

“Sweet” detectives: children crack the case for a healthy future

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To coincide with British Science Week, we ran an outreach activity in March 2024 with several year 5 and 6 (ages 9–11) classes at Whitehall Park School in Islington, London. Cases of type 2 diabetes are on the increase in children, so we wanted to raise awareness of diabetes and discuss the importance of healthy living as prevention. We also wanted to promote the work of scientists and show the diversity of those working in science, technology, engineering and mathematics disciplines. We did this through a range of accessible, fun hands-on interactive activities such as getting children to play the role of scientists to test the sugar content of popular soft drinks. Through these activities and by collecting feedback, we learnt how much children already knew about healthy living and diabetes and recorded how much they learnt from doing our activity. Children said they enjoyed the activity, and we received positive feedback from teachers. This feedback will help inform our future diabetes research and improve our communications with the public and local communities. Due to the success of these activities, we plan to take them to more schools across London in the near future.

Increase incidence of type 2 diabetes in children

As scientists and educators, we are interested in building links with our local community to share knowledge. We are passionate about making a difference and want to widen participation in Science, Technology, Engineering and Mathematics (STEM) activities by taking them out of the laboratory into the local community. Our university (London Metropolitan University) is based in Holloway Road, London. Through our own research, we noticed that some London boroughs close to us (e.g., Tower Hamlets, Hackney and Islington) have populations with higher rates of type 2 diabetes compared to the rest of the country. This is partially linked to high rates of obesity and deprivation in parts of these areas. Worryingly, there is a marked increase in the number of obese children and those diagnosed with type 2 diabetes, reflected across many other parts of the country. Type 2 diabetes is a serious condition and if untreated or poorly managed can lead to serious consequences such as heart disease, strokes and blindness. The good news is that type 2 diabetes can be prevented through healthy lifestyles and even be reversed.

Having recently established a new diabetes group (Diabetes Interest Group, part of the Centre for Health and Life Sciences Research, London Metropolitan University) we decided to design some activities that we

can take to local schools focussing on diabetes awareness and prevention for early intervention. We thought engaging with primary school children (year 5 and 6, ages 9–11 years) was a good target audience since they have a good basic knowledge of science and are at an age we could inspire to engage in a healthy lifestyle. We also wanted to go to a school that has children from diverse backgrounds with the aim of inspiring underrepresented groups in STEM to go on and study these subjects. Our team consisted of researchers who are scientists (STEM ambassadors), educators and a registered nutritionist (PhD student), all with varying experience in delivering outreach activities. We planned our activities together and ensured they were inclusive and appropriate by discussing them with the teachers in advance.

Our interactive activities

We planned four interactive activities that could be delivered during the school schedule during a 1 hour teaching session and could accommodate up to 40 students per session. We deliberately planned our event to coincide with British Science Week addressing the aims of celebrating diversity and careers in science and engineering. The theme for science week was time, so with this in mind, we focussed on how we can influence the health of future generations by promoting healthy living and diabetes awareness.



Us volunteers excited about delivering our activity! From left to right: Samireh, Medah, Cassandra, Mabel, Eirini

We started by briefly introducing ourselves, our names, where we worked, e.g., next to Arsenal football stadium (point of reference the students could relate to) and a fun fact about each of us to emphasise that researchers come from diverse backgrounds and are relatable! We then introduced the aims of the session, so students knew what was expected of them. We emphasised that the activities were meant to be fun and to promote healthy living to prevent conditions such as type 2 diabetes. We then explained how sugar circulates in our body and gets into the cells with the help of a key (insulin). We described what happens if the key doesn't work and sugar can't get into the cells and that the increased level of sugar in the blood can lead to diabetes.

To assess the children's understanding of healthy eating, after a very short introduction about the importance of eating a balanced diet, we asked the children to design a healthy meal using food stickers and paper plates. We then asked students to explain why they chose those food groups and portions to see what they understood. We then showed them a healthy plate and the proportions of vegetables that they should be eating to emphasise the importance of a balanced diet to stay healthy.



Children learning about the importance of healthy eating and having a balanced diet

Activity two was where the real fun began. We wanted children to experience 'being a scientist' and get them interested in biochemistry by giving them the opportunity to do their own experiment. Therefore, we switched roles and it was over to the children to be scientists for the next fifteen minutes. Children were given a range of soft drinks and told to first guess which ones contained the most sugar and rank them in order of sugar content (emphasising the importance of a hypothesis). Drinks included flavoured water, fizzy drinks and fruit drinks. We also explained the importance of a control and all of them guessed correctly that water contained no sugar and was the negative control for the experiment. Children then put their PPE (lab coats, goggles and gloves) on and were instructed how to test their hypothesis using glucose strips to measure the actual sugar content of the drinks by referring to the scales given (where the browner the colour indicated more sugar). After all groups finished, we asked them to feed back their findings with us and note any surprising results. All of them were surprised by how much sugar was in the flavoured water and fruit drinks, as they thought they were meant to be healthy. We showed them how to read food labels and emphasised that we get enough sugar from the food we eat.



Children undertaking hands-on activities designing healthy meals and testing soft drinks for sugar

For activity three, we introduced the importance of physical activity and sleep for staying healthy. We then gave them 3 minutes to write or draw as many examples as possible of physical activities they could think of. We discussed how any form of movement (not just sports) is good for us, including walking the dog or tidying their room.

Our final activity was a ‘True or False’ game to see how much they learnt from the activity. They answered questions by holding up their green or red cards to indicate true or false to the following statements: (1) All scientists look like Einstein and have crazy white hair and a beard (false). (2) Insulin’s job is to increase sugar levels in the body (false). (3) For a nutritious balanced meal, only a quarter of your plate should be vegetables (false). (4) Sports are the only forms of physical exercise that keep you active and healthy (false). (5) Children are recommended to sleep for 9–12 hours per night (true). Over 90% of the children got each of the answers correct.

Anonymous feedback collected from the children at the end of each session revealed that overall, 78% rated our science session as ‘good’ or ‘very good’ and 80% rated us as ‘good’ or ‘very good’ facilitators. We asked them how difficult the experiments were and 20% of the students said it was OK, 44% said it was easy and 36% said it was too easy. Based on this, we can change the experiments to make them more difficult next time and/or take the existing experiments to younger children. We also asked what we could do better next time. Most children said ‘nothing’ however some children said ‘more experiments.’ This is something we could easily incorporate at future sessions. We also asked for feedback from teachers. The only improvement they suggested was to have more multiple-choice and less open-ended questions, something we can easily change in future sessions. We gave the children some plantable pencils to use throughout the day that they could take home to plant and some lanyards with our university name and logo

on as reminders of the activity. Children also had the opportunity to take their worksheets and findings home to share with their families and friends.

Reflections from the day

From the feedback we received and observations on the day, our activity taught the children many things including the importance of healthy living and how to perform experiments. Students learnt about the importance of a hypothesis and were asked to consider possible flaws in their conclusions, introducing them to the importance of experimental design and controls in the interpretation of results. We were all surprised and shocked by the amount of sugar present in soft drinks assumed to be healthy (such as flavoured water), and some students said they will not be drinking these again and will be telling their friends and families!

We all really enjoyed the day, and it was a learning experience for us also. We learnt that children love hands-on experiments and understood scientific principles better if activities are interactive. We also learnt that year 5 and 6 learn about healthy living as part of the curriculum. This is good to know for tailoring our communications and activities in the future. This activity also provided us with insights on classroom management, which we can apply in future school sessions. We got to raise awareness of our research and ‘give back’ to the local community and build relationships with this school. We had the opportunity to practice communicating about science to non-specialists which was rewarding and good to get a fresh perspective of topics from a young person’s perspective. We also wanted to challenge the stereotypes of scientists, and I think we achieved that aim since all the students said all scientists did *not* look like Einstein with white hair and a beard!



Feedback collected from students asking them what they learnt in the sessions (blue) and general feedback about the sessions collected from teachers (green).

Future work and advice for others undertaking outreach activities

On reflection, next time we deliver this activity, we could incorporate another hands-on experiment to replace one of the other activities since students loved 'being a scientist.' We could also emphasise more about how it is OK to live with a medical condition to remove the stigma associated with having conditions such as diabetes. It would also be good to spend some time describing what we and other scientists and educators do day-to-day to emphasise the importance of science in society. It would also be good to expand the session to involve more teachers to get their feedback about the topic and what other content we can include to complement the curriculum. Also, having some information leaflets that the children could take home and share with their families (who may have type 2 diabetes already) would share this knowledge with an even wider audience. A follow-up session with the same classes 6 months later would build upon their prior knowledge and allow us to

assess if they remember what we taught them previously. Our last words of advice for anyone thinking about doing an outreach activity is to plan ahead, do a run-through prior to the event to test everything works (reagents, timings, etc.) and talk to the hosts in advance. Lastly, have fun! If you are interested in being involved in any of these activities, please email us.■

Authors

All authors are part of the Diabetes Interest Group (led by Dr Eirini Meimaridou) part of the Centre for Health and Life Sciences Research at London Metropolitan University (@LondonMetUni) also based in the Schools of Human Sciences and Social Sciences and Professions.

Cassandra, Samireh and Eirini received funding for this activity from a Biochemical Society Scientific Outreach Grant.

Further reading

- British Science Week: <https://www.britishsienceweek.org> [Accessed 16 September 2024]
- STEM Ambassadors: <https://www.stem.org.uk/stem-ambassadors> [Accessed 16 September 2024]
- London Metropolitan University research: <https://www.londonmet.ac.uk/research/centres-groups-and-units/centre-for-health-life-sciences-research/> [Accessed 16 September 2024]
- Whitehall Park School: <https://www.whitehallparkschool.co.uk> [Accessed 16 September 2024]
- Diabetes UK: <https://www.diabetes.org.uk> [Accessed 16 September 2024]

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