

**Our vision**

- Prevalence of childhood anxiety in UK is high; estimated at up to 50% in children up to the age of 12. Many of these children require clinical help but barriers to access exist [e.g., waiting list, family logistics] and many children drop out of intervention.
- A ‘smart’ toy carried by the child, may provide a safe space for them to explore their fears and worries at a time and place that suits them
  - In turn, this may facilitate greater intervention efficacy, allowing earlier identification of core problems for the child and family
  - It may also contribute to economical benefit in clinician’s time, resources and improve wellbeing and quality of life for children and families

**Aims:**

1. To review up-to-date studies on technologies developed/in use for anxiety in childhood.
2. To find out the range of toys familiar in school-aged population to establish suitable design context.
3. To explore acceptability from children and families:
  - a) On adapting familiar toys for ‘smart’ toy
  - b) About children wearing ‘off the shelf’ activity trackers
4. To conduct participatory design workshops to outline a range of potential user scenarios and personas to envisage suitable user profiles for our smart toy [Figure 1].

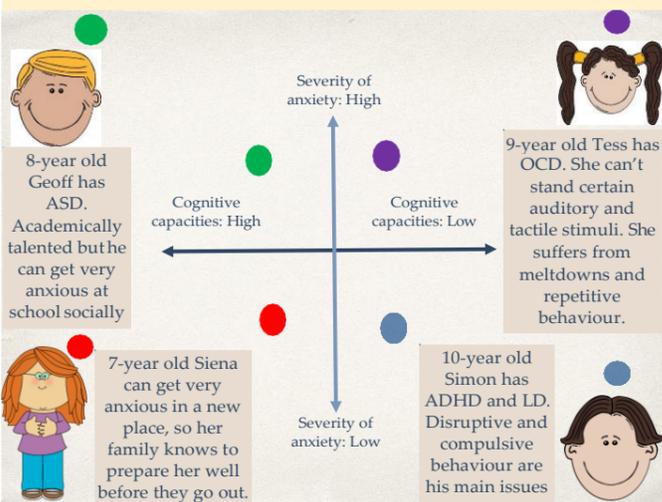


Figure 1: Initial personas at brainstorming stage

**Activities:**

1. Literature review [scoping style] on existing studies on technologies aimed for anxiety in childhood
2. Participatory design workshops with typically developing children
3. Interviews with children’s families
4. TATO@Home: Home trials by workshop attendees
5. Interviews with clinicians

**Activity 1: Scoping review**

310/1526 articles fulfilled our criteria set to capture technologies for anxious children.

Wide range of contexts for child anxiety:

- Neurodevelopmental (inc. ADHD, autism)
- Other medical/neurological (e.g., migraine, asthma)

Types of studies:

- ‘Serious’ games to teach coping/social skills, plus biofeedback loop added
- Participatory/design process
- Virtual Reality
- Humanoid/other robots with tactile and/speech functions
- Our study was one of very few amongst those which used children’s existing toys as a base or encouraging them to explore their anxiety

**Activity 2&3 : Design workshops and interviews**

- 2 groups of children took part in one workshop each
  - Group 1: 6 children (3 girls) aged 7-9
  - Group 2: 10 children (4 boys) aged 4-8
- Children brought a toy of their choice
- All enjoyed trying out devices and sensors on their toys [Figure 2-6]
- But some did not want sensors to be visible [Figures 3&4]



Figure 2: Children trying out Estimote sensors with paired iPad



Figure 3: Some children wanted sensors on the back, so it isn't visible.



Figure 4: Some children did not seem to mind the sensor being visible on their toys.

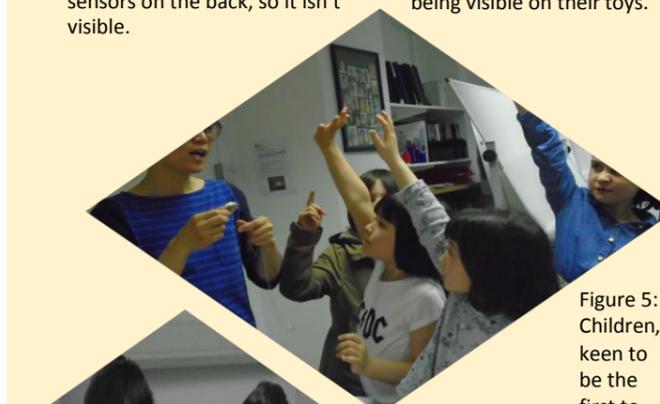


Figure 5: Children, keen to be the first to try out devices.



Figure 6: Wrist band style such as “Fitbit” (pictured) was particularly popular

- Children were open to various toys and preference may depend on the novelty and market trend, it was confirmed in parents’ interviews
- Families were taking care to keep an optimal balance between children’s interest in technology, their health, time management (e.g., lessons and homework), as well as nurturing sensible consumer behavior

**Activity 4: TATO@Home**

- Workshop participants took various sensors and activity trackers (with an iPad paired with them) from the workshop to try at home for up to 2 weeks
- A chance to embed these kits into their daily life
  - Explore their acceptability, usability, and compatibility with everyday family life
  - Children also had a project camera each to keep a photographic diary
  - A wide range of interest levels reported, reflecting their previous exposure to technology in their homes
    - E.g., A family who said they were not very ‘tech-savvy’, saw their children completely absorbed in the kit and they had to introduce a daily allowance system
  - A trend to prefer instant feedback (e.g. step count)
  - Low interest in analyzing activity pattern over time
  - Low threshold for errors

**Activity 5: Interviews with NHS clinicians in CAMHS [mental health services for children and young people]**

- Clinicians would like more technology to become available in their clinical work, because they think it will:
  - Enhance their young clients’ interest and engagement.
  - Improve commitment to tasks assigned to them in between appointments
- Families often enquire if an intervention prescribed is evidence-based.
  - They need to know the ‘value’ of their effort and commitment

**Summary:**

- TATO seems to offer a unique design idea in both academic and clinical communities to address childhood anxiety
- While technology presented seemed to spark an initial interest, it is crucial that the design of TATO engages and maintains interest for children and their families
- Each participant presented a unique set of aspects and features which they valued, see Figure 7.
- Our study has informed design features and concepts for TATO based on end-users’ voice and experiences.
- THANK YOU to all our participants!



Figure 7: User persona profiles as a result of workshops and home trials

