Strength In Numbers Hackathon: Using a novel technology-focused brainstorming activity to engage stakeholders in intervention development.

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Young adulthood has been identified as a particularly challenging time to live with and manage a chronic condition, like type 1 Diabetes (McKnight, Wild, Lamb, Cooper, Jones, Davis et al., 2015; Wiebe, Helgeson, & Berg, 2016). A growing body of research shows that living with type 1 Diabetes as a young adult is associated with more Diabetes-related problems as well as reduced wellbeing (Bryden, Dunger, Mayou, Peveler & Neil, 2003; National Health Service, 2015). Despite growing awareness of the risks faced by young adults with type 1 Diabetes, there is a lack of evidence-based guidance in the research for supporting young adults to improve self-management and outcomes (O’Hara, Hynes, O’Donnell, Nery, Byrne, Heller & Dinneen, 2016).

Addressing the needs of young adults: The D1 now study

The findings of an audit of the Young Adult Diabetes Clinic conducted in Galway University Hospitals confirmed poor outcomes similar to reports from other parts of the world and demonstrated the need to engage differently with this population (Casey, O’Hara, Cunningham, Wall, Geoghegan, Hynes et al., 2014). The research team was awarded a Health Research Award by the Health Research Board (HRB) in Ireland to establish an evidence base for developing a new intervention for young adults living with type 1 Diabetes, the D1 now study.

Based on the development phase of the Medical Research Council Framework for developing and evaluating complex interventions (Craig, Dieppe, MacIntyre, Michie, Nazareth, & Petticrew, 2008), four work packages were completed. To identify the evidence base related to improving outcomes among young adults with type 1 Diabetes, a systematic review of all interventions aimed at improving clinical, behavioural and psychosocial outcomes for young adults with type 1 Diabetes was completed (O’Hara et al., 2016). A qualitative study was conducted involving interviews with parents of young adults with type 1 Diabetes and diabetes service providers, and focus groups with young adults to develop a theoretical understanding of the drivers of young adult self-management (Hynes, O’Hara, Casey, Murphy, Byrne, & Dinneen, In prep). Utilising a methodology from behavioural economics, young adults’ preferences
for characteristics of Diabetes clinics, and the delivery of education and support services, were assessed using a Discrete Choice Experiment. The final work package was to establish and integrate a Young Adult Panel (YAP) of Diabetes service users. Jigsaw Galway is a local youth mental health organization with an extensive track record of meaningful engagement with the young adults using their services. With the support of Jigsaw Galway, an eight-member Public and Patient Involvement (PPI) panel of 18 to 25 year olds living with type 1 Diabetes was recruited. The YAP have made significant contributions to all aspects of the research including development of research materials and dissemination.

Engaging stakeholders in intervention development

Recommendations for designing behaviour change interventions emphasize the importance of the development phase and collaboration with experts, particularly relevant stakeholders, to translate the evidence-base into a potentially effective intervention (Craig et al., 2008; McSharry, Fredrix, Hynes, & Byrne, 2016). A consensus event, called the Strength In Numbers symposium was organized with the support of a Knowledge Exchange and Dissemination Scheme Award from the HRB, to gain stakeholder input into the D1 now intervention development process. The main conclusions drawn from the systematic review, qualitative research, discrete choice experiment and YAP engagement was that a new approach to working with young adults was needed and that this approach would need to be innovative, prioritise self-management support, harness the power of digital technology and social media, and engage young adults throughout the process.

The symposium took place over three days and involved over 110 delegates, 10% of whom were individuals living with type 1 Diabetes. Delegates also included Diabetes service providers, technology experts, policy-makers and researchers. The symposium included three main activities; a Core Outcome Set Consensus meeting (funded by a New Foundations Award from the Irish Research Council) to identify outcomes which should be included in all future young adult type 1 Diabetes research, a conference, and an expert panel meeting. The expert panel meeting involved two parallel meetings, one focusing on reaching consensus regarding strategies for improving young adult self-management, and the other on identifying technology solutions to fit within an intervention, through a brainstorming activity called a Hackathon.

The Strength In Numbers Hackathon

A Hackathon is a dynamic, collaborative approach often used in the development of start-up technology businesses that brings together a diverse group of people with the relevant skills to create an output. Their use in healthcare innovation is increasing (Silver, Binder, Zubcevik, & Zafonte, 2016). Hackathons capitalize on the fact that many healthcare innovations are borne out of individual experience, for example a doctor trying to solve a problem. Supported by experts from the Irish Health Services Executive Office of the Chief Information Officer, and from the NDRC, the D1 now team chose to use the Hackathon format as a rapid and engaging approach to translating findings from the developmental phase of the research into feasible and innovative technology solutions. Harnessing digital technology to support self-management is widely regarded as an important approach and one that is particularly relevant for young adults (Yardley, Choudhury,
Patrick, & Michie, 2016; Monaghan, Helgeson, & Wiebe, 2015).

Hackathons are based on ideas developed in response to a clear problem statement with input from a diverse team. The planning and implementation of the Strength In Numbers Hackathon was guided by the Health Hackathon Handbook (MIT Hacking Medicine, 2016). The Strength in numbers Hackathon involved 28 participants, including representatives from Irish and multinational technology companies, local and national hospitals and universities, and eight young adults with type 1 Diabetes. Hackathon participants were provided with a summary of the findings of the D1 now study and a description of three modifiable focus areas identified based on the research findings, two weeks in advance of the Hackathon, to facilitate the development of their ideas. The three focus areas were: 1. The way young adults are introduced to the adult Diabetes clinic, 2. Attendance at Diabetes clinic appointments and contact between appointments, and 3. Building relationships between young adults and service providers.

The Hackathon participants attended the Strength In Numbers conference on day two of the symposium to gain a deeper understanding of young adult type 1 Diabetes self-management and engage in discussions with other delegates. The Hackathon began on day two of the symposium immediately after the conference. The first part was a brainstorming session to generate ideas from the participants and started with young adults living with Diabetes describing opportunity and problem areas. As ideas were shared the IT experts suggested where technology may form part of the solutions to address those areas. The next phase was an open discussion on the ideas and potential solutions to converge on four or five ideas, with participants self-selecting into working teams based on having a minimum of one of each key stakeholder: a young person with Diabetes, a Diabetes health practitioner, a health psychologist, and a technologist.

The following day teams began work on their proposals early with mini-milestones set to ensure teams clarified their target users, related their proposal back to the behaviour change evidence base, and they tracked towards a well-developed pitch.

The Hackathon produced four ideas intended to fit within an intervention. The four ideas are described Group work discussing intervention strategies during the Strength In Numbers Expert Panel meeting.
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<thead>
<tr>
<th>Hackathon Team Name</th>
<th>Proposal description</th>
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<tr>
<td><strong>Transition App</strong></td>
<td>Platform &amp; aim: Mobile app aimed at aiding timely transition from paediatrics to adult diabetes services. Setting: Paediatric diabetes clinic, school and social contexts, such as sports clubs. End-users: Parent and/or young person with type 1 diabetes Features: App is accessed through diabetes clinic WiFi. The app aims to enhance relationships between young people and their service providers, allow young people to access high quality educational content on the go, provide motivational advice from influencers and deliver rewards via gamification to encourage better self-management. Implementation: The reach of the app to its target population will be maximised using social marketing expertise.</td>
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<td><strong>Injection, Pumps, Understanding and Management (IPSUM)</strong></td>
<td>Platform &amp; aim: Mobile app and web portal for enhancing communication between young adults and service providers. Setting: Daily self-management End-user: Young adults with type 1 diabetes and service provider Features: App helps young adults log and monitor their carbohydrates, exercise, alcohol and blood glucose levels. Includes an in-built calculator to help determine insulin dose adjustments. Data will be visualised on a web portal to assist with clinic consultations and used to monitor trends to help reach collaborative goals between young adults and service providers. Implementation: App will be integrated with other smart devices (such as accelerometers and other wearables) to minimise manual input requirements from the young adults.</td>
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<td><strong>SnapD1</strong></td>
<td>Platform &amp; aim: Channel on the popular social media app called Snapchat, which sends young adults personalized motivating and informative content Setting: Daily self-management End-users: Young adults with type 1 diabetes Features: App integrates personalized motivational and educational content with a social network of peers with type 1 diabetes. App can send reminders, facts and top tips as well as providing young adult generated content and motivational pictures and comments.</td>
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<td><strong>DiaLog</strong></td>
<td>Platform &amp; aim: Website or mobile app to improve communication between young adults and service providers, and empower young adults as they transition to adult diabetes services. Setting: Paediatric diabetes clinic End-user: Young adults with type 1 diabetes and service providers Features: App allows young adults to find out about service providers present at each clinic visit and provides a platform for a two-way communication between the diabetes clinic team and young adults. Young adults would complete a pre-consultation checklist asking how they are feeling and some questions they would like to discuss during visit. Implementation: App is activated when the hospital WiFi is accessed and includes a range of features for making the most of clinic visits by tailoring to individuals.</td>
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enlightening experience and facilitated the D1 now research team to produce a proposal for a complex intervention to improve self-management among young adults with type 1 Diabetes. In the next phase of the study the proposed intervention will be further refined, before beginning a pilot randomised feasibility study.

A growing body of research demonstrates the need to change the way diabetes services are delivered to young adults with type 1 Diabetes, as well as other chronic conditions such as asthma and Cystic Fibrosis (O’Hara et al., 2016; Okumura, Ong, Dawson, Nielson, Lewis, Richards, Brindis et al., 2014). Health psychology has much to contribute to facilitating the use of novel approaches such as Hackathon to translate evidence into intervention components. Iterative processes of development, engagement with stakeholders, testing and adaptation are recommended to develop effective mHealth interventions, which contribute to the evidence base as well as achieve positive outcomes (Yardley, Spring, Riper, Morrison, Crane, Curtis, Merchant et al., 2016). Through continued engagement and collaboration with the stakeholder network created through the Strength In Numbers Hackathon, the D1 now study aims to enhance engagement between young adults and service providers, to improve self-management and to ultimately impact on diabetes and psychosocial outcomes of young adults living with type 1 Diabetes.

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Statement of competing interests

None

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