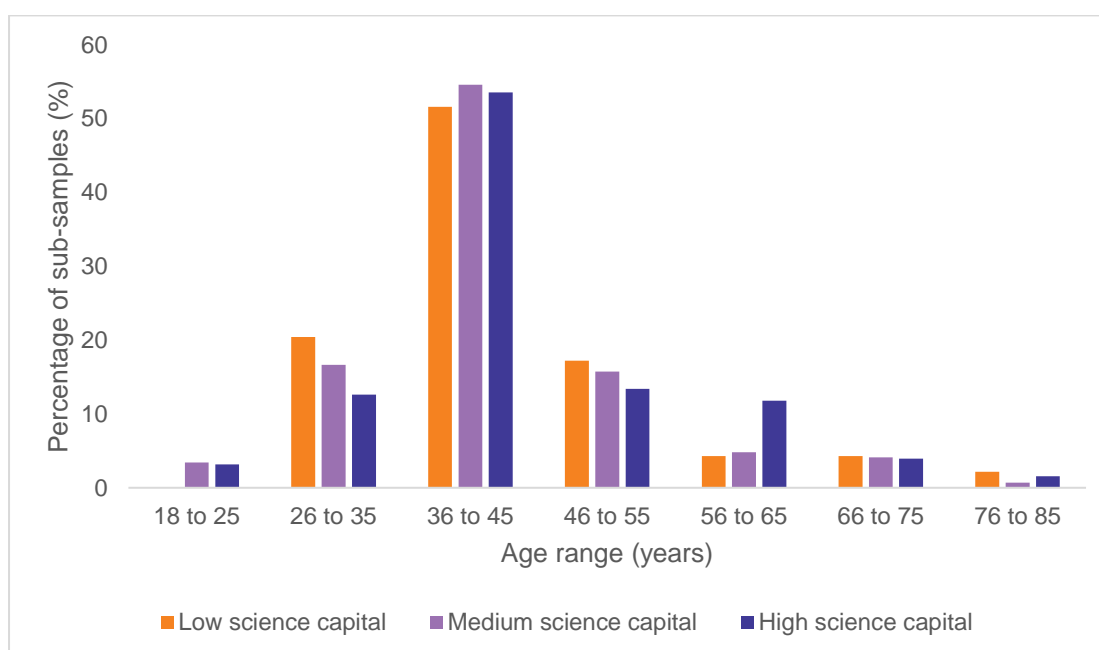
Science capital scores, calculated by assigning number values to the respondent's answers to the science capital questions, ranged from -18 to 31 (see Table 3). Most respondents had either 'Medium' or 'High' science capital, with just over 14% comprising the 'Low' science capital segment.

**Table 3 – Science capital scores of survey participants**

Science capital range	Minimum score	Maximum score	n	Percentage of sample
Low	-18	-2	93	14.13374
Medium	-1.5	14.5	438	66.56535
High	15	31	127	19.30091

## Demographics

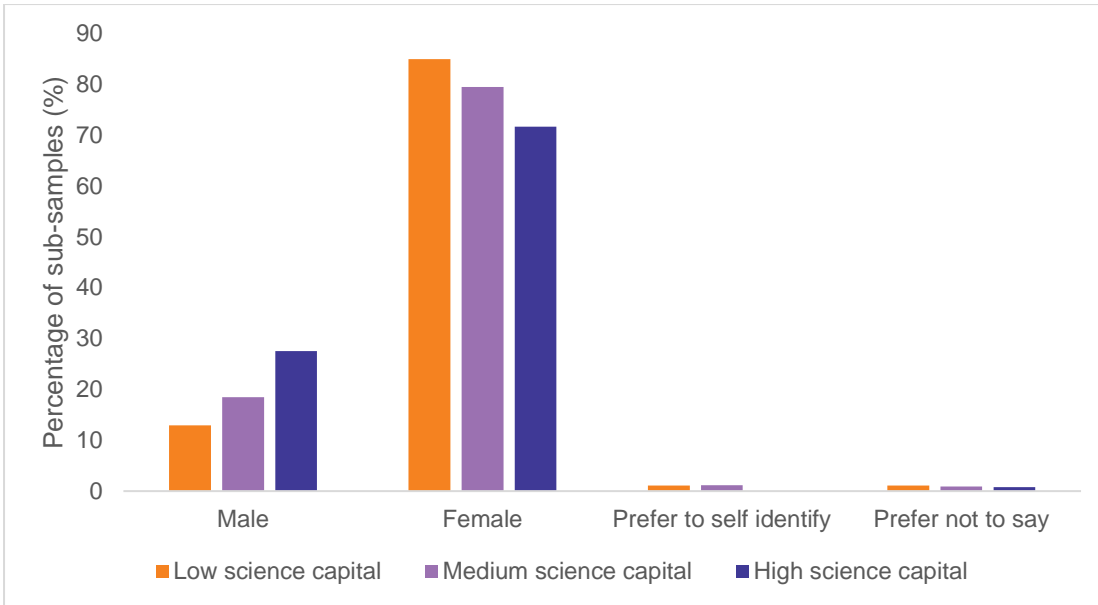
The survey was completed by people from a wide range of ages, with most being between 26-to-55-years-old (see Figure 1). There was no statistically significant relationship between participants' age and science capital.



**Figure 1 – Age ranges, compared to science capital**

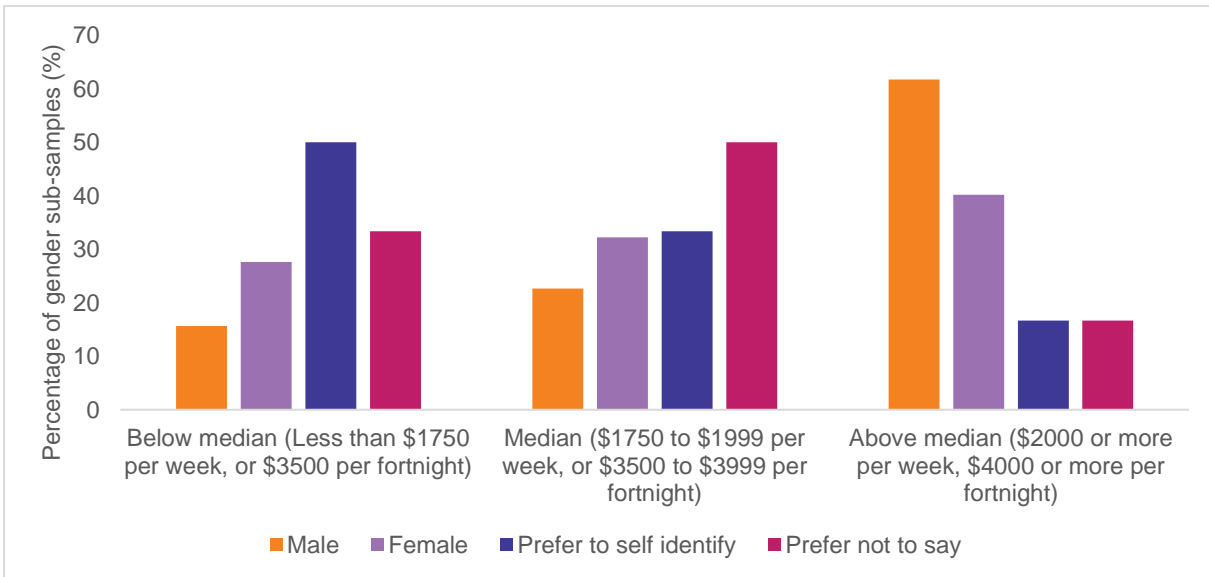
Gender told a different story (see Figure 2). While women were more likely to complete the survey (78.7% of the sample, see Table 1), participants who self-identified as 'Male' were more likely to have higher science capital than those who identified as 'Female' or 'Prefer to self-identify'. However, the effect size was small ( $p=0.004$ ,  $r=0.13$ ).



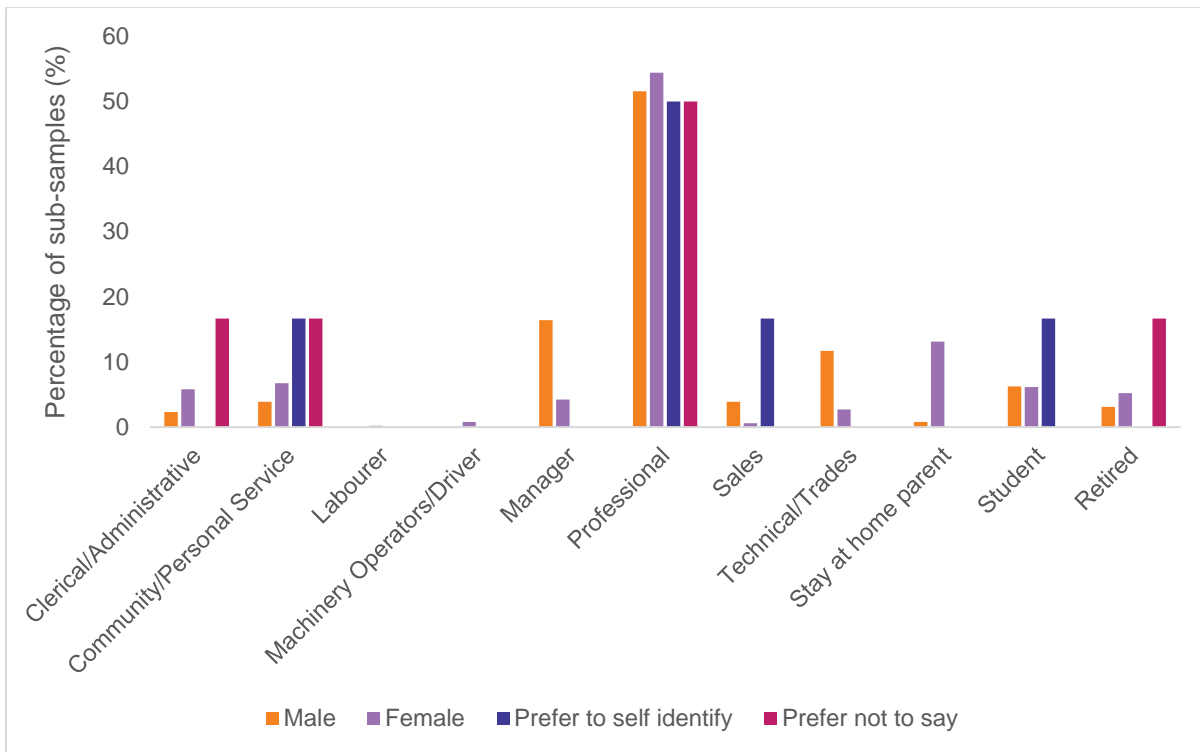


**Figure 2 – Gender, compared to science capital**

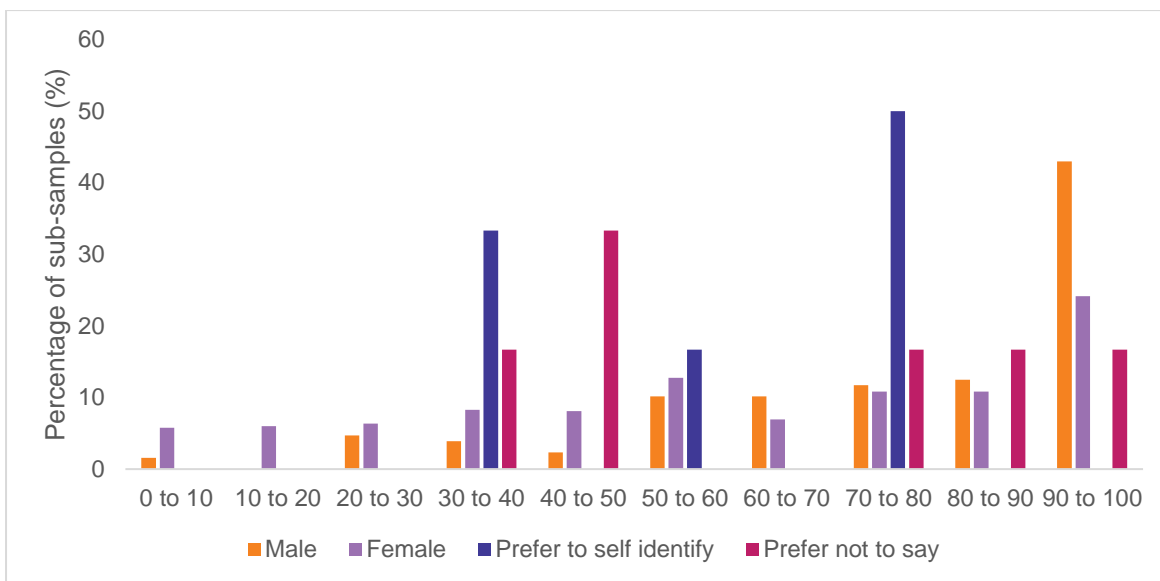
To explore the relationship between science capital and gender further, we compared gender with household income (Figure 3), occupations (Figure 4), and the extent to which participants perceived their current jobs related to STEM (Figure 5). As shown in the respective figures, males were more likely to report above-median household income and rate the association of their jobs to STEM in the 90<sup>th</sup> percentile. Men were also proportionally more likely to work in Technical or Trades and Manager occupations than women.



**Figure 3 – Household income, compared to gender**

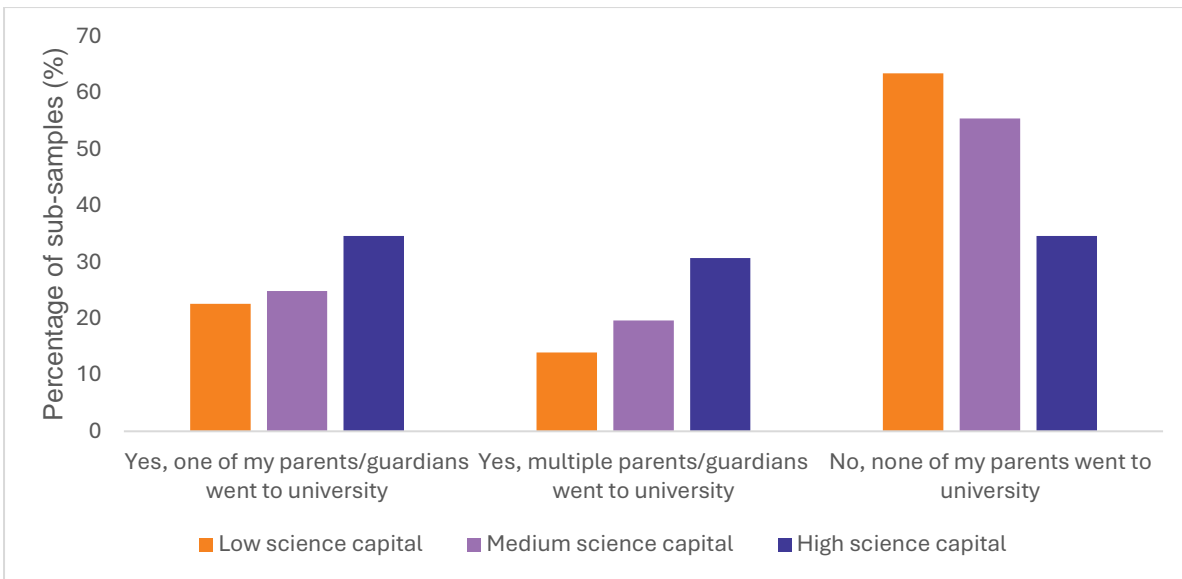


**Figure 4 – Occupations, compared to gender**



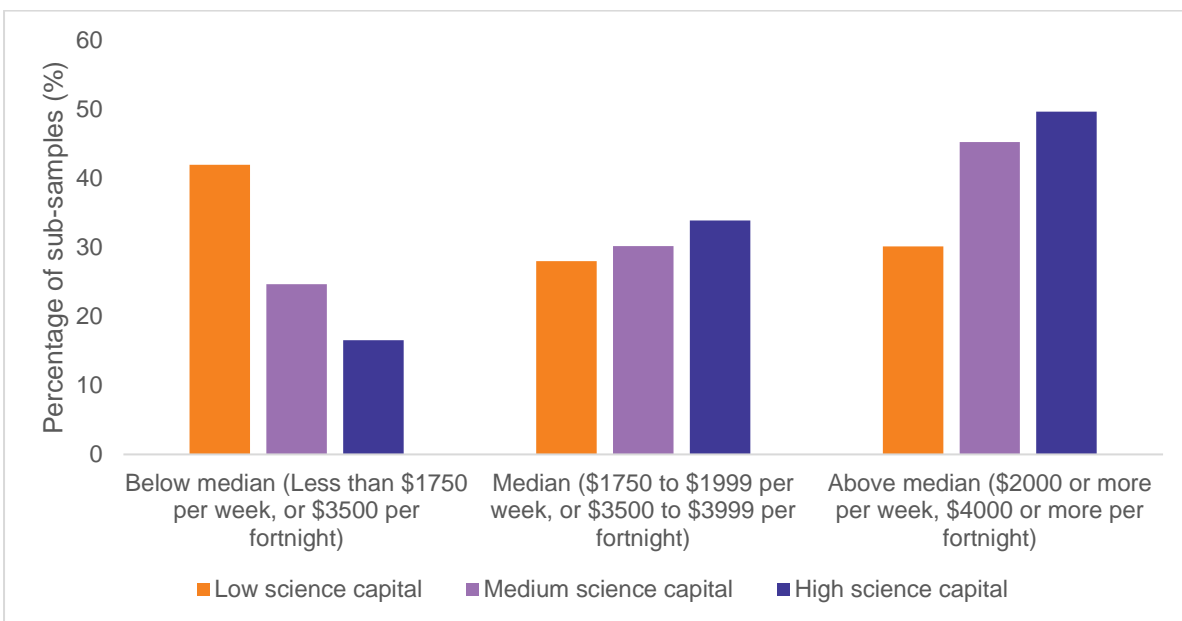
**Figure 5 – Extent participants' jobs relate to STEM, compared to gender**

Survey participants who had at least one parent or guardian who had attended university were significantly more likely to have higher science capital ( $p < 0.001$ ) (see Figure 6), though the effect size was small ( $r = 0.17$ ). However, whether participants' parents had a paid job while they were a child did not significantly correlate with science capital.



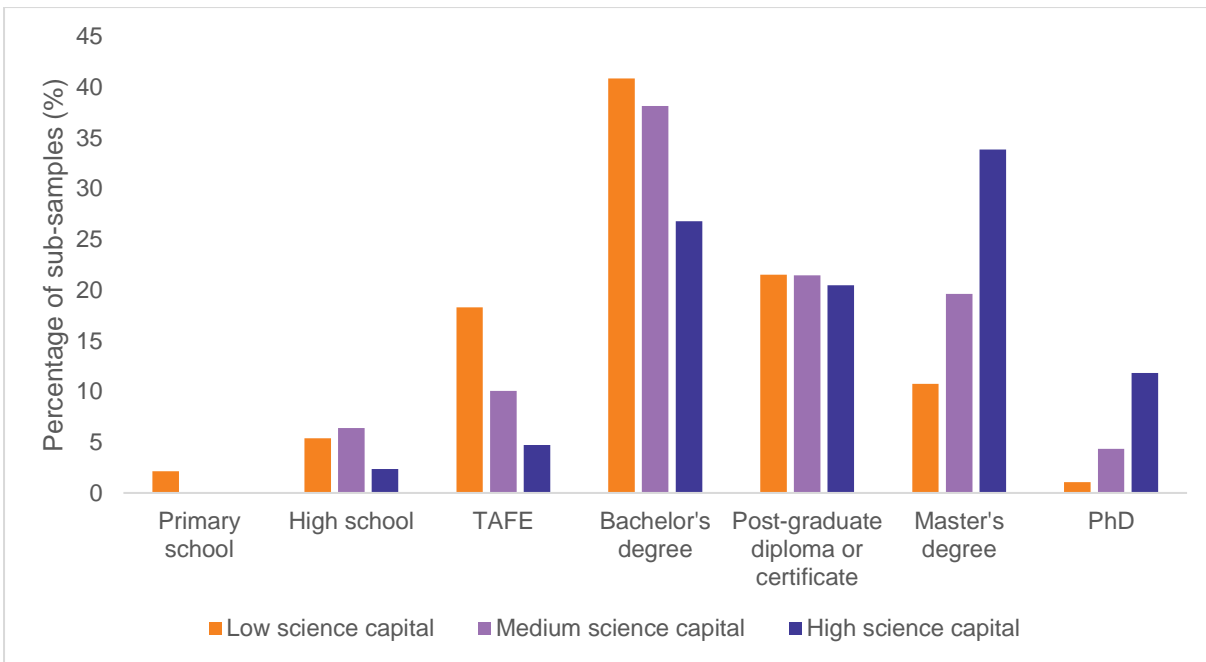
**Figure 6 – Parents' attendance at university, compared to science capital**

Participants who reported higher household incomes were significantly more likely to have higher science capital ( $p < 0.001$ ), though the effect size was small ( $r = 0.16$ ) (see Figure 7).



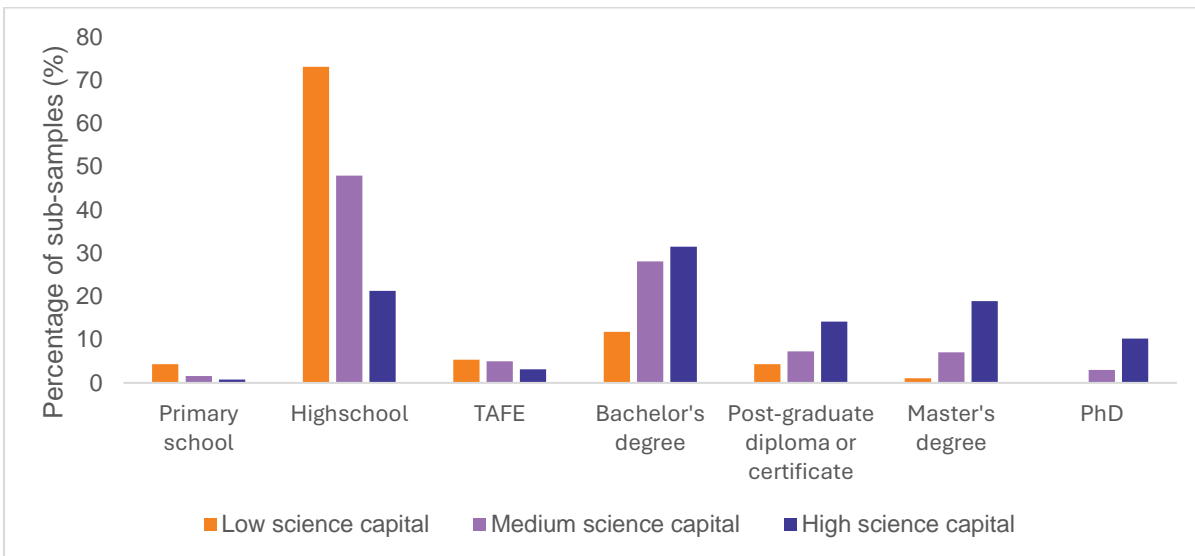
**Figure 7 – Household income, compared to science capital**

Survey participants who had completed higher education (in any field) were significantly more likely to have higher science capital, with a medium effect size ( $p < 0.001$ ,  $r = 0.27$ ). This was most prominent in those who had completed postgraduate study, including a Master's degree or a PhD (see Figure 8).



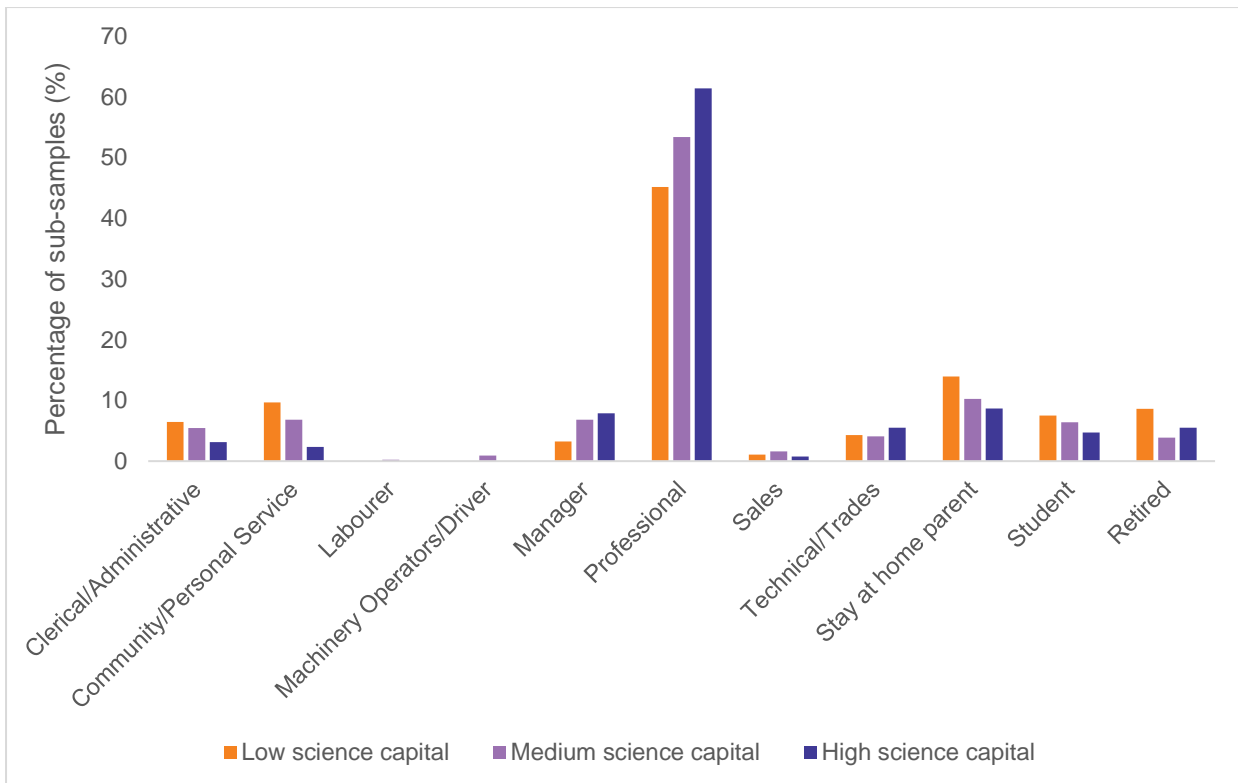
**Figure 8 – Highest level of education, compared to science capital**

Similarly, as shown in Figure 9, participants who had studied STEM after high school (especially at university) were significantly more likely to have higher science capital, with a medium effect size ( $p < 0.001$ ,  $r = 0.38$ ).



**Figure 9 – Highest level of STEM education, compared to science capital**

Current occupations also had a significant relationship with science capital. Those who self-reported their occupation as Professionals (including Arts, Media, Business, Design, STEM), had higher science capital than participants who self-reported as Community or Service Workers ( $p = 0.034$ ) (see Figure 10). Participants with higher science capital were also significantly more likely to indicate that STEM was a core part of their job, with a medium effect size ( $p < 0.001$ ,  $r = 0.29$ ). However, there was no significant correlation between being a teacher (as self-reported in the survey) and science capital.



**Figure 10 – Occupations, compared to science capital**

Almost 1 in 3 survey participants spoke another language at home (see Table 1), but there was no statistically significant relationship between Cultural and Linguistic Diversity and science capital. Similarly, there was no significant relationship found between participants' First Nations status and science capital. However, due to the very small proportion of participants who identified as First Nations Australians (n=4, see Table 1), conclusions about the relationship between these two variables cannot be confidently drawn. Finally, participants' geographic remoteness<sup>4</sup> based on their current postcodes and where they lived as a child (for those who grew up in Western Australia) was also unrelated to science capital.

## How does science capital influence engagement with science?

### High Science Capital

All but one of the 'High' science capital interviewees (n=5) identified as "science people". The one who did not identify as a "science person" reflected that they still had a lot to learn while studying at university, and didn't think they were quite at that level yet.

"I would consider myself down the middle really. Interesting, because I ended up doing Public and International Health, which is a mixture of both!"

"A lot of my framing of the world is based on science and physics and how your body works ...the way I've been taught to think about things throughout my school is very much like a science mindset."

"I think maybe I'm too bookish for science. I still have a lot to learn, and still have a long way to go."

<sup>4</sup> Based on the Australian Bureau of Statistics Remoteness Areas: [Census geography glossary | Australian Bureau of Statistics](#)

All engaged with science through their work or study, as teachers, an engineer, an engineering research student, and a retired lecturer. Most also had science-related hobbies, including nature walks, SCUBA diving, backyard tinkering, reading popular science and engaging with other science centres and museums.

“We've got a five-year-old at the moment, so pretty much all my spare time is spent with him. A good chunk of that is going to Scitech, to be honest. But also doing stuff where I might be working in the shed, doing all sorts of odd projects and sort of teaching him about tools and building things and whatnot, and also things in the garden and going out to places. And we like going to various museums and libraries and the aviation museum and stuff.”

“I love learning, and I'm totally addicted to reading and watching as much as I possibly can about all sorts of different things, and so I will often watch science documentaries on YouTube, and read science books, particularly ones that are written sort of more at the pop culture level.”

“I used to do SCUBA, and I had the same feeling now. I remember being on the barge that's off the North Mole in Freo and just looking at the square meter, thinking there are so many different species here and I haven't a clue about any of them! It's that more, 'I don't know anything.’”

The key motivators for engaging with science for ‘High’ science capital interviewees were personal curiosity and interest – they were simply fascinated by the world around them and how it works.

“I know when I'm walking, I'm always fascinated by the plants that we've got in WA because I just find them so unusual, some of them are so weird! ... I mean, it's not like I'm a plant person, but the things I've seen, it's not normal. So I suppose inadvertently, I'm always looking.”

“I question everything...for example with the Aurora Australis that happened just recently ... For some people, they might look at that and think, ‘Oh, it's just a beautiful natural wonder.’ Whereas I'll look at things and think, ‘Oh, I wonder why that's working that way?’ or ‘I wonder why it's happening?’ and things like that.”

Interviewees with ‘High’ science capital discussed science in terms of being curious, discovering new things, learning from failures and the wider epistemology of science.

“Curiosity, imagination, wanting answers to the world.”

“We need to make decisions based on results and past history. You collect and then try to refine your decision, refine your judgment based on the data”

“I see science both as a body of knowledge, but also as a very important tool for decision-making and knowledge gathering and the epistemology of it all.”

All agreed that science and applications of science can be found all around them, with most noting they use science to make day-to-day decisions.

“I think it's important to everybody's life because science is all around you, [and] most people don't realise ... I would include myself in that. I don't think about science, but it's there in everything we do. If it wasn't for science, we wouldn't be switching on an electric light.”

“I've got a mould infestation, and I use one type of cleaning product and it doesn't get rid of it. Well, then you try another one and you keep going until you find what works. I mean, so that's [the] scientific method just appears everywhere all the time and more so than I think people realise.”

‘High’ science capital interviewees felt strongly connected to science through everyday actions and challenges, especially the climate crisis. Two mentioned childhood experiences that strongly influenced their current connection and interest in science.



“Where I'd love it [science] to fit more is getting the solutions to the mess that we've made of the planet! ... We need science. And we need the research to give people information. I think they're beginning to realise it after this summer, and the weather we've been having. I think people are finally going, 'Ooooh, maybe they've got a point.’”

“In some cases, it's taking something good and making it better, like medicine, and in other cases it's trying to arrest something that's not going the right way, and point it somewhere more constructive, like climate and greenhouse gases and whatnot.”

“Growing up, we were very much a science and STEM kind of kind of household ... Mum and Dad were always doing similar things that we're doing now. They were very much explaining science and getting us to investigate things scientifically that we found, and we had a subscription to Double Helix<sup>5</sup> for as long as I can remember.”

Those with 'High' science capital were also likely to have friends or family members working in STEM careers and typically talked about science with their children, family and friends.

“My wife's a meteorologist ... so she might come home and mention that they've been learning a new modelling system that tries to predict where bad bushfire conditions are ... And I've got a bit more computer modelling experience, and I'll ask questions about where they get the data from to feed this model, and how they measure these things ... Sometimes if our son talks about something they did at school. 'We learned about such and such a thing of, you know, animals that live in the ocean.' And so, we'll go off on a side-run about whatever ocean wildlife one of us has heard about and things like that.”

“My mother-in-law, who is a music teacher, like music isn't always thought of as having science, but it is like we talk about how the airflow through the flute and the temperature changes can affect the way the flute sounds and things like that.”

“My pub trivia team, last week, we were calculating the focal length of the glasses of someone at our table just for fun.”

### **Medium Science Capital**

Similar to the 'High' science capital interviewees, all those interviewed with 'Medium' science capital scores (n=6) self-identified as being “science people” or having a strong interest in science.

“That's not a yes-no question. I'm interested in science. I love hearing about it. That said, I don't always understand it. I loved it at school. I love biology and chemistry. I adored it. I wasn't brilliant at it, but I loved it. I haven't followed it up, particularly in my adult life, except it for my own interest.”

“I would say [I'm a science person] because like I wanna know how things work and the reasons why not just saying something and going oh, that just happens. Like really actually wanting to know that there's probably some sort of scientific explanation for it and wanting to know about it.”

Interviewees with 'Medium' science capital typically engaged with science through the natural world, at-home projects or activities with their children, engaging with science media and informal science learning. Four also engaged with science through their jobs: one working as a laboratory manager, one IT specialist and two teachers.

“It's a big part of my life. I run a testing laboratory. We test steels, welds, plastics, bolts. We do failure investigations on bits of metal that have failed ... I've got two young kids, and we use science to explain things ... having a fire, things you can set on fire, things won't set on fire, why they will, why they have smoke, why it's hot. It's not just seeing things, but understanding things.”

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<sup>5</sup> [Double Helix](#): CSIRO Science Magazine for children

“I started running the bird-watching club, and we just do it for fun. We just go, have a look around, look at the birds. It's something for the kids to do. At the end of each month, we try and create a tally, and graph it out and have a look [at] what birds we've seen. And it's given the kids a little bit of incentive to be a little bit more mindful.”

“I'm always excited about new ideas. I love listening to Doctor Karl ... and David Attenborough ... I was brought up on all of those... My husband keeps saying we need to invest in a proper telescope, so when we get round to doing that, I'll become one of those crazy, nerdy people, who kind of races out and tries to see stuff. And my idea is that when I retire, I'll be heading off into the outback to stargaze. That's my big bucket list dream.”

“My YouTube history probably tends towards sciencey knowledge, whether it's sort of more on the popular science side than a deep dive.”

Key reasons for engaging with science for 'Medium' science capital interviewees included influencing their children and students, their own or their children's science interests, and aiming to make the world a better place.

“I wanna know how things work and the reasons why not just saying something and going, 'Oh, that just happens.' Like really actually wanting to know that there's probably some sort of scientific explanation for it and wanting to know about it.”

“I think, as a teacher, the most important part is developing an understanding of nature and protecting nature and going down that path. As a mum, for my family, it's about sports science, our bodies, how they move, how we keep strong, how we keep them healthy.”

“I think my eldest son is probably the biggest driver of it. He is interested but also knows that I do science for a living, so he'll come up with an idea and then run it by me, and then we'll go and do it.”

“I gravitate towards science, and I think I always ... I'm kind of hyper-aware now because of my children. But actually, if they weren't doing it, I would go that way anyway ... I always get hyper-excited about whatever sciencey thing is going on [at the WA Museum] and their research and I have been known to take myself off to their talks and what have you.”

Three interviewees also discussed key science engagement experiences, that either reinforced or encouraged their science interests.

“Two years ago, I went on a Bush Blitz expedition with TeachLive. I was out in the field with scientists, scooping up species and fish and lizards. And then at the end of the night, after having dinner together, like in a makeshift lab and categorising and looking at things, just really being out in, in the bush camping [and] talking science ... just being able to connect with other scientists, and talking about those things that not everyone wants to just sit around and chat about.”

“We had a very well-stocked science department at school. That was a big focus of learning in the biology, physics, chemistry, not just the practical aspects of it, but that actual curiosity discovery, scientific method, creative thinking, analytical thinking, was all part of my education and growing up. It was very normalised for me to think about stuff analytically, think about it critically.”

“I guess I also sort of fell into it [science]. We're in a mining state, I'm heavily involved in the mining industry and it was an exciting and interesting way of earning money ... I started as a purchasing officer [at an engineering company] ... and then shifted into their heat treatment facility with a bunch of metallurgists who basically taught me everything ... That was 20-odd years ago, and now I've run the biggest destructive testing labs in Australia ... The unique part of it was I got to break things, and I got paid for it! As an 18-year-old bloke that was a pretty cool trade-off.”

'Medium' science capital interviewees talked about science in terms of learning from failure, the process of discovery and curiosity, and how science can improve our lives. In contrast to those with 'High' science capital, one interviewee discussed science in terms of subjects, rather than an all-encompassing way of thinking.

"Sometimes science experiments don't work, and that's part of the exciting parts of science, is that if everything worked and everything did exactly what it should do, then it wouldn't really be science."

"I think it's even more important than just that kind of streamlined maths and literacy because if you're doing science, you get both of those skills and being informed about things you know, like even just as simple as advertising. And, you know, when claims are made about foods or medicines or programmes and things like that, like actually looking at that and going well."

"Well, with science we do things easier ... [for example] when you open a newly bought jar from the store and sometimes you cannot open the lid? Well with science, just adding a little rubber band, it helps increase the friction so the lid can be open and it's already science. It's making my life easier."

Similar to the 'High' science capital interviewees, those with 'Medium' science capital agreed that science is all around them and saw it as a valuable part of their everyday life.

"I feel like now that I teach science full time, I just see it everywhere, in everything ... I've been teaching the year threes about the phases of the moon. I was driving home, and it was a full moon, and it was just beautiful. I was just like, I hope some of my students look up at that ... I would love if they, you know, thought about the things that I'd taught them."

"I think that's really part of how I'd naturally operate is sort of quite I tend to be quite curious about things ... Is that something I think about day-to-day? Probably not heaps, but I consider it a value valuable part of the world around me ... I think the value of the world around us is deeply based in science and discovery and the advancement that's come from that. And so how we've come to be where we are, as people, has come from that scientific endeavour and artistic endeavour, and those are often intertwined."

Interviewees felt connections to science through their work and global issues, such as the climate crisis.

"I think my life would be a lot less rich and a lot more dull without it [science]. And I also think that with climate change so obviously upon us. And all the topics of science being so relevant today, too, our survival."

"Our current topic [at school] is about the environment and habitats and how the environment influences us, how the environment is important for humans and animals, and how we can protect it ... [Local council representatives] take us out on little excursions to help plant trees in places. We've got the numbat in our area, which is bordering on going extinct, and we create little homes for them. And yeah, so it [science] seeps very easily into our existence."

Most interviewees with 'Medium' science capital regularly talked about science with others inside and outside of a professional context, including with their children, colleagues and friends who worked in science-related roles. Science-related conversations were typically embedded in context, rather than specifically to discuss science.

"There is a huge clash between mining and farming, and especially the mine site is extending. We have to talk about their positives, because they bring a lot of money to us, and they bring a lot of minerals that help with us our development through machinery, through technology, through everything. But also recognise the damage they might be creating to nature. It's really conflicting and open conversations we have with the kids here, it's fantastic."

"I'll talk to anyone who will listen to me about science ... I did find one of my skater friends loves nudibranchs as well and we had a half an hour discussion about nudibranchs."

“We don't we don't specifically say to other people like, ‘Hey, I'm talking science about it now,’ but I think we talk about it quite every day.”

### **Low Science Capital**

The ‘Low’ science capital interviewees (n=6) had weaker science identities: four self-identified as *not* “science people” and one was in between; one former teacher noted that while they use science daily, it’s not something they’re personally passionate about.

“Not really, I'm just an average person, you know, that's trying to make sense of things and wanting the world to be a better place than what it is, to make it reach its full potential.”

“I'm not really [a science person]. I'm [from an] engineering background. Not science background.”

“I have an interest in science ... but not probably the study of science ... Personally, I don't have a scientific brain, but I really, really respect and think that there's a very, very valuable place for any science [people] that have got that brain and can comprehend all of the material.”

“I'm using it [science] every single day in my life, but I wouldn't consider that it would be something that I would be passionate about, like being in a laboratory or those kinds of things.”

Most of the ‘Low’ science capital interviewees engaged with science through family- or child-oriented activities, such as their children participating in science clubs, cooking and gardening with children, watching documentaries together, going to other informal science learning institutions and children sharing their knowledge and interest in science.

“My son went to Perth Hills Discovery Centre and did the ‘Nearer to Nature’ program. Telethon Kids Institute links in with PEAC as well and does their ‘Microscopic World’. When my son had nits, because they all get nits and lice, we got out the telescope [microscope], and we're looking at what's going on. Life is wonderful when you can use what we know of science to make it real for kids.”

“We've gone to Perth Zoo, and I guess gardening is even more science, is it just based on very general knowledge, like in September is going to be flowering season in the Botanic Gardens. I do look at the gardens and how people made it from [laughs] gardens with lots of weeds become a very nice garden. I really like to look at, even though I walk past the streets and all that I do look at the nice gardens.”

“My son is just STEM all the way ... He is just an absolute science nerd. [We've] been coming to Scitech since he was pretty much born, and he just is this wealth of information and I find that my interest in science often comes about because my son will just go, ‘Hey, I just figured out today how this works and this works.’ ... Something as mundane as cooling or composition of elements ... and just gives me this big lecture and it is actually really fascinating.”

“We watch documentaries at home. My son and I, I think our most favourite one was ‘My Octopus Teacher.’ That was amazing, we really loved that. And we definitely play a role in making sure that we try to engage in science or conservation out in our environment ... We go to Caversham [Wildlife Park] ... We've been to AQWA recently.”

One participant noted that they only engaged with science in “science spaces”, such as science centres, museums and the zoo.

“If I go to the zoo, I will then relate to the science. If we go to the beach, I wouldn't think of as related to science. I have to go to a particular place like the science museum and Scitech, or if we go to a lab ... I would consider that is the more science ... I hardly can relate to those things with the science ... If you asked me to relate to engineering, I think that will be a bit easier. But related to science, I think it's more like a medical style for biological stuff or I can't even chemistry stuff. Those things we don't [do, they're not] really happening a lot in our daily life.”

In contrast to the 'Medium' and 'High' science capital interviewees, those with 'Low' science capital were less motivated to engage with or think about science in their daily lives. Three noted that science was valuable in their lives, but was typically related to specific personal motivations, such as environmental issues in the local community or family health issues.

"Particularly in WA as well, because they do say that we've got the lowest tree cover of any state, which is terrible ... our cities, they could be a lot greener and a lot a lot better if we knew the right things to do. Even the council puts up, they have the tree verge program ... But across the road, each one that they've put in has just died. And this is happening when I'm walking around. So many of the trees that planted have just died ... [local councils] need a lot of help in that area, and using things like glyphosate to kill the weeds, but it's killing the plants as well, and probably killing birds and animals and who knows."

"When I finished high school, I kind of just was really looking forward to leaving it [science] behind, to be honest ... I suppose in adulthood it's mainly probably been the Telethon Kids Institute and undiagnosed disease programme geneticists, and that's probably been the biggest [influence] ... I'm one of those really annoying parents ... I'll ask a lot of questions to medical people, and I've actually connected with them on social media and constantly in touch with others that are going through similar things or that can actually give some advice."

"To be honest, I didn't have the curiosity to find out why things happen like that when I was little. So that's why I would like my kids to go more and just to explore things more and understand the world."

All interviewees with 'Low' science capital acknowledged that science is an important aspect of our lives, improves our lives, and will play an important role in securing our future. However, several noted that they don't always see science in their daily life, and typically discussed science in terms of knowledge and facts.

"Working in the lab and doing some like micro telescope to see small, small stuff ... My life is quite just normal, boring life: cooking, eating, travelling, and then working. And my work is more related to the engineering parts, I didn't see any particular science part."

"I would say they were really smart if they do any science ... It's smart is equal to science or science equal to smart, you know?"

"I wouldn't have thought it in that sense [of everyday life], ... but science is extremely important to my life in the sense of my longevity of life. And my day-to-day living. I think science has an impact that I don't necessarily see. But things that are being done through science in the longer term have an improvement for me and everyone else in in the in the world."

"I'm not, you know, particularly science-oriented, so I've always encouraged inquiry into processes and explanations I don't actually have on the top of my head, and even just the process of finding out something that someone asks a question about at home. It's not enough to just go, 'I don't know.' It's 'let's Google and find out, let's get to the bottom of this.' So definitely togetherness, but also educational and scientific if we possibly can."

"I think, as a teacher, it's definitely seen as a specialist subject. I could really see that. And a lot of parents consider that science tends to be a specialist subject, or 'I don't know anything about science. I wouldn't know how to teach that to my children, we'll let the teacher do that.'"

Interviewees with 'Low' science capital were less likely to identify everyday connections to science: three agreed that while science was important, they had difficulty identifying everyday science occurrences outside of science contexts. Three others noted the relevance and value of science within health, the environment, emerging technologies and cooking.

"I remember during the COVID time, there was a little video clip was showing if you put some like detergents that germs won't get on your fingers. So, when I saw those sort of videos that I would like to

do in front of my kids as well, I would say, see, this is sort of kind of science, how important you have to wash your hands properly to keep the germs away.”

“I don't know whether growing plants and things, would that be like science?”

“Number one has got to be health. Like technology advances, and medications. My husband had a heart attack last year, but you could see how, you know, on reflection when my husband woke me up, and said 'There's something wrong, phone the ambulance,' that they knew, it was almost like the scientific process. 'This is what you need to do to save your husband's life.'”

“I would just say that the environment is probably the number one thing that science can help us with. Climate change, doing the right things, the small things that we're now doing every day, recycling every day.”

“When we're cooking at home, it's really important that he [my son] knows why this chemical reaction is happening, and then what happens to the bread if it doesn't, if you don't get that chemical reaction, little things like that ... We do it [science] all the time, just in our everyday lives. Or, you know, 'Why is my car not starting today?' Could be something as simple as that, and then making that link, that 'Oh that's actually science!'”

Interviewees with 'Low' science capital were less likely to have STEM role models in their lives: one noted they had colleagues in engineering and a friend in the pharmacy industry, and another shared how their child would often come home “just brimming with science revelation[s] he learned at school.” Two did not talk about science with others; those that did typically discussed science in terms of issues that were relevant to them and their context.

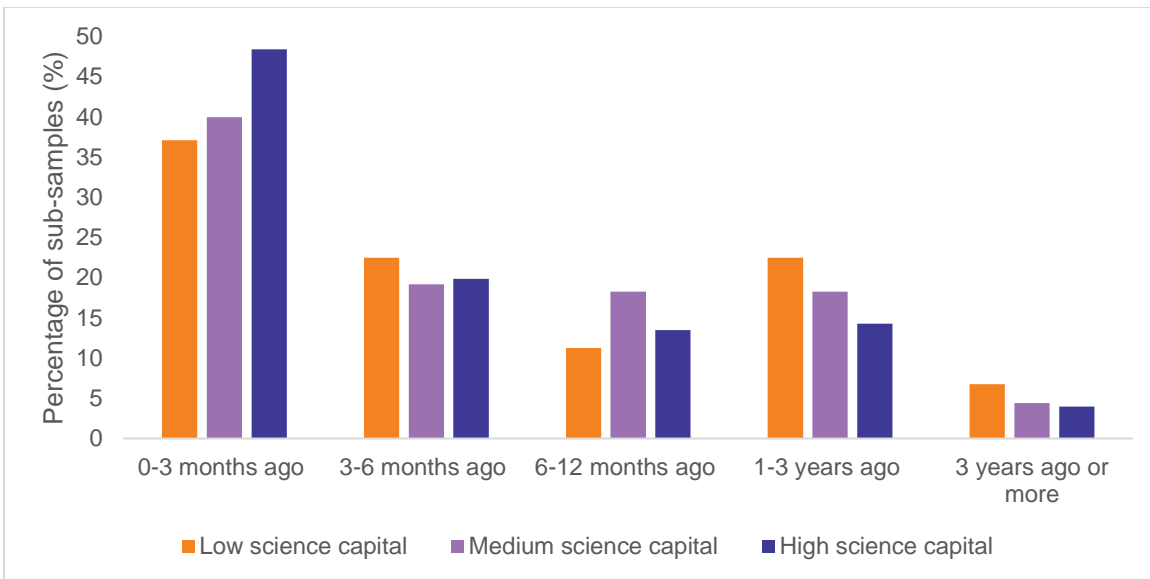
“We do tend to talk about the environment a lot, changes that we've seen in the greenery, or lack thereof. You know, trees are dying ... The council were planning on having fake grass down at the oval ... A protest group got together and lobbied and made sure that that didn't happen, thank God. There's elements of science in all of that. When you're communicating with people, it's something that everybody talks about, what you're observing and what needs to be done, and what you've read about and what the latest research is from, what you're reading.”

“I think answers that we seek ourselves to real-life questions ... The other day, we were just talking about petrichor because they were talking about the smell of rain. And, you know, that's weird, isn't it? And where does the smell come from? ... Those kinds of things I find probably the most meaningful to me, just because it's something that the family, one person in the family has asked, and it's encouraging that inquiry and then actually finding the answers so that then we can be, you know, we can have learned something through scientific investigation.”

## Engagement with Scitech

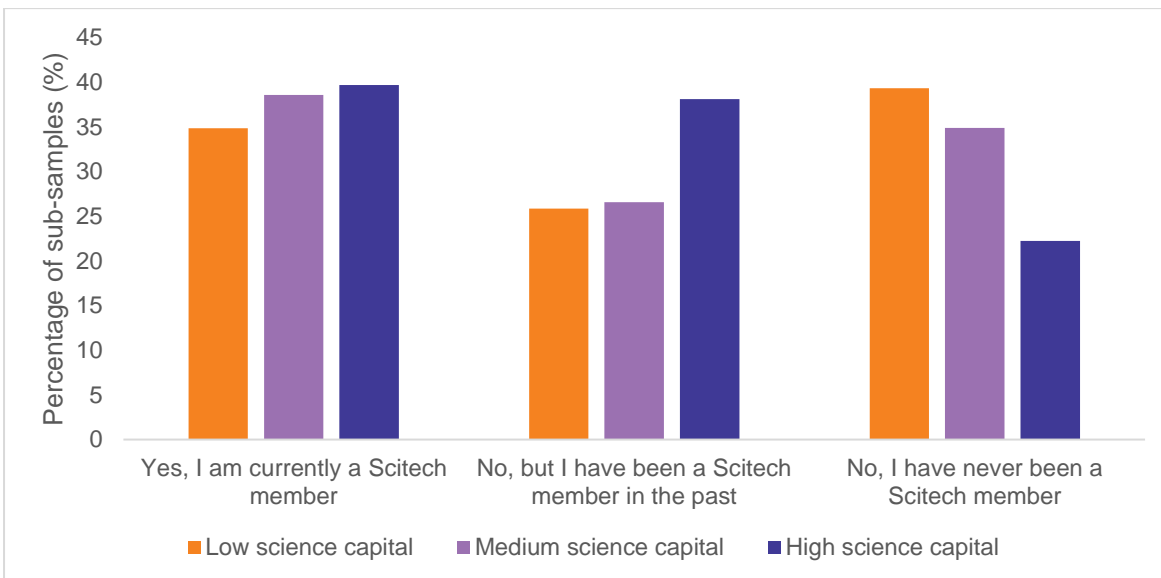
Almost all survey respondents had previously visited Scitech Discovery Centre (n=648), so there was no significant relationship found between science capital and visiting the Discovery Centre. However, there was a significant correlation between the time since last visiting the Discovery Centre, with science capital being highest for those who had visited most recently, with a small effect size ( $p=0.002$ ,  $r=-0.12$ ) (see Figure 11). ANOVA testing showed this relationship was only significant for those who had visited in the last 3 months compared to those who had last visited 1-3 years ago ( $p=0.009$ ). However, there was no significant difference in science capital for those who had visited once or multiple times in the last 12 months.





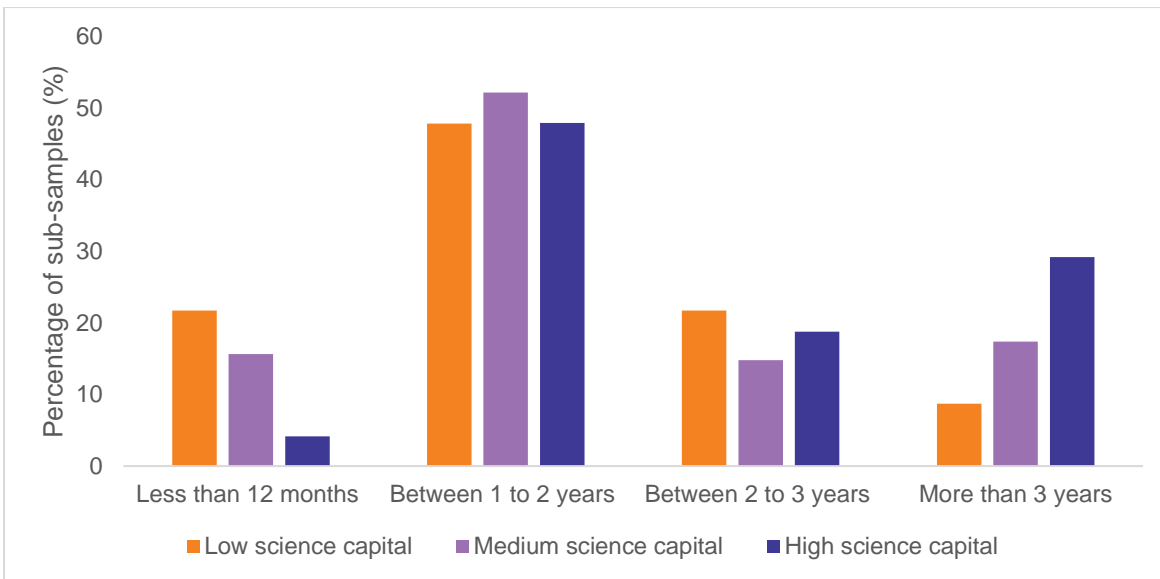
**Figure 11 - Time since last visit to Scitech Discovery Centre, compared to science capital**

Current Scitech members were more likely to have higher science capital (see Figure 12), with a small effect size ( $p=0.004$ ,  $r=0.11$ ). Those who had *never* possessed a Scitech membership were significantly more likely to have a lower level of science capital, also with a small effect size ( $p=0.004$ ,  $r=-0.12$ ).



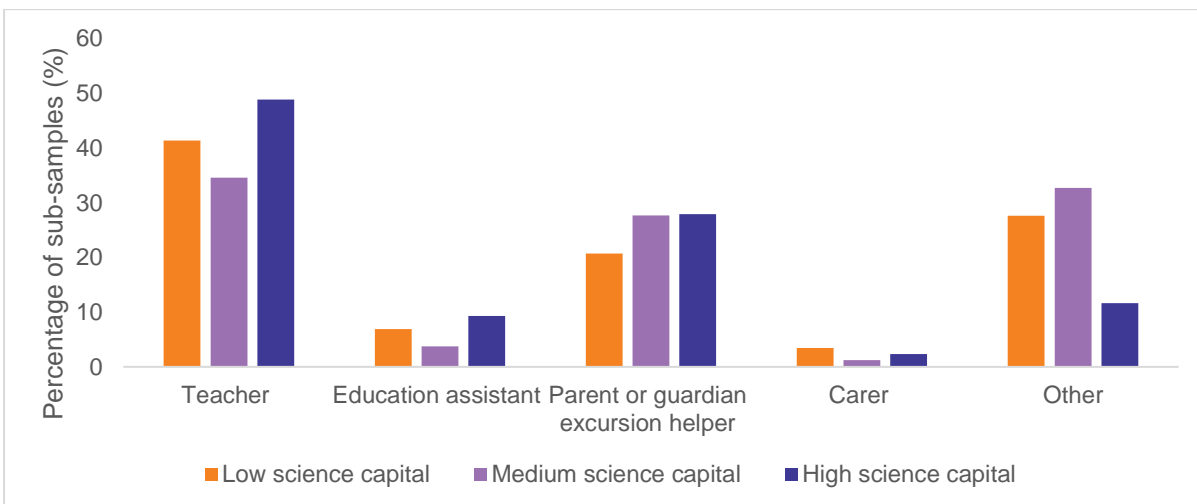
**Figure 12 – Current and past Scitech membership, compared to science capital**

Participants who had previously held a Scitech membership had higher science capital the longer they were members ( $p=0.01$ ,  $r=0.18$ ), as shown in Figure 13.



**Figure 13 – Length of previous Scitech memberships, compared to science capital**

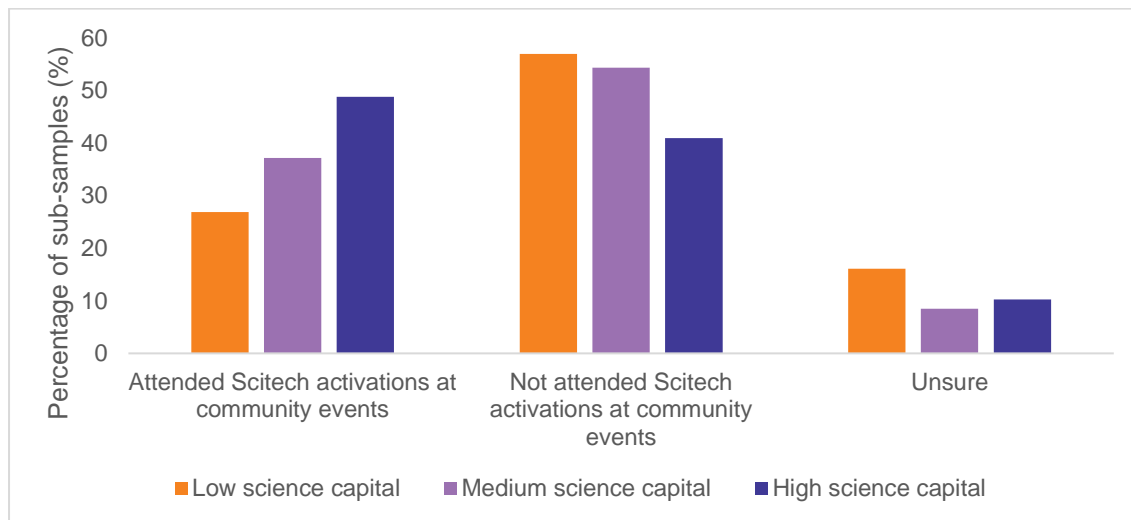
Of the participants who had visited Scitech Discovery Centre, 36% had attended as part of a school excursion. Almost 2 in 5 survey respondents attended Scitech excursions as a teacher, 27% as parent or guardian helpers and 7% as education assistants or carers (see Figure 14). The “Other” responses mostly included participants who indicated they had attended Scitech excursions as school students. While there was no significant correlation for those who had visited the Discovery Centre as part of an excursion compared to overall science capital, teachers who visited participated in Scitech school excursions were significantly more likely to score highly on the ‘talking about science’ component of science capital ( $p=0.01$ ), though the effect size was small ( $r=0.11$ ).



**Figure 14 – Role during Scitech school excursions, compared to science capital**

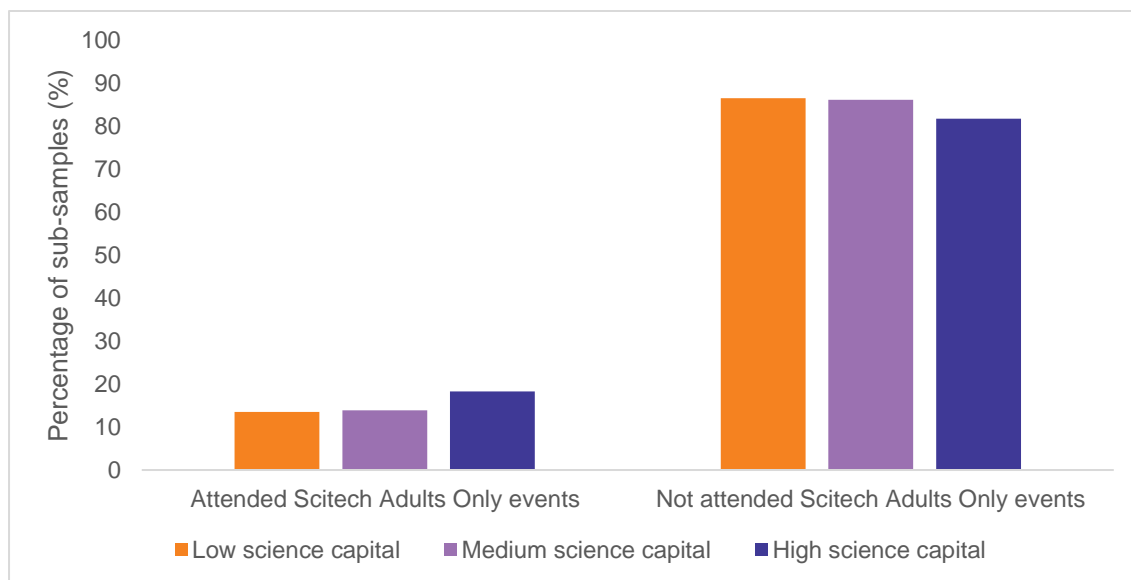
Attendance at Scitech activations at community events, such as agricultural shows or festivals such as WA Day, significantly correlated with higher levels of science capital (Figure 15). The effect size was small ( $p=0.012$ ,

r=0.10). However, the time since participants had taken part in Scitech activations at a community event did not have a significant relationship with science capital.



**Figure 15 – Attendance at Scitech activations at community events, compared to science capital**

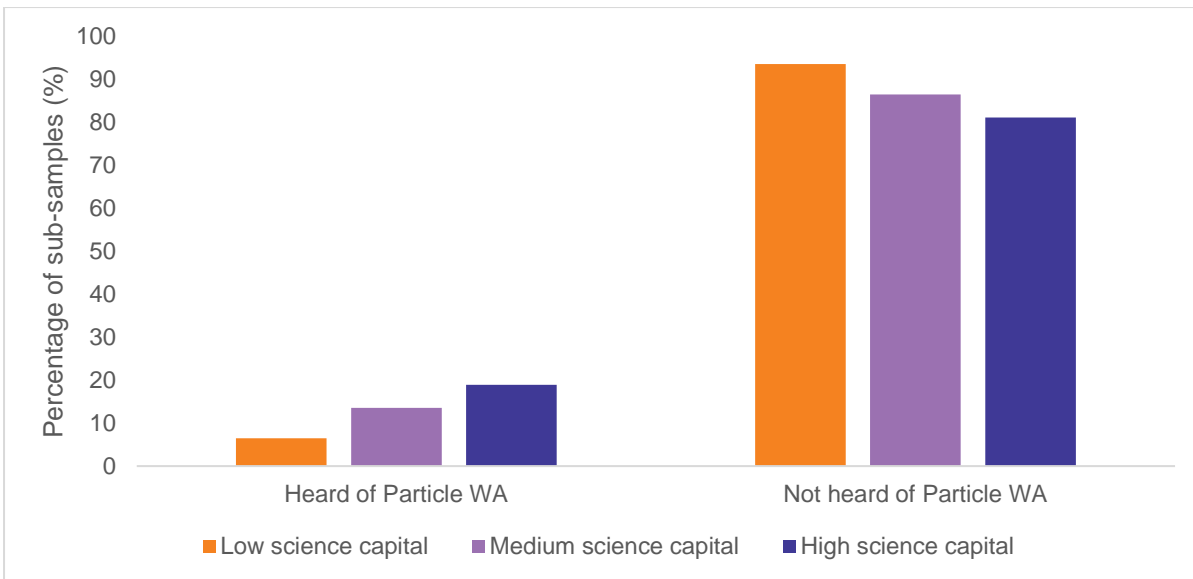
As shown in Figure 16, participants who had attended Scitech Adults Only Events were significantly more likely to have higher science capital than those who had not ( $p=0.013$ ,  $r=0.10$ ). This contrasts with daytime visitation to the Discovery Centre, which showed a wider range of science capital scores amongst visitors. However, this relationship only applied to those who had attended the After Dark or Dome Date Night events; attending Pink Floyd’s Dark Side of the Moon 50<sup>th</sup> Anniversary Planetarium special had no significant relationship with science capital.



**Figure 16 – Attendance at Scitech Adults Only Events, compared to science capital**

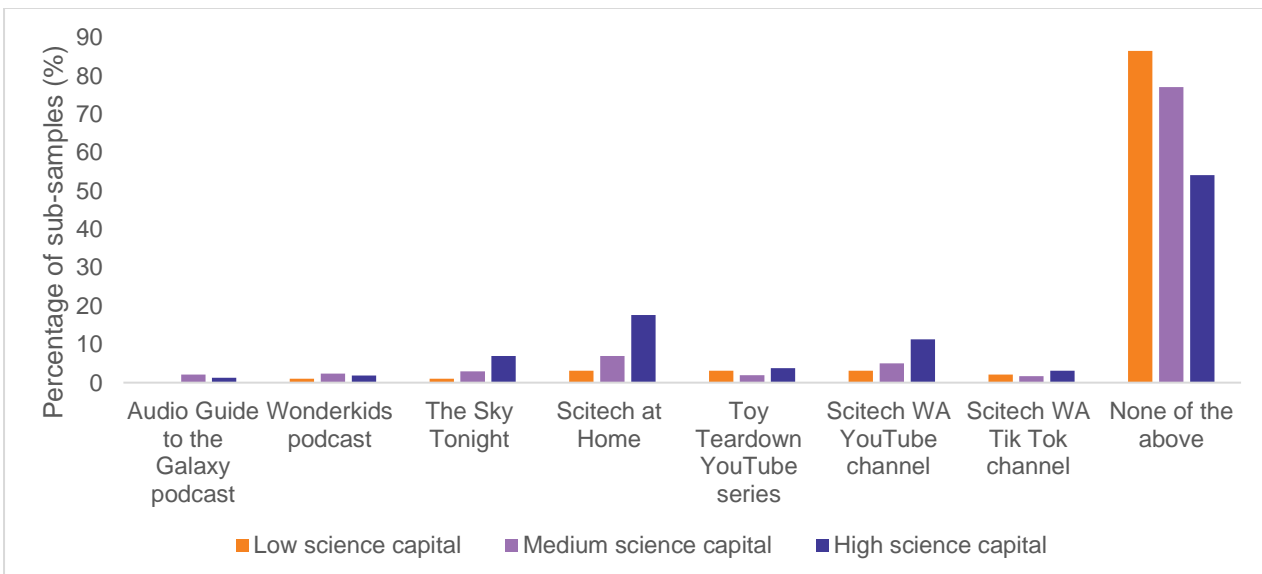
Familiarity and engagement with Scitech’s online content also correlated with science capital. Survey participants who had heard of [Particle WA](#), Scitech’s digital science publication targeted at youth, were significantly more likely to have higher science capital ( $p<0.001$ ,  $r=0.14$ ) (see Figure 17).





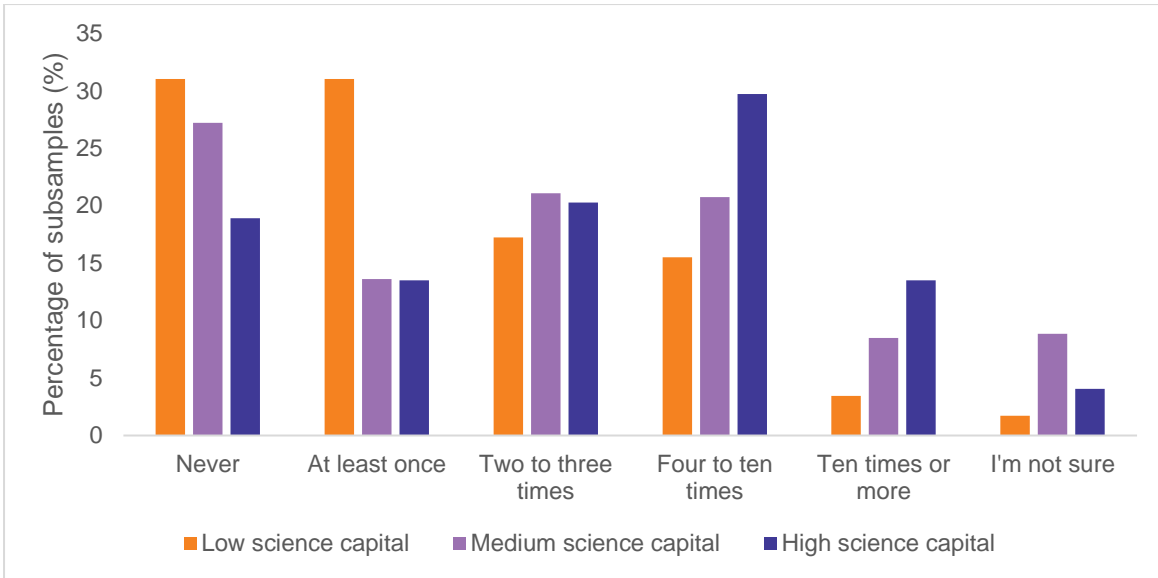
**Figure 17 – Familiarity with Particle WA, compared to science capital**

Similarly, those who had previously engaged with Scitech’s other online content, including YouTube, Tik Tok, podcasts and at-home science activities, were more likely to have higher science capital (see Figure 18). Those who had *never* engaged with any of the digital content were significantly more likely to have lower science capital ( $p < 0.001$ ,  $r = -0.16$ ), while higher levels of science capital were more likely for those who *had* engaged with the Sky Tonight podcast ( $p = 0.01$ ,  $r = 0.12$ ), Scitech At Home activities ( $p < 0.001$ ,  $r = 0.18$ ) and the Scitech WA YouTube channel ( $p = 0.01$ ,  $r = 0.13$ ).

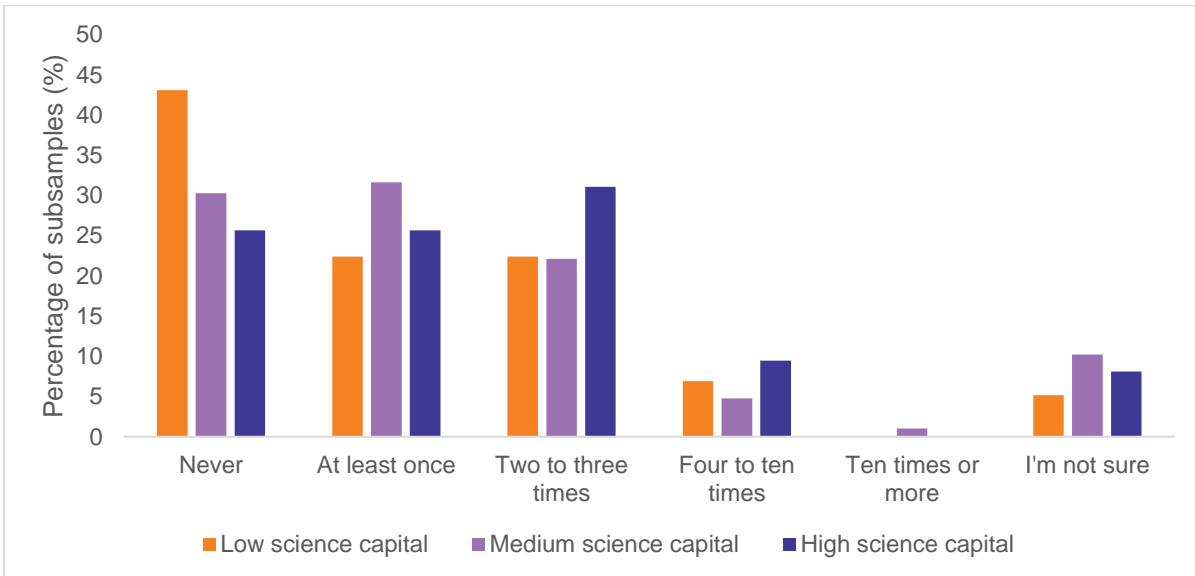


**Figure 18 – Engagement with Scitech online content, compared to science capital**

Childhood visits to Scitech Discovery Centre with family and friends (Figure 19) or as part of a school excursion (Figure 20) had a significant relationship with science capital: the more times participants visited the Discovery Centre as children, the higher their science capital was likely to be. The effect sizes were small, with family visits ( $p < 0.001$ ,  $r = 0.24$ ) having a slightly stronger correlation with science capital than excursions ( $p < 0.001$ ,  $r = 0.22$ ).

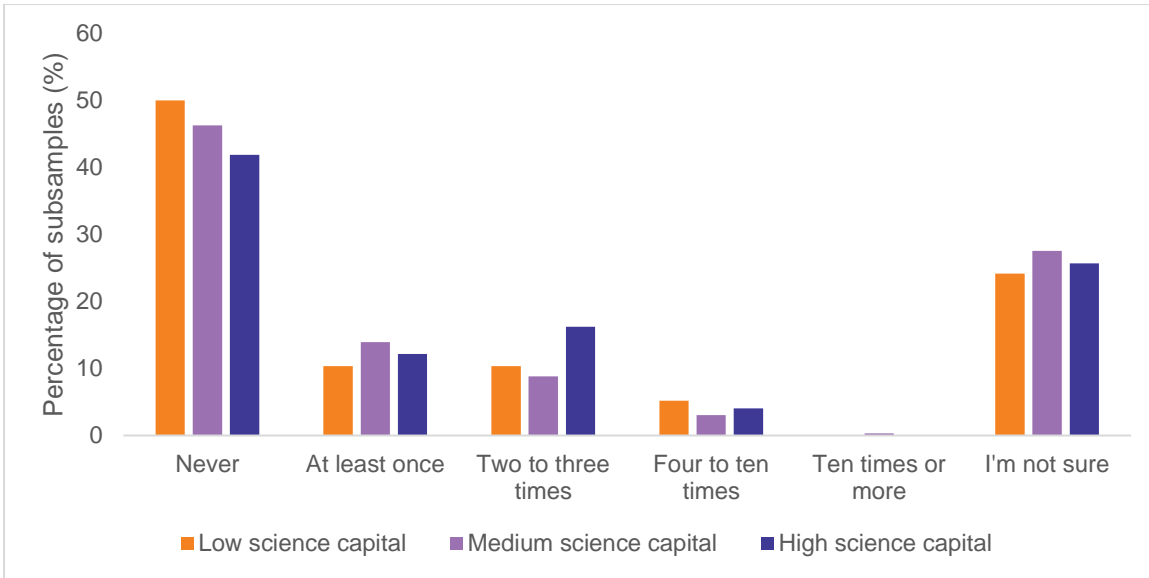


**Figure 19 – Childhood visits to Scitech Discovery Centre with family or friends, compared to science capital**

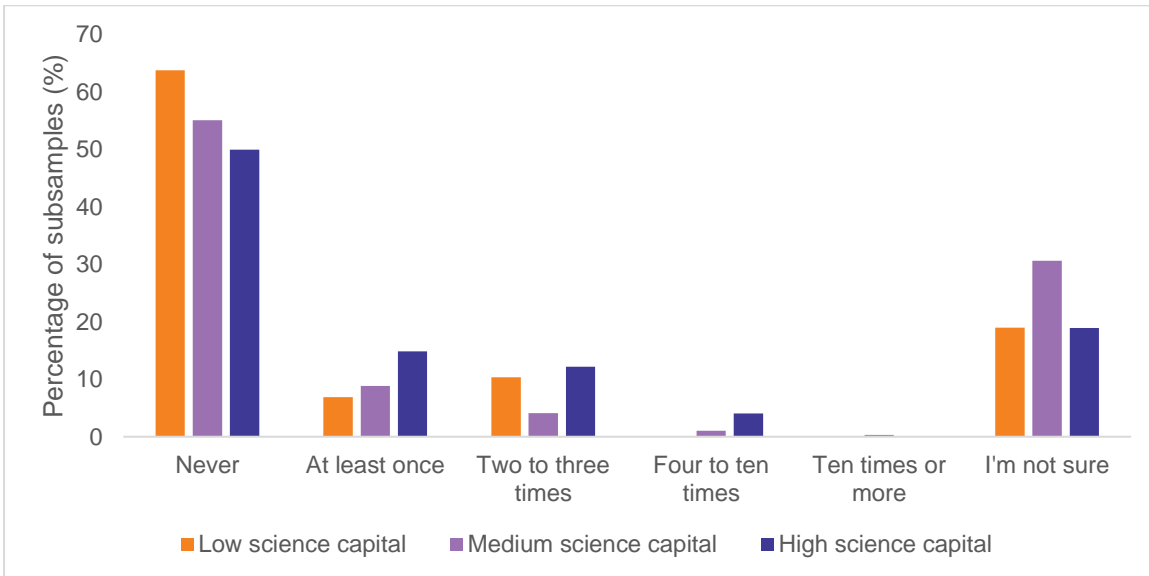


**Figure 20 – Childhood visits to Scitech Discovery Centre on school excursions, compared to science capital**

Childhood experiences of Scitech outside the Discovery Centre through school incursions (Figure 21) and seeing Scitech activations at community events also significantly correlated with higher science capital (Figure 22). The more times a participant engaged with Scitech during a school incursion ( $p=0.03$ ,  $r=0.14$ ) or at a community event ( $p=0.05$ ,  $r=0.13$ ), the higher their science capital was likely to be. In contrast with childhood visits to the Discovery Centre, the correlation was slightly higher for school incursions compared to community events, which children typically attend with family and friends.



**Figure 21 – Childhood engagements with Scitech during school incursions, compared to science capital**



**Figure 22 – Childhood engagements with Scitech at community events, festivals or agricultural shows, compared to science capital**



## How does science capital influence Scitech engagement?

### *High Science Capital*

Most interviewees with 'High' science capital visited Scitech with their children or grandchildren several times a year. Those with Scitech memberships and younger children were more likely to visit more frequently.

"At the moment, probably once every four or six weeks or so. It's kind of a bit of a decline at the moment. We kind of had a peak maybe a year or so ago, where it was closer to at least once a month. It was also at a time when he was very interested in trains, and so we would catch the trains to Scitech."

"I think last year we went about 15 or 16 times ... We'd go about every three or four weeks ... It's exclusively with my daughter."

"I would say at least once every two weeks, because sometimes if I've got them [grandchildren] at the weekend we'll go in for a short time, that's the advantage of just having membership, it doesn't matter."

When asked about key memories of Scitech, 'High' science capital participants reflected on enjoying watching their children and grandchildren playing, and how the experience could be used to create shared memories together.

"I remember my two kids really liked that there was a 15-to-20-metre-long racing exhibit. As you ran through the station, the lights would light up. It was basically to illustrate, showing the most scientific way, of training you how to improve your running speed. And we tried that once, and then my kids tried it a lot of times."

"There was a guy doing an exercise ... he would show the crowd a picture that he couldn't see, and they would have to try and tell him how to draw it. So, it was like, program the person to draw the picture, except he would make obvious mistakes from ambiguous instructions, and he was trying to make a point about programming computers, and how you need to be very specific. So that was kind of a new one that we hadn't been to before, and he [my son] quite liked that, and he's kind of old enough now to get the point and obviously still enjoy the fun of it. That was interesting to see him developing in that sense, and sort of following that a bit more."

"They also have their favourites, and they'll make straight for it, and just the different games they play. [My grandson] got into, you know, the ball run<sup>6</sup>. He and a group of boys were making burgers. I thought, 'How? Okay.' So, it was a burger-making machine. They had this, you know, very complex [game going on]. I think he was six years old. I just love the way they work out and do their different [things]."

"I get lots of ideas, and then we'll go home, and we'll play with the Lego blocks and make something inspired by what she saw at Scitech. So, yeah, definitely get lots of ideas as well."

"I like the challenges where you have two people participating in something, but I have to communicate to share the knowledge. There was an exhibit in the Astronaut [exhibition], one where [you're] trying to ... press buttons in a certain sequence, but the information came from the other person. The interaction with the science exhibits that that to me is the most memorable part is when the exhibit forces you to involve two people to then engage with it, because that then that connection with my daughter is what's most memorable."

"[My granddaughter] got very excited the other day because they'd been out at night or something and she saw the dome all lit up, and she was telling me, 'I saw the Scitech dome, and it changed colour! And it went to my favourite colour!' It's very much a part of their lives, and that's the nice thing about being the grandparent, that you can, you've got the time to do these things."

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<sup>6</sup> The Mighty Moving Machine, Discoverland

One 'High' science capital interviewee also shared childhood memories of visiting Scitech with relatives in Perth, and the Scitech outreach team visiting their high school.

"I didn't live in Perth, as a kid, I was in the Northern Territory, but we had relatives here and came through on one or two holidays. I've vividly remembered certain parts it when I then moved to Perth as an adult, and then came with my own child. It was a bit strange, like, 'Oh that! I know that!' ... The travelling exhibit, I think was in Year Eight or Nine? That was pretty cool. One of the things that stood out for me was a demonstration of a very hydrophilic powder that you put in a cup, you pour water in and then it stays in the cup. I thought that was really cool! I kind of got the things absorb water, like little the sachets you get in boot packaging, but I'd never seen something on the extreme scale like that. I thought, 'Wow, that's pretty impressive!'"

A key motivation for 'High' science capital interviewees to bring their children to Scitech was the opportunity for their children to learn about science in an engaging environment. Several also reflected on the unique opportunities available at Scitech, including hands-on interaction, placing science in context, and the broader value of Scitech within the WA community.

"Coming to Scitech means they have a more visible understanding of how things work, what kind of things are possible, what kinds of opportunity we as humans have achieved, and find out what they [can] maybe also achieve or better."

"It's still to just come and play with everything, really. He's interested enough that we'll go on an outing just to go to Scitech, and we don't need to sugarcoat it with any other activities. We'll just go off and do that on Saturday morning. And yeah, it's just to come and play with stuff. It's also familiar – it's somewhere where he knows how everything works, which way all the handles turn and whatnot."

"I just think keep going. I think we're really lucky to have it, and I'm even luckier because it's so close to home."

"I mean, the kids love it. They really love going ... We've been here [in Perth] for two years, but we used to come and visit ... There's certain exhibits that they can play with over and over and over again, or we discover something new or go to the same exhibit and discover something new about that exhibit in particular. And so, it's always a really good way to spend a few hours. The kids are really engaged. They really enjoy it. And it's easy for me as a parent to go and let them explore."

"I don't know that it [Scitech] has increased my interest in science. But I think like what I like about it is how it exposes my kids to science and may trigger an interest in them."

#### **Survey participants were also asked to reflect on their childhood memories of Scitech. Key memories included:**

"It was the most fun place to go on the weekends! I was always amazed at how all the different exhibits worked, and as I got older I was so proud when I learnt the science behind my favourite exhibits."

"I loved visiting Scitech as a child it encouraged me to pursue a STEM degree, and then to start a STEM career"

"I always wanted to go but never had the chance. I now take my kids 3 or 4 times a year"

"It was extremely fun & exciting & very eagerly anticipated. We lived in Geraldton and hardly ever got to visit Scitech. I discovered Scitech in late primary school as part of a Girl Guide camp. After that I was hooked & begged my parents to take me (and my siblings) whenever possible (perhaps once a year)."

"I remember visiting many many times and learning something new every time. I also loved doing school holiday programs at Scitech."

"Went on my first ever date to Scitech :)"

"Living in the wheatbelt and getting to do a very long day trip to Perth to visit Scitech, it was always my favourite time of year and everyone was so excited in the lead up to the excursion."

All 'High' science capital interviewees noted that they were already interested in science but agreed that Scitech was very important for their children's or grandchildren's science engagement. Two noted the value of Scitech in providing important ways to extend their child's science learning, beyond their own knowledge and household experiences.

"It's a great sort of stepping off point for me to continue the education of my child in science ... I try to bring science into our backyard discussions and shed discussions. But there's a lot of science that just doesn't come up in that context, and then we go to Scitech and we see more things about the more environmental things and just all sorts of other stuff ... For me personally, I think Scitech's really important that way. It obviously continues on my own childhood enjoyment of science museums and all the ones we went to. It does an important job of bridging that gap between kind of just a fun, cool thing to play with, and then actually learning the scientific principles behind it as well. And I think in a broader kind of societal sense as well, I think it's quite important for that. It's partly educating people with specific facts, but also educating people in the kind of scientific method and process and field of science."

"I think it plays a very important role of getting the younger generation interested in science because it does it in a fun way. And also, I mean, all the programs and your special exhibits, they all have a different focus. So, kids realize, "Oh, science is not just this narrow compartment. It's huge, it encompasses everything." And if you think about the recent ones, you know, you know you have the space one, you have that the detective one, there's so many different areas. I think it's really good for firing the kids' imagination and just thinking, 'Oh, ok, this is also science.' Not just, you know, somebody in a white lab coat."

"I'm a high school teacher, so most of my experiences with the older students and whereas Scitech has given me lots of ideas of how to engage with science with the younger age groups. So, sort of the primary level, which I think is just perfect and I think it sort of caters to that market really, really well ... [I had a] big interest beforehand. But Scitech certainly complimented that really, really well."

"It's very important. And I really like that there's so many different areas of science that are introduced over time. So, every time we go, like, my son made me like one thing one time, but then go to another exhibit and find something different. And then we can kind of talk about, like completely different fields than what we've ever talked about before."

### **Medium Science Capital**

Like the 'High' science capital interviewees, those with 'Medium' science capital typically visited Scitech with their children or as teachers accompanying school groups for excursions. One had also visited after-hours events with their partner, and another mentioned attending an event as a corporate volunteer. Those with Scitech memberships attended more frequently, but most visited two or three times a year.

"As a family we come to Scitech, but also my class go on excursions to Scitech. We go on the bus at 6:30am, there's a whole two groups, and then we'll do the big trek to Perth [from Boddington] ... As a teacher, we come once a year. As a parent, we try twice a year."

"I'd say probably once or twice a year ... Mainly just me and kids, and then they shoot off in different directions and I gotta go find them again."

"[I visited] once as a sort of corporate volunteer for a function that was held there. So, when we had a break ... the rest of us just went and played with all the machines ... And one of my wife's friends had a birthday party after hours there, which is interesting. Didn't even know that was a thing."

"I've been member for at least three years ... [We visit] at least once a month ... and sometimes we held the playdate at Scitech as well."

"[I don't visit often] unless I'm going for professional development or to pick up equipment [for school], not visiting the exhibitions. I did go to one of the adults-only ones a couple of years ago, that was really enjoyable ... being able to wander around without all the kids everywhere. And about three years ago, I went on an excursion with the school I was on doing my placement, so that was really good as well. Seeing the kids being able to just kind of navigate and sort themselves out ... [And] I went to the planetarium ... to watch Wall-E with my husband."

One interviewee reflected on his ability to visit Scitech frequently as a child, living closer to the city compared to his wife.

"[My wife] didn't live as close to it [Scitech] as I did ... I grew up around the western suburbs, so it was quite easy to get to somewhere like Scitech, and that's probably why I did get to go several times over the years. She lived a bit closer into the hills, so got to visit, but probably not as often."

Key memories of Scitech for 'Medium' science capital interviewees mirrored those of the 'High' science capital: observing children having fun and playing, and finding opportunities to extend the learning experiences at home or school. Talking about the Scitech visit was also noted, especially for teachers accompanying school groups.

"Something that the children still talk about here is your beehive. They were just fascinated with that, because we have families in town, loads of bees here, loads of beehives, we're a high producer of honey. They thought that was bizarre you had it in the city! They did not think that was a thing! 'That's a country thing, and you've got that!' And that was amazing. And we still talk that, that it can be done anywhere."

"Sometimes after what we do in Scitech then the children play with it at home. We make ours on a much smaller scale ... but they are interested in doing it. I mean to replicate what they have done in Scitech ... It's very messy, but yeah, it's education."

"Interviewer: What kind of emotions or feelings do you kind of remember from those visits?"

Participant: Excitement. Delight. Joy. Surprise. Sometimes confusion when we went how does that work but not kinda like negative confusion, more like inquiry, kind of ... What else? Overall happiness. The kids always look forward to it with excitement. It was never, 'Oh, my God, we're going to Scitech!' It was never that."

Two 'Medium' science capital interviewees also shared childhood memories of visiting Scitech with their school and family.

"It was [with] school, and I distinctly remember, I call it the Tesla Coil<sup>7</sup>, I don't know what the actual name is, and the hair standing on end. So that was a big memory for me."

"I remember a variety of specific exhibits from being there as a kid, so there's ones about nutrition. There's one's about sort of physics and the mechanical things there. There's sort of life cycle and growth stuff ... They used to have the little chick-hatching pod there ... I went there with my cousin, and they had a 3D green screen type thing, and you do all the different activities and it would spit out a VHS at the end. You could take home and you're just in all these different, short film activities. And then, of course in the Omni Theatre as well the planetarium that it is now. There's always something interesting. I was never bored ... Probably more with family and friends like more frequently. But I would have thought certainly through kinda mid-to-late primary school, there was probably a visit every year, give or take."

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<sup>7</sup> This participant is referring to the Van der Graaf generator (which is very similar experiment).

Key motivations to visit Scitech included their children enjoying Scitech and being interested in science, and links to school and the curriculum for teachers. Several reflected on the unique opportunities available at Scitech and the broader value of Scitech in the WA community, while others noted the practical nature of an indoor science centre.

“The flippant answer could be [to] feel like you're a good parent if you go and do something sciencey ... I knew that they'd get a kick out of it, 'cause it's just so designed for them, and it was something you got to explore. I knew they'd be getting educational information rather than just going to a fun fair ... Brilliant thing to do on a boiling hot summer day or a freezing winter day, 'cause it's balmy and air-conditioned and warm and ... [can do] something with your kids on the school holidays ... as basic as that.”

“I'm just envious of the kids today, which is why I think part of the reason I take them is I go, I get to play too. Cause, it's really good fun for parents as well, so that's a nice thing. And teachers.”

“To see practical demonstrations of science. You know, I can show them bits and pieces at work, but there's lots of little practical [examples], like the one that sticks in my mind is the chip cup and the wind tunnel. We replicated that at home with a leaf blower. But seeing those sort of things, learning about electricity, learning about science, physics, that sort of thing, but in a practical fashion.”

“As a mum, it's just it's such an engaging place, and it opens up an interest in my daughter, because her vision in life is to become a nurse ... We love being in the country, but [the] country comes with limits in that she doesn't get exposed to a lot of, for example, machinery activities. She's quite limited in the clubs that we have here, so by coming to Scitech, there are a lot more opportunities to do so ... For my kids at school last year, we came because you had the Human Potential exhibition. And for us, we were learning about how our bodies, how we can make our body stronger, and it just linked perfectly for us.”

“I'm glad it's still there and it's still well-funded and still well enjoyed by new generations of kids in WA, 'cause I do think that it's important. I think it gives a lot of lot of value, just to opening up, you know, inquiring minds and getting kids just thinking about things that they might not be exposed to otherwise.”

### Survey participants with ‘Medium’ science capital shared Scitech childhood memories, including:

“Very fond memories. It was an explorative wonderland! So much buzz and excitement in every visit. I specifically remember the live shows with lightening bolts.” [sic]

“I LOVED Scitech as a kid. Especially 11-12 years of age. I remember jumping up to leave shadow pictures on the wall. The mirror triangle thing. Playing pipes with a thong. I just thought it was so exciting. I usually went with two friends or my family.”

“Making things explode, learning new things! Oh and the BEES 🐝 I could watch them all day 🍯” [sic]

“Seeing a display showing what technology was going to be like in the future, one of the items was a phone you could video call each other on. I remember being in awe of it and experiencing the same feeling when I made my First video call to someone. I fondly remember that and tell everyone the story. Makes me feel old hahaha.”

“I loved our school excursions to scitech. I loved all the interactive exhibits and I think we watched a video on space. It was one of my more enjoyable school excursions. I love taking my kids here to visit too although they are older now. I took them alot as toddlers to younger primary ages.” [sic]

“We could only afford to go every second year. It was always the highlight of my Christmas break.”

“Visits to Scitech centre, the planetarium, the visits to our school with the Liquid nitrogen frozen ducks being smashed by hammers, puppet shows, the Scitech theatre shows, lots of great memories!”

“I remember it being very interesting and entertaining for me whilst also providing important knowledge that was explained in a way that was easy to understand for multiple age groups”



The importance of Scitech to science engagement was more nuanced for the 'Medium' science capital interviewees. While they agreed it was an important place to extend science learning for their children and students, some noted Scitech's role in building on *their* existing interest in science, and how their Scitech experiences have expanded their science interest and confidence.

"Very important, I think. Just as a little influence, just in the back of mind thing and really just adding little pieces, little ideas, little thoughts in there ... I was always interested in building things and taking things apart and was probably a bit sort of mechanically minded in that way, which a lot of the [childhood] Scitech experiences can be geared towards. So that probably makes me think it just expanded on a spark that was already there I think."

"I was always interested in space, but I didn't know much about it, and I think that your [planetarium] movies and things kinda opened up my eyes to know more. And then I kinda went, 'Oh, I should really get a map of the night sky, and we should really get a telescope. And I should really kinda get us up to the observatory,' so all that sort of thing."

"We see you guys as a great source of enjoyment for the children. It's a privilege, it's a treat for them ... As teachers we've got that knowledge and we try to share that with them, but you guys have got the creativeness of stuff and the resources ... we've done the base of knowledge, [at Scitech] now you can practice, and that's been really important to us."

"For kids, as an entry into science and understanding that science is a part of everyday life, I think it's amazing. You know, it's been there for a long time, and I still recognise a lot of the exhibits that were there when I was a kid, but it doesn't change the fact that they're still relevant ... Learning, showing kids that there's a practical element to science and how it interacts with your everyday life is crucial in problem-solving and recognizing that there's pathways in science. I think Scitech is a unique and exciting way of showing kids how science works in everyday life."

"For me it's really important because the access to the [Scitech] DIY kits and providing the kids with real equipment I feel is really important for building up those foundations and getting them to respect and engage with the science ... being a newer teacher it gives me the confidence ... It has made my journey into teaching really enjoyable and not so daunting with the content."

### **Low Science Capital**

Interviewees with 'Low' science capital also exclusively visited Scitech with their children or grandchildren, ranging from once or twice a year to at least twice every school term. Visiting with partners and other families as a joint outing was also more common among the 'Low' science capital interviewees.

"[We visit] probably less than before, maybe once or twice [a year]. My husband, myself, my son, and normally one of his friends. Because he's an only child, he likes to go with his friends ... He just loves going on everything and testing things out. And it's nice to go with a friend so that they can experience things together."

"My son and I are members of Scitech. We try to come at least a couple of times every term, so maybe eight times a year at least ... Because we're members as well, we get invited to come and see the exhibit before it opens up to everyone else."

"I don't come very often because, you know, the tickets and everything every time we come is [expensive] ... But I used to have the annual membership with my son, but since my daughter, it's less, but we come like three or a couple of times a year."

"Usually, we go about every three months. I go with another family, so it's more like the case meet up and I meet the family ... [We have] an annual membership, so if it's raining [or] the weather is not good, then myself, [I] might take the kids to Scitech."

One interviewee with a Scitech membership noted that they had just discovered the Scitech [At Home](#) online content before the interview, and intended to engage with it in the future.

“We've been members for, I don't know, the last three years or whatever and taking the [grand]kids there and they have a fantastic time, and I think the exhibits that they have and the shows that they have. Really entertaining and really valuable for the kids to learn. And as I say, for the first time I got onto their website and had a look and went, ‘Holy \*\*\*\*. They've got a whole lot of stuff here that I didn't even wasn't even aware of, videos I could have been sitting down with the kids to have a look at!’ ... This is really the first time I've probably spent about an hour, and I went, ‘Oh, shoot, they've got that and they've got that. They've got podcasts, they've got videos’ ... I wasn't aware of any of that.”

Similar to ‘High’ and ‘Medium’ science capital interviewees, those with ‘Low’ science capital shared memories of their children and grandchildren enjoying their time at Scitech, learning new things and asking questions. One noted how they would extend the visit experience with conversations in the car on the way home. Another shared their memories of being a Scitech volunteer (Sciguide) during their time at university.

“We went to two shows in the planetarium. After the show, my [six-year-old] daughter did ask, ‘It is day with no sun?’, which is great that motivates her to think. Even though it seems very reasonable and natural, it's just, you know, the sun comes out in the day and not at night ... Scitech makes her think.”

“The other one that they can stay long is the making their own car and then they have the race. That one they're really interested as well ... And I'm I was happy to see them. [They] can be enjoying doing such items like, repeatedly like come here again. And if this car is not fixing very well and they can think of they're trying to think of other ways to, to do it, and then trying to win.”

“We'd have conversations about stuff in the car. We would bring stuff back, like for example the drawings with the, where you put the pen on the paper, and it makes particular squiggles and all those sorts of things. So, it'll just be a conversation point and an opportunity for them to be engaged in something that they like doing.”

“I've been going to Scitech for many, many, many years, and I used to be a Sciguide, actually, when I was at university.”

“His [my son's] favourite exhibit at Scitech, he's 14 by the way, is still in the little kids area, with the one that you have the balls ... you have to put the balls in the drop, and then you have to wind the conveyor belt and it moves around.<sup>8</sup> That has been in that same place the whole entire time my son has been alive, and it was his favourite exhibit when he was a baby, and when he was a kid, and it's still his favourite exhibit today. And sometimes I have to deter him. I'm like, ‘You're fourteen!’ [mimicking her son]: ‘Oh Mum, please, I just want to go in there, just for five minutes. Come on!’ I'll be like, ‘Okay.’ And then I feel like this really awkward parent, who's got this teenage kid. He's rolling the balls on the thing and there's all these little kids around, and I'm, [sighs] Okay.”

**Key childhood memories of Scitech from ‘Low’ science capital survey participants included:**

“We lived in a lot of rural towns around WA, I remember Scitech roadshows coming to school.”

“The videos! We still have them. Like us singing and playing to love is in the air and sitting on the magic carpet.”

“Always a lot of excited when going. I once saw a show in the dome that was about the plants and space and it fascinated me so much. It was my strongest memory of Scitech and I always wish I could watch it over and over again.” [sic]

Motivations for ‘Low’ science capital interviewees to visit Scitech were strongly related to their children's or grandchildren's interest in science and nurturing that engagement and learning. Scitech was also perceived to be a safe and easy family experience, including being an ‘escape’ for one family who regularly visited Perth to

<sup>8</sup> The Mighty Mover Machine strikes again!



bring their child to the hospital. Several also reflected on the broader value of Scitech in the WA community and expressed their desire for it to continue to be available for other families to enjoy in the future.

"[My son], he wants to go there! He's excited about it. It's good for him. It's a valuable experience to go there. It's not like these other things where they are just mucking around, but it's done in a fun way. They enjoy it. I love seeing the look on their faces when they're doing the different things. They're surprised, they're in awe, they're amazed. They come and chat to you about what they've done. It's a great feeling. It's self-reinforcing to go there."

"It's just a good activity that you can do for two or three hours 4 hours. And it's educational. And they really love it."

"I didn't have the curiosity to find out why things happen like that when I was little. So that's why I would like my kids to go more and just to explore things more and understand the world."

"I think it's actually earned quite an important place in our family, like in every individual family member's heart ... We live regionally, but we've spent over two years collectively in Perth in a hospital with our little one who's not very well and we have just used Scitech membership as a 'let's get out of the hospital.' ... But it's just been this really positive, amazing place to escape to. So that's sort of what it's meant to us."

"Scitech's very important. I really see it as a key role in Perth, and I'd like to see it take a next step, essentially, to be more prominent and to be bigger, and to be like *the* place to go, like The Big Place that gets promoted by the City of Perth. And I don't feel that it's probably that it's promoted as much as it possibly could be. I kind of feel like it's just, 'Oh, Scitech - yay,' if that makes sense? But it really needs to be bigger and prominent. It's Perth's one science area, where you can go and you can have hands-on engagement with science."

"From a little one who's nonverbal and has a severe intellectual disability but is engaged by sensory stimulation through to a 16-year-old who's a science buff and also learns, it's got something for every member of the family. And it's just a really fun place to go and visit as well for everybody."

In contrast with the 'High' and 'Medium' science capital interviewees, those with 'Low' science capital were more likely to agree that Scitech played an important role in their own science engagement, especially in terms of enabling them to engage their own children with science, as well as expanding their own understanding.

"I'm going to come back to my son's involvement, because I'm very much wanting him to move forward in science in a way that engages him and makes him realise, I mean, I think he knows how important science is for us, but to have somewhere to go where you can see that spark about science. So, I would say it's really important, because I want that to continue."

"It's important to get the next generation into it [science]. I mean, I'm in my forties and I find it interesting, but then it's more like our job to get the next generation to be more into it, to prove, to discover more, to see what could happen, what things can turn out to be with science. Especially a lot of robotics and machinery involved in the world, and in lots of different careers as well."

"I think it's great. I think it's a really, really clever simple and easy thing to be exposed to science, but as I was saying earlier, I think sometimes we may not necessarily see it as science ... I just go, 'I really like that activity. Can I actually do it?' Without necessarily relating it back to whether it's a science thing or not."

"Every time we go, we all walk away with something new that we didn't know before. So, I think it's perhaps it's not something that we've really even thought about that we learn. But I think it is important in just feeding scientific knowledge and an understanding you know better understanding of the world and space ... I think it's the interaction, the hands-on interaction as well. That makes whatever we do learn really stick. It's not just reading it in a textbook or on a Google search, it's actually seeing how, and I think that's the real, important thing. Scitech does that gives this huge amount of context and you know, sort of significant to whatever you learn."

## Discussion

This study aimed to explore the relationship between science capital and Scitech engagement, recognising participation in Scitech programs and experiences as factors that may contribute to or strengthen an individual's science capital. Using a sample of adults living in Western Australia, we explored how the influence of other science capital-building experiences, knowledge and role models may increase or reduce the potential influence of Scitech. In the following discussion, we will outline key findings from our examination of science capital and Scitech engagement, then evaluate the validity of this methodological approach to measure the social impact of informal science learning organisations, such as Scitech.

### Science capital's influence on science engagement

As discovered during previous studies, several demographic factors had significant correlations with participants' science capital. While a higher proportion of women completed the survey, men were more likely to have higher science capital than women or non-binary individuals (Archer et al., 2015; Godec et al., 2024; Moote et al., 2021). Men were also more likely to work in management roles (which typically pay a higher salary), self-report a higher relationship of STEM with their current jobs (Australian Government Department of Education, 2022; Australian Government Department of Industry Science and Resources, 2023) and report a higher household income (Australian Bureau of Statistics, 2023). Survey participants who reported higher household incomes were also more likely to have higher science capital (Moote et al., 2021).

The role of parents as role models was also reflected in the science capital scores. Participants who had at least one parent who had attended university were more likely to have high science capital, consistent with findings by Moote et al. (2021). Those who had completed higher education in any field, as well as participants who had studied STEM after high school, were also more likely to have higher science capital. This is consistent with findings by Godec et al. (2024), who found that undergraduate students, studying both STEM and non-STEM majors, had a larger proportion of those with medium science capital than previously seen in other science capital studies, reinforcing the intersecting inequalities people with low science capital were more likely to experience, decreasing their likelihood of completing higher education.

Participant interviews revealed further depth about how science capital influences everyday engagement with science. While the majority of people we interviewed with 'High' and 'Medium' science capital scores were likely to identify as "science people", most with 'Low' science capital did not. Several talked about "science people" as having a different set of skills or the ability to think about science in a way that they perceived they could not. Carlone & Johnson (2007) highlighted the important role of being recognised as a "science person" by oneself and meaningful others, or "people whose acceptance of [them] matters to [them]" (p. 1992), in accessing a science identity. This suggests those with 'Low' science capital lacked such recognition, internally and externally, causing them to "other" those for whom science came naturally.

Interview participants with 'High' and 'Medium' science capital engaged with science through their work as STEM professionals and educators, and in their spare time by exploring the natural world, engaging with science media, and doing at-home experiments and projects with their children. 'High' science capital interviewees were motivated to engage with science because of their innate interest and curiosity about the world, while those with 'Medium' science capital wanted to use science to make the world a better place and encourage their children's interest in science. In contrast, those with Low science capital only talked about participating in science in the context of their children. Rather than engaging with science for its own sake, their science participation was related to issues that were deeply personal to them, such as discussing local environmental challenges with neighbours, supporting their children's interest in science or having a better understanding their children's health needs. This is consistent with findings by Falk & Dierking (2012), who noted that adults' science interests are typically linked to decision-making or action, such as personal matters (like health and the environment) or leisure (like bushwalking and astronomy). Carlone & Johnson (2007) also noted women's involvement in science is typically altruistic, aiming to help others rather than for personal gains, which aligns with our results from the 'Low' science capital interviews.

Only interviewees with 'High' and 'Medium' science capital shared stories of key memories that influenced their current interest in science, including science magazine subscriptions, access to high-quality science resources at school and participating in a professional development experience with practising scientists. This is consistent with science-related media and knowing people in science-related roles as being core dimensions of science capital (Archer et al., 2015), and how school science experiences shape student habitus and science capital (Dewitt et al., 2016). The childhood experiences described laid the groundwork for developing science capital at a young age, while recent professional development experiences reinforced existing science capital. In contrast, those with 'Low' science capital described no such memories, which is consistent with *not* being provided with the resources and experiences to contribute to developing their science capital.

Participants described science in different ways depending on their level of science capital. Those with 'High' science capital showed their passion for science and higher-order conceptualisations of science, discussing it in terms of broader processes and ways of thinking, curiosity and discovering new things about the world. 'Medium' science capital interviewees also mentioned curiosity, discovery and learning through failure, plus the role of science in improving our day-to-day lives. 'Low' science capital interviewees were most likely to focus on science as a specific type of knowledge, with one interviewee (who was an engineer) equating doing science with being "smart." This mirrors research by Braaten et al. (2023), who noted that assumptions of engineers being "smart" acted as a barrier to increasing the diversity of those who pursue engineering as a career.

Seeing science everywhere in the world around them was common amongst interviewees with 'High' and 'Medium' science capital. Those with 'Low' science capital reflected that science plays an important role in our lives and our futures (especially related to health, technology and the environment), but several noted they didn't always see it themselves, consistent with research by Godec et al. (2017). Of note, one participant described how they only felt they were doing science in "science spaces", such as the zoo or a museum, but not in other contexts, such as at the beach or while cooking. Interviewees across all levels of science capital discussed the important role science will play in addressing global socio-scientific issues, especially climate change.

Only interviewees with 'High' science capital described having conversations about science for the sake of discussing science – for example, calculating the focal length of glasses with friends during pub trivia. Those with 'Medium' and 'Low' science capital recognised they had conversations that related to science, but the science topics discussed were often related to other aspects of their daily life or personal concerns. As aptly put by one interviewee: "We don't specifically say to other people like 'Hey, I'm talking science about it now.'" This aligns with findings by Hine (2014), who investigated discussions in a parenting blog about headlice eradication strategies. The pros and cons of different approaches to removing lice were discussed in the context of parents' values and personal experiences, rather than necessarily being linked to scientific merits (Hine, 2014); they were discussing science without saying, 'I'm talking about science.'

## Science capital's influence on Scitech engagement

Visiting Scitech regularly had multiple correlations with science capital. Survey participants who had visited Scitech most recently were most likely to have higher science capital. Respondents who had possessed a Scitech membership at some point had higher science capital than those who didn't, and the longer the length of previous memberships, the higher their science capital was likely to be. All interviewees noted that they always visited Scitech with their children or grandchildren, or as a teacher accompanying a school group (except one teacher who had also attended after-hours events at Scitech). Interviews also suggested that those with Scitech memberships visited more frequently than non-members (consistent with Scitech visitation data), increasing opportunities for engagement. While 'High' and 'Medium' science capital interviewees were more likely to visit with only their children and grandchildren, some with 'Low' science capital mentioned meeting up with other families or bringing their children's friends as a shared experience.

While attending Scitech on a school excursion as an adult did not have a relationship with science capital overall, teachers who accompanied school groups during excursions to Scitech were more likely to regularly talk about science than those who didn't. This aligns with discussions from the teachers interviewed, mentioning

how they would draw upon the shared Scitech experiences and discuss what they had learned with their class back at school. Attending Scitech activations at community events, visiting Adults Only events at Scitech and engaging with Scitech's digital content all correlated with higher levels of science capital. Only one ('Medium' science capital) interviewee mentioned attending Adults Only events at Scitech.

Promisingly, increasingly frequent childhood engagements with Scitech related to higher levels of science capital, both at the Discovery Centre (through family visits and school excursions), and in the community (through school incursions and community events); the more participants engaged with Scitech as a child, the higher their science capital. Only interviewees with 'High' and 'Medium' science capital shared memories of childhood experiences with Scitech, including sharing details of specific exhibits and science demonstrations. One 'Medium' science capital participant noted how he was fortunate to live close to Scitech as a child, recognising that it played a significant role in his ability to visit regularly, compared to his wife who lived further from the city. Two 'Low' science capital interviewees noted they had visited Scitech during childhood but didn't describe their visits in detail.

Across all interviews, participants shared fond memories of enjoying watching their children, grandchildren and school students playing, learning and enjoying their experiences at Scitech. Some 'Medium' and 'Low' science capital interviewees discussed talking about their visit on the way home, using the visit to Scitech as a shared experience to draw upon. Just as students in the study by Milne & Otieno (2007) used classroom demonstrations as a shared experience to create a shared language and supported further conversations about science, visits to Scitech can play a similar role in allowing family groups to draw upon a shared experience to discuss science and co-create meaning.

Scitech was perceived by interviewees as a safe, fun, interactive place for children to learn about and develop an interest in science. For 'High' science capital interviewees, the focus was on sharing their passion for science and passing it on to the next generation. 'Medium' science capital participants were motivated by supporting their children's science interests, in addition to sharing their own science enjoyment. 'Low' science capital participants were strongly motivated to visit by aiming to spark or nurture children's science interests. This is consistent with findings by Suortti et al. (2023), who found that parents draw on their own science capital to support their children's science interests and aspirations. They also noted parents who had completed vocational degrees had the most support for their children's science aspirations (compared to those with academic-focused qualifications), and those with vocational degrees were more likely to have lower levels of science capital (Suortti et al., 2023).

The hands-on, interactive nature of Scitech was also an important motivator for interviewees across all levels of science capital. Additionally, those with 'High' and 'Medium' science capital noted how Scitech provided their children and students with opportunities to engage with science in ways that they couldn't anywhere else, such as experiments that can't be safely done at home or school, or just showcasing larger-scale exhibits than models that can be built in the backyard. Barriault & Pearson (2010) noted how interactions with exhibits in science centres must be considered in their "social context, seeing and hearing the positive emotional responses of other visitors, creates an ambience in which breakthrough is encouraged. Take an exhibit out of its context and it may not be as successful in eliciting the behaviors [sic] that occurred elsewhere" (p. 104), reinforcing the value of science centre experiences that cannot be done at school or home. Rennie & Howitt (2020) noted how interactive exhibit experiences could contribute to children's science identity, even if they didn't necessarily recognise those experiences as science (Rennie & Howitt, 2020), providing further value to these interactive escapades.

**“The comment that you hear [from] people who haven't been to Scitech before, the thing they love about it is how it's interactive - there's nothing that kids can't touch or smell, or, you know, do something with.”**

The broader value of Scitech in the WA community was discussed by interviewees across all levels of science capital. For many, Scitech is a valuable resource to help inspire their children and students in science, either building on their own science interests and knowledge, or helping fill gaps that they can't provide by themselves. Several expressed desires for Scitech to receive additional funding to help grow, upgrade, or expand its capabilities to keep providing its crucial role of being *the* place to go in Perth for engaging, all-ages science learning opportunities. One teacher reflected on the broader value of Scitech's reputation, using Scitech-branded educational resources to give her more credibility with her students. For one family, Scitech is a special place to take a break from the children's hospital when they visit Perth for ongoing medical treatment. As discussed by Falk (2006, 2011), visitors to cultural institutions such as science centres take on different identities, which are influenced by their pre-existing interests, where they visit, and whom they visit with. While those with lower science capital described their experiences at Scitech in accordance with *Facilitators*, those with higher science capital were more likely to take on *Explorer* or *Professional/hobbyist* identities in addition to their *Facilitator* role (Falk, 2006, 2011).

**“I really would like it to be known that it really has sort of multi-generational impact. It's been around for so long. It's a Perth institution, it's an awesome place to sort of just take the kids out for the day, but it's also an incredible place to actually support and promote science and STEM in the community. I really think that it's an extremely valuable organisation.”**

While 'High' and 'Medium' science capital participants were less likely to credit Scitech for their own science interests – many noted they already had a strong interest – they all reflected that Scitech is an important resource for children's science engagement and relationship with science. Two 'Medium' science capital interviewees noted that Scitech built on their existing science interests and confidence, including one who regularly visited during childhood and shared that Scitech “expanded on a spark that was already there.” In contrast, 'Low' science capital interviewees agreed that Scitech played an important role in their children's and grandchildren's science interests, and two noted that it provided *them* with learning opportunities they wouldn't otherwise seek for themselves, such as identifying stars in the night sky through planetarium shows or feeling immersed in learning through playing with the hands-on exhibits. The theme of Scitech being a valuable resource to inspire the next generation in science, technology, engineering and mathematics was clear throughout these discussions, reinforcing the special role it plays in the WA community.

### Using science capital to evaluate impact

A key aim of this study was to determine if using science capital as an evaluation framework was valid for assessing the social impacts of science centres. Based on findings, we are confident that science capital *is* a valuable tool for understanding a science centre's impact on the wider community, as it provides a lens through which to understand *how* and *why* audiences engage with science centre programs, content and experiences.

By using a combination of quantitative-focused surveys and qualitative interviews for additional depth and context, we were able to account for other sociocultural factors in people's lives and paint a detailed picture of how Scitech fits into people's science learning and engagement experiences; not simply a 'science pipeline' but a 'science ecosystem'. By targeting adults, we were able to also explore the role of parents as role models, and how *their* engagements with Scitech can encourage their children and grandchildren to engage with science.

Importantly, these findings show that, contrary to some popular assumptions, Scitech is not just “preaching to the converted.” Individuals with a wide range of science capital scores regularly visit the Discovery Centre, highlighting its accessibility to a diverse audience, regardless of pre-existing science interests or knowledge. Our results show that Scitech plays a crucial role in being a recognisable “science space”, not only encouraging young people to become interested in STEM but also helping adults recognise the relevance of STEM in their day-to-day lives and legitimising scientific discourse.



## Limitations

A key limitation of this study is that we did not examine the influence of Scitech on the science capital of children. We chose to focus on adults because research with children requires a more extensive ethics approval process, which we didn't have the capacity to complete during the pilot study, which was funded in kind. A key aim of this study was to test the relationship between science capital and science centre engagement, so we targeted adults as a proof of concept. For future research, we hope to expand these methods to include a wider sample, including children of different ages.

The other pragmatic decision we made, given the pilot nature of this study, was to recruit participants from Scitech's database of members and email subscribers. This meant most people who responded to the survey had previously visited Scitech or engaged with Scitech regularly. Therefore, we were not able to examine the effects of *not* visiting Scitech on an individual's science capital or explore potential barriers to visiting Scitech or engaging with Scitech's content or community activations. Future studies should also expand participant recruitment beyond science centre email subscribers, such as targeting schools in postcodes that are not represented amongst existing visitor data.

## Next steps and recommendations for practice

We recommend using these findings to develop multiple theories of change to describe the science engagement journey with Scitech for different audience segments, based on their science capital. These audience segments may include, but are not limited to:

- Educators (based in the Perth metro area, and regional WA),
- Low science capital adults with highly science-engaged children,
- Low-to-medium science capital Scitech members,
- High science capital adults who visit for Adults Only Events (and might bring their low-to-medium science capital friends),
- Low science capital adults who just want a safe and easy day out with their family.

We also recommend repeating this study, recruiting adults and children from other science centre contexts, in other locations around Australia and internationally, to compare Scitech's influence in the WA community with similar informal science learning organisations elsewhere.

## Conclusion

Science capital influences how individuals perceive science in the world around them and how they engage with science; those with higher science capital are more likely to have an innate passion for science and “see it everywhere”, while those with lower science capital are more likely to participate in science if their children are interested. However, having lower science capital doesn’t prevent people from engaging with science or seeing science as valuable; they are simply more likely to perceive people who *do* participate in science as having different abilities or a ‘science brain’, which they don’t possess.

Participants in our study across all levels of science capital visited Scitech, however their motivations for visiting Scitech varied depending on their science capital. ‘High’ science capital participants brought children to Scitech because *they* love science. ‘Medium’ science capital participants brought children because they love science or their children loved science, and they wanted to nurture that existing interest in a place known for its fun, engaging and hands-on science learning experiences. Those with ‘Low’ science capital visited because Scitech was identified as a fun, engaging and safe “science space”, where they could encourage the next generation to be interested in and learn about science, even if they weren’t interested in science themselves. It is important that Scitech continues to provide non-intimidating opportunities for people with lower levels of science capital to visit a “science space”, with an emphasis on children’s science engagement, while allowing those with higher science capital to continue to participate and access opportunities for strengthening their own relationship with science, such as Adults Only events like After Dark. In short, as one of our research team observed, “Scitech is for sciencey people and non-sciencey people in different ways.”

Everyone we spoke to during the interviews or who shared their comments within the survey expressed how much they value Scitech and its role in the WA community. Beyond simply being a science centre, it plays the role of a safe space, an easy day out, a place to escape, a source of credibility in their teaching, the place they used to visit on childhood visits to Perth, and, of course, the spark of inspiration for the next generation. Several people interviewed expressed their wishes for Scitech to continue to grow and extend its capability to reach and inspire all Western Australians.

Overall, Scitech means many things to many different people, and its true value lies in this flexibility. By identifying further opportunities to ensure Scitech remains a welcoming, accessible and easy resource to inspire engagement by children *and* adults in science, technology, engineering and mathematics, it will continue to be valued by future generations, and keep contributing to the science capital of all Western Australians.



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## About the authors

**Shanii Phillips** is the Audience Research Manager at Scitech and an Adjunct Research Fellow in Science Communication at the University of Western Australia. She completed a Master of Science Communication at UWA and is now pursuing a PhD in inclusive science communication through the National Centre for the Public Awareness of Science at the Australian National University.

Through a series of fortunate events, Shanii fell into the world of science communication and has worked at Scitech since 2013. Over the last decade, she has actively contributed to Scitech's purpose by igniting hydrogen balloons, blowing giant bubbles, freezing all manner of objects in liquid nitrogen for the delight of thousands of Western Australians, and, most recently, seeking to find rigorous ways to demonstrate the impact of Scitech's efforts.

Shanii identifies as a science communicator, researcher and passionate advocate for the role science communication can play in social equity, through encouraging scientific discourse and informed decision-making.

**Tarryn Basden** (she/they) was a Research Assistant for this project and has extensive experience in science communication and education. They hold degrees in biology and science teaching, and recently graduated with a Master of Science Communication from UWA.

Tarryn began their career in conservation education, engaging with youth to promote positive conservation attitudes and behaviours. They then progressed into communication, research, and project management locally and internationally, developing and delivering education initiatives, coordinating science events, implementing nationwide communications strategies, entertaining crowds of hundreds with fun science facts, and even training birds in Brazil.

Combining their knowledge, skills, and passion, Tarryn specialises in integrating behaviour change theory to create engaging and effective audience-centred communication strategies that create connections, inspire intrigue, and promote positive behaviours, improving outcomes for both the audience and the organisation. They relish communicating about any and all topics, and enjoy the challenge of learning and teaching about something new – including conducting qualitative interviews for the first time for this research!

**Dr Heather Bray** is a Senior Lecturer and Chair of the Discipline of Science Communication at the University of Western Australia. She was an animal production scientist in Australia and the Netherlands before starting out in science communication 25 years ago at the Investigator Science and Technology Centre in Adelaide, initially as a volunteer and then in Visitor Services and Programs and Exhibitions. She then developed education and engagement programs about complex and controversial technologies for two agricultural research centres (one of which won a national award) before undertaking research on attitudes to the use of science and technology in food production at the University of Adelaide.

Since joining UWA in 2019, Heather's role has been focused on delivering the undergraduate minor in Science Communication and Master of Science Communication. Heather's research interests centre on two broad areas: perceptions of agricultural practices, and diversity and inclusion in science communication, but she still has a 'soft spot' for science centres. She is frustrated by the paucity of evaluation in science communication, rejects claims that it is "too hard", and is motivated to find fit-for-purpose ways to help science communicators and their institutions communicate their value.

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# Appendices

## Appendix 1: Survey questions

### Demographics

What is your age? [Radio buttons – choose one]

- 18-25
- 26-35
- 36-45
- 46-55
- 56-65
- 66-75
- 76-85
- 86 years or older

What is your home postcode? [Open-text response]

What is your gender? [Radio buttons – choose one]

- Male
- Female
- Prefer to self-identify [open-text response]
- Prefer not to say

Do you speak any languages other than English at home?

- Yes
- No
  - [If yes]: What languages other than English do you speak? [open-text response]

Are you of Aboriginal or Torres Strait Islander origin? [Radio buttons – choose one]

- Yes, Aboriginal
- Yes, Torres Strait Islander
- No neither
- Prefer not to say

In the [2021 Census](#), the median weekly household income in Western Australia was calculated to be \$1,815 (before tax), or \$3,630 per fortnight. Would you say your current weekly household income is below the median, near the median or above the median? [Radio buttons – choose one]

- Below median (Less than \$1750 per week, or \$3500 per fortnight)
- Median (\$1750 to \$1999 per week, or \$3500 to 3999 per fortnight)
- Above median (\$2000 or more per week, or \$4000 per fortnight)

Did you live in Western Australia as a child (under the age of 18) for at least one year?

- Yes
- No
  - [If yes]: What is the main suburb or town you lived in while growing up in Western Australia?

Did your parents or guardians go to university? Please tick all that apply. [Radio buttons – choose one]

- Yes, one of my parents/guardians went to university
- Yes, multiple parents/guardians went to university
- No, none of my parents/guardians went to university

While you were a child, did your parents or guardians have a paid job? [Radio buttons – choose one]

- Yes, one of my parents/guardians had a paid job
- Yes, multiple parents/guardians had a paid job
- No, none of my parents/guardians had a job



- [If yes]: What was their main job when you were a child? (If you're unsure of their specific job or jobs, please describe which industry or field they worked in.)

What is the highest level of education that you have completed? [Radio buttons – choose one]

- Primary School
- High school
- TAFE
- Bachelor's degree
- Post-graduate diploma or certificate
- Master's degree
- PhD

What is the highest level of education that you have completed in STEM (science, technology, engineering, or mathematics) or a STEM-related field? [Radio buttons – choose one]

- Primary School
- High school
- TAFE
- Bachelor's degree
- Post-graduate diploma or certificate
- Master's degree
- PhD

Which of the following best describes your current occupation? [Radio buttons – choose one]

- Manager (eg. CEOs, Legislators, Farm Managers, Specialist Manager, Retail/Hospitality Manager)
- Professional (eg. Arts, Media, Business, Design, STEM, Education, Health, ICT, Legal and Social Professionals)
- Technical or Trades Worker (eg. Engineering, ICT Technicians, Automotive, Construction, Telecom and Food Trades Workers, Skills Animal/Horticulture Workers)
- Community or Personal Service Worker (eg. Health and Welfare, Carers, Hospitality, Protective Services and Sports/Personal Service Workers)
- Clerical or Administrative Worker (eg. Office Managers, Personal Assistants, Clerical Workers)
- Sales Worker (eg. Sales Representatives, Assistants and Support Workers)
- Machinery Operators or Driver (eg. Machine, Stationary and Mobile Plant Operators, Road and Rail Drivers, Store persons)
- Labourer (eg. Cleaners, Laundry, Construction and Mining, Factory Process, Farm, Forestry and Garden, Food Preparation Workers)
- Student
  - [If Student]: Please describe what you are currently studying [Open-text response]
- Stay-at-home parent
  - [If Stay-at-home parent]: If you had a paid occupation before becoming a stay-at-home parent, which of the following best describes that occupation? [Same occupation categories as above]
- Retired
  - [If Retired]: Which of the following best describes your career before retirement? [Same occupation categories as above]

To what extent would you say your job involves or is related to science, technology, engineering, or maths? [Slider question, values from 0 to 100]

- Please explain your answer. [Open-text response]

Are you a teacher? [Radio buttons – choose one]

- Yes
- No

- [If yes]: Have you ever participated in the following in the course of your work as a teacher? [Check boxes – can choose multiple]
  - Visited Scitech on a school excursion
  - Been visited by Scitech for a school incursion
  - Participated in a Scitech Professional Learning program or workshop
  - Hired a Scitech DIY Science Kit
  - Participated in the Scitech Schools' Weather Wall program (Regional schools only)
  - Used online content or resources available on Scitech's website in your classroom teaching (including Particle or Science at Home)
  - None of the above [exclusive]

### Science Capital

How much do you agree with the following statements? [Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree]

- A science qualification can help you get many different types of job.
- One or more of my parents/guardians think science is very interesting.
- One or more of my parents/guardians have explained to me that science is useful for my future.
- I know how to use scientific evidence to make an argument.
- At school, my teachers specifically encouraged me to continue with science after finishing high school.
- At school, my teachers explained to me science is useful for my future.
- It is useful to know about science in my daily life.

How often do you do the following things? (Never or rarely (less than once a year), Once a year, Once every 3-6 months, Once a month, At least once a week)

- Read books or magazines about science?
- Watch science, health, or nature documentaries?
- Listen to podcasts about science, health, nature or technology?
- Go to a science centre, science museum or planetarium?
- Visit a zoo or aquarium?
- Participate in local citizen science or environmental groups (such as beach clean-ups, tree-planting, or wildlife rescue)?

How often do you talk about science with other people?

- Never or rarely (once a year)
- A few times a year
- About once a month
- About once a week
- Almost every day

Who do you talk with about science? (Tick as many as appropriate)

- My children
- My partner or spouse
- Friends
- Siblings (brothers or sisters)
- Parents or guardians
- Extended family members (grandparents, aunts, uncles, cousins, nieces, nephews)
- Directly with scientists
- Teachers
- Other (please specify) [Open-text response]
- No one [exclusive]

Do you know anyone (family, friends, or colleagues) who works as a scientist or in a job that uses science?

- Yes
- No
- I don't know
- [If yes]: Who do you know who works as a scientist or in a job that uses science? (Please tick as many as appropriate)
  - My children
  - My partner or spouse
  - Siblings (brothers or sisters)
  - Parents or guardians
  - Extended family members (grandparents, aunts, uncles, cousins, nieces, nephews)
  - Friends or neighbours
  - Someone I know from my community

### Recent Engagement with Scitech

Have you heard of Scitech? [Radio buttons – choose one]

- Yes
- No
- [If yes, continue with follow section of questions. If no, skip to **Future Research**]

Have you ever been to Scitech Discovery Centre (in West Perth)?

- Yes
- No
- Unsure
- [If yes]: When was the last time you visited Scitech?
  - 0-3 months ago
  - 3-6 months ago
  - 6-12 months ago
  - 1-3 years ago
  - 3 years ago or more
- [If yes]: How many times have you visited Scitech in the last 12 months?
  - Once
  - Twice
  - Three times
  - Four times
  - Five or more times
- [If yes]: Have you ever attended any of the following Scitech Adults Only Events? Please tick all that apply. [Check boxes – can choose multiple]
  - After Dark
  - Dome Date Night
  - Pink Floyd's 50<sup>th</sup> anniversary "Dark Side of the Moon" planetarium special
  - None of the above
- [If yes]: Did you participate in any of those visits to Scitech as part of a school excursion?
  - Yes
  - No
  - [If yes]: What was your role in the school excursion? [Radio buttons – choose one]
    - Teacher
    - Education assistant
    - Carer
    - Parent or guardian excursion helper
    - Other (please specify) [open-text response]

Are you a Scitech member? [Radio buttons – choose one]

- Yes, I am currently a Scitech member
- No, but I have been a member in the past
- No, I have never been a Scitech member [Skip to ‘Have you ever been to Scitech Discovery Centre’]
  - [If “yes”]: How long have you been a Scitech member?
    - Less than 12 months
    - Between 1 to 2 years
    - Between 2 to 3 years
    - More than 3 years
  - [If “no, but I have been a member in the past”]: How long were you a Scitech member?
    - Less than 12 months
    - Between 1 to 2 years
    - Between 2 to 3 years
    - More than 3 years
  - [If “no, but I have been a member in the past”]: How often did you visit Scitech when you were a member?
    - At least once a week
    - At least once a fortnight
    - At least once a month
    - At least once every 3 months
    - At least once a year

Have you ever participated in a Scitech incursion at a school, library, playgroup or community centre?

- Yes
- No
- Unsure
- [If yes]: When was the last time you participated in a Scitech incursion?
  - Within the last 6 months
  - 6 to 12 months ago
  - 1-2 years ago
  - 2 years ago or more

Have you ever seen Scitech at a community festival, community event or agricultural show?

- Yes
- No
- Unsure
- [If yes]: When was the last time you saw Scitech at a community festival, event or agricultural show?
  - Within the last 6 months
  - 6 to 12 months ago
  - 1-2 years ago
  - 2 years ago or more

Have you ever heard of [Particle](#), a digital science publication developed in-house by Scitech?

- Yes
- No
- [If yes]: Have you ever participated in the following activities? Please tick all that apply. [Check boxes – can choose multiple]
  - Visited the Particle website
  - Read an article on the Particle website
  - Subscribed to the Particle newsletter
  - Listened to a Particle podcast (such as Elements or Please Look Up)
  - Seen or interacted with a Particle social media post (such as Facebook, Instagram, or Twitter)
  - None of the above [exclusive]

Have you ever read, watched, or listened to any of the following online content created by Scitech? Please tick all that apply. [Check boxes – can choose multiple]

- Audio Guide to the Galaxy podcast
- Wonderkids podcast
- The Sky Tonight
- Scitech at Home
- Toy Teardown YouTube series
- Scitech WA YouTube channel
- Scitech WA Tik Tok channel
- None of the above [exclusive]

### Historic Engagement with Scitech

[Only show if they answered “Yes” to ‘Have you ever heard of Scitech?’ and “Yes” to ‘Did you live in Western Australia as a child?']

As a child (under the age of 18), how many times did you participate in the following activities? [Radio button grid: At least once, Two to three times, Four to ten times, Ten times or more, Not sure, Never]

- Visit Scitech with your family or friends?
- Visit Scitech as part of a school excursion?
- Have Scitech visit your school for an incursion?
- See Scitech at your local library, playgroup or community centre for an incursion?
- See Scitech at a community festival, community event or agricultural show?

What memories do you have of Scitech from your childhood? [Open-text response]

### Future Research

Would you be interested in being considered for a follow-up interview to discuss your experiences with science and Scitech in further detail? [Radio buttons – choose one]

- Yes
- No
- [If yes]: Please provide your contact details below:
  - Name: [Open-text response]
  - Email: [Open-text response]
  - Phone Number: [Open-text response]

### Prize Draw

Thank you for completing this survey. If you would like to go into the draw to win 1 of 10 \$50 Prepaid Visa Gift cards, please provide your contact details below.

- Name: [Open-text response]
- Email: [Open-text response]
- Phone Number: [Open-text response]

## Appendix 2: Interview protocol

*Welcome, thank you for your time.*

*Confirm consent for audio recording. Confirm participation is voluntary and can withdraw from the interview at any time. You can ask for your responses to be withdrawn from the project up to 3 months from today.*

*Today we'll be talking about your experiences with science, Scitech and how they fit into your life. At the end, I'll confirm your address to send you a Discovery Shop voucher.*

*Any questions before we get started?*

### **Broad attitudes and associations with science**

First of all, what comes to your mind when I say the word "science"?

- Prompts: subjects, associations, activities, emotions

Do you consider yourself a "science person"?

- Why? Why not?

Is science something that is important to your everyday life?

- Why? Why not?

### **Social Norms**

What do you like to do in your spare time?

- What are your hobbies? Interests?

Do you do any of these with other people?

- Who? (eg. family, friends, children, parents, other community members)

Do you think any of your hobbies are "sciencey" or have a science component to them?

- Why? Why not?

### **Science Capital and Science Influences**

Where do you come across science in your everyday life? [Trying to tease out broad associations and key influences]

Follow-up prompts - encourage expansion as needed:

- Do you read science news or watch science fiction?
- Do you watch science, health or nature documentaries?
- Do you talk about science with other people in your life? (eg. Family, friends, children - esp. careers)
- Do you know anyone who works in a science-related role?
  - Is there anyone in your family who has studied science or works in a science-related role?
- Are you part of any environmental organisations or citizen science projects?
- Do you like to do gardening, tinkering, sewing or knitting? Do you go the zoo, national parks, museums or Scitech?

Who do you participate in these activities with?

- e.g. Children, partner, family, other community members, alone?

Which of these, if any, do you think is the most important influence on how you think about and interact with science?

- Why? Why not?



## Experience with Scitech

Have you ever been to Scitech?

- If no:
  - Have you ever heard of Scitech?
  - Is there anything stopping you from visiting Scitech? [key barriers to entry]
  - Are you aware of Scitech's free online content? Would you be interested in engaging with Scitech that way? Why/why not?
- If yes:
  - How many times do you visit Scitech each year?
  - Who do you visit with? Why do you visit? (key motivations)
  - Tell me a bit about your last visit [key memories/experiences/emotions]
  - Do you have any memories of visiting Scitech as a child? (either with family or school, or Scitech visited you?)
  - How important do you think Scitech is to your engagement with science? Do you think Scitech has helped you become interested (or influenced your interest) in science? Were you interested in science before? [Prompt discussion about their relationship with Scitech and the importance of Scitech to their overall science capital]

## Final remarks

Is there anything we haven't covered that you'd like to share?

## Appendix 3: Interview codebook

Code Name	Description
Hobbies and spare time	Describing how they spend their spare time
With children	Spare time activities done with or related to children
Influencing children	Discussing how science can influence the next generation, or the importance of getting kids involved in science
Sci capital	Quick reference - assigned "level" of science capital
High	High science capital (15 to 31)
Low	Low science capital (-18 to -2)
Medium	Medium science capital (-1.5 to 14.5)
Sci engagement	How do people engage with science? Where do people DO science?
By children	Describing how children in their life engage with science (as opposed to doing science with those children)
Childhood memories	Childhood memories of doing science activities (excl. childhood memories of Scitech)
Cooking	Engaging with science through cooking
Finding answers	Researching and finding out answers to science-based questions
Gardening	Engaging with science through gardening
Music	Engaging with science through playing or composing music
Nature and environment	Engaging with science through nature, the environment and the natural world (including space and stargazing)
Other science and enviro orgs	Engaging with science through other science or environmental organisations (including, zoos, aquaria, nature orgs etc)
Pets	Engaging with science through pets and pet care
Science media and scifi	Engaging with science through science media (non-fiction) and science fiction
Sport	Engaging with science through playing sports
Through work or study	Engaging with science through work or study
Teaching science	Engaging with science through teaching study
Tinkering and experimenting	Engaging with science through tinkering or experimenting at home
Visiting other museums	Engaging with science through visiting other museums and science centres
With children	Describing engaging with science, with children
With scientists	Describing engaging with science, with scientists
Sci identity	Description of science identity - are you a 'science person'
In between	In between having a strong 'science identity' and a strong 'non-science identity'
Not a science person	Describing themselves as 'not a science person' or 'not a sciencey person'
Science person	Describing themselves as a 'sciencey person' or a 'science person'
Sci motivations	WHY do people engage with or participate in science?
Children interested in science	... because their children are interested in science
Curiosity!	... because they're curious, or want to find out more about the world, or how the world works - elements of asking questions or investigating things more vs. just being interested
Make the world a better place	... because they want to make the world a better place (and science is a way to do that)
Personal interest	... because of their own personal interest in science or a science topic (different to curiosity - less curious, and more about wanting to know or learn more about science or science topic)
Protecting family	... because understanding science is an important way to take care of or protect their family



Threats and Wicked Problems	... because we need science to help us solve or overcome Wicked Problems
Climate action	Discussing the role of science in reducing the impacts of climate change
Sci philosophy	How do they talk about "science" in general?
Discovery and curiosity	Science is about being curious and discovering new things
Knowledge	Science is about knowledge or contributing to a body of knowledge
Learning from failure	Science is about learning from your failures, and you won't always get things right the first time
Science improves life	Understanding science can help improve your life, or science has contributed to improving our lives (esp. through tech and medical advancements)
Science is connected	Science cannot be done in isolation from society
Science IS relevant	Discussions about science, and how it is relevant to people's lives, even though they might not think it is
Science stereotypes	Descriptions of science related to stereotypes (eg. lab coats, lab equipment, being smart)
Scientific method	Describing science as a process, or linking it to the scientific method
Observation	Science involves observation
Teaching science	Describing how they teach science, how science teaching is perceived by others, or encouraging science learning/teaching processes
Sci relevance	How does science fit into or relate to everyday life?
Connection to science	Topics or avenues for people relate to or connect with science
Through cooking and food	Connecting with science through cooking
Through environment (crises)	Connecting with science through environmental issues
Through family	Connecting with science through family and THEIR interest in science
Through health	Connecting with science through health (both personal and family health)
Through nature	Connecting with science through nature and the natural world (but excluding our harmful impacts on the natural world)
Through technology	Connecting with science through technology, especially advances in technology
It's everywhere!	Describing how science is everywhere, all around us, all the time
But I don't always see it	Noting that while science is most likely everywhere, they don't always notice it themselves
Not relevant	Describing how they don't perceive science as relevant to their everyday lives
Science influencing choices	Discussing how science (method or knowledge) influences everyday choices and decision-making
Study-related	Describing the relevance of science through study (either current, recent or childhood schooling)
Work-related	Describing the relevance of science through work
Sci role models and peers	Discussing people they know who work in science or science-related roles
Sci talking	Discussing talking about science with other people
With children	Discussing talking about science with children
With community	Discussing talking about science with neighbours or local community members
With friends and peers	Discussing talking about science with friends or peers
With partner	Discussing talking about science with their partner
With scientists	Discussing talking about science with scientists
ST engagement	Visiting the centre, seeing outreach, online content, PL etc --> HOW
Frequency	How often do people visit Scitech
Limiting factors	Demographic factors that limit visits to Scitech
Scitech After Dark	Visiting Scitech After Dark

Scitech Discovery Centre	Visiting the science centre
Scitech online	Visiting Scitech website for online activities or videos
Scitech PL	Using the Scitech PL resources available for teachers
Scitech Statewide	Having Scitech touring team visit communities (recent engagement only)
With children	Describing visiting Scitech with children
ST importance to sci engagement	Self-described importance of Scitech to current science engagement
Important	Agreeing Scitech is important to science engagement
But for the kids	... but focusing on how it's important for their children
Not important	Discussing how Scitech does not affect or influence their engagement with science
ST memories	What do they remember from last time they visited Scitech? (or other recent visits)
Adult learning	Personally learning new things from Scitech visit
Adult playing	Personally playing (or engaging) with Scitech interactives and experiences
Adults enjoying	Personally enjoying the experiences at Scitech
Childhood memories	Memories of Scitech from their own childhood
Children enjoying	Describing their children or students enjoying Scitech experiences
Children learning	Describing their children or students learning through Scitech experiences
Children playing	Describing their children or students playing at Scitech, or interacting with the exhibits, shows and content
Enjoying how children interact	Describing how they enjoying observing their children interacting with exhibits at Scitech
Everyday links	Identifying links to everyday life or experiences during Scitech visit
How things work	Describing learning how things work during Scitech visit
Talking about visit	Discussing how they talked about their Scitech visit (either during or after) with group members (either children or students)
Visit extensions	Discussing how the Scitech visit was extended (eg. through taking items home, or being inspired to try new experiments)
Volunteering	Discussing time as a Scitech volunteer
ST motivations	Why do people engage with Scitech?
Adults enjoy	.. because THEY enjoy it! (as adults)
Adults learning	... because THEY learn something when they go to Scitech (as adults)
Broader value of Scitech	Discussing more broadly the wider value of Scitech to the WA community, and it should be engaged with (and supported)
Children enjoy	... because their children enjoy Scitech
Children interested in science	... because their children are interested in science
Children learning	... because their children learn things at Scitech
Enjoying how children interact	... because they enjoy observing their children interacting with exhibits at Scitech
Family time	... because it's a nice thing to do as a family
Safe and easy	... because it's a safe and easy day out
School links	... because it links in with school topics or curriculum
Unique opportunities	... because of the unique opportunities Scitech offers, that you can't get anywhere
Interactive	Describing the hands-on, interactive nature of Scitech experiences (as a unique value feature)
Planetarium	Discussing the unique value of the Scitech planetarium
Science in context	Discussing the unique nature of how Scitech describes or places science in context
ST suggestions	Unprompted suggestions for improving Scitech

## What's *your* science capital?

Find out for yourself and compare your experiences to our study participants using our science capital quiz.

Scan the QR code below or follow [this link](#) to find out!

