Received: 15 July 2024 | Accepted: 18 April 2025

DOI: 10.1111/bjhp.12803

REGISTERED REPORT

Diabetes technology use in young adults living with type 1 diabetes in Ireland: A qualitative interview study

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Funding information
Irish Research Council

Abstract

Background: The challenges of living with and managing type 1 diabetes during youth and emerging adulthood are well documented. The management burden may be alleviated in part using diabetes technologies including continuous glucose monitoring and hybrid closed-loop insulin pumps. However, young people's experiences of diabetes technology during this life stage are not well understood. This study aims to address that gap.

Methods: This study will recruit 30–40 young people living with T1D, aged 16–21 years, from paediatric, transition and adult T1D clinics. Semi-structured qualitative interviews will be conducted. The data will be analysed using framework analysis.

Results: TBC (registered report format).

KEYWORDS

adolescence, framework analysis, qualitative, technology, transition, type 1 diabetes

INTRODUCTION

Living well with type 1 diabetes (T1D) requires a multifaceted approach, including regular blood glucose monitoring, insulin therapy, dietary adjustments, physical activity and risk reduction behaviours to maintain glycaemic control and minimize the risk of complications. The substantial psychological burden associated with diabetes management is well documented elsewhere (Holt et al., 2021) and can be especially challenging during adolescence (often defined as 10–19 years) and emerging adulthood (from about 18–25 years, or older), owing to the rapid biological, psychological and social development of these life stages. Young adulthood is characterized by increasing independence, potentially 'risk-taking' behaviours and identity development (Morrissey et al., 2022), all of which affect, and are affected by, living with T1D. An additional developmental challenge occurs in the transition from paediatric to adult diabetes services (at approximately 18 years), which can go smoothly or be experienced as disruptive to life with T1D (Olsson et al., 2023). Although these challenges are increasingly well understood, one area that remains underexplored is how using diabetes technology affects young people's experience of living with T1D.

Importantly, advances in diabetes technology may alleviate some of the burden of management and improve quality of life for young people living with T1D. One such technology, the continuous glucose monitor (CGMs) is now standard of care for T1D (ADA, 2024). A CGM is a small sensor, usually placed on the arm or abdomen, which continuously monitors interstitial glucose levels and transmits the data to a display device, such as a reader or smartphone, with updates every 1–5 min. CGMs can alert the user to changes in glucose levels, helping to manage highs and lows, and are an essential component in advanced diabetes management technologies, such as hybrid closed loop (HCL) systems. The recently updated National Clinical Guideline No. 17 (Department of Health, 2024) for and the Rapid Health Technology Assessment of CGM (HIQA, 2023) in adults living with T1D in Ireland, with international guidance from NICE and the American Diabetes Association (ADA) (Committee, 2023)/European Association for the Study of Diabetes (EASD) (Holt et al., 2021), recommends offering adults with T1D a choice of CGM based on an individual's clinical needs, preferences and device functionality. Owing to the lack of a diabetes register in Ireland, there is limited evidence in Ireland as to the proportion of people with T1D who have access to CGM; however, CGM use has been shown to result in an HbA1c improvement of 6.7 mmol/mol (Courtney et al., 2023). Another device used is the HCL, also known as an artificial pancreas or automated insulin delivery system. The HCL integrates an insulin pump, CGM, and a control algorithm to use real-time glucose data for automatically adjusting insulin delivery, increasing insulin when glucose levels are high or predicted to rise and decreasing or stopping insulin when glucose levels are low or predicted to drop (Griffin et al., 2023). Current commercially available systems are hybrid rather than fully closed loop because, for effective diabetes management, the user must manually input carbohydrate intake into the system, prior to carbohydrate consumption (Griffin et al., 2023). In Ireland, there is considerable heterogeneity in the uptake and/or access to insulin pump therapy. In 2016, it is estimated that 10.5% of people with T1D were using insulin pump therapy with significant geographical variation (Gajewska et al., 2020); in 2022, the proportion using insulin pump therapy is estimated to have increased to 15% (Flynn, 2023). As the proportion of users increases, understanding the impact of these technologies on users' lives requires exploration.

At least two strands of theoretical literature are relevant; firstly, *technology acceptance models* provide a framework for analysing decisions and behaviours related to the use of health technology. One prominent model, the Unified Theory of Acceptance and Use of Technology (UTAUT), combines elements from eight established models (Venkatesh et al., 2003) to propose four core determinants of technology use intention and actual use: performance expectancy, effort expectancy, social influence and facilitating conditions and four additional factors: gender, age and user experience as well as the degree of voluntariness in technology use. Although UTAUT provides a comprehensive understanding of how individuals' intentions to use technology are formed and how these intentions translate into actual usage behaviour, models like UTAUT are limited by their binary logic of acceptance or rejection (Karnowski et al., 2011) and assumption of rational behaviour (Fishbein & Ajzen, 1975), which may not fully align with the complexities of self-management and diverse user contexts and experiences (Dadgar & Joshi, 2018). The second relevant framework is the influential *COM-B model* (see McSharry et al., 2020; Morrissey et al., 2021). This model proposes that to perform a particular behaviour (like adopting a health technology), a person must feel that they are both psychologically and physically able to do so (Capability; C), have the social and physical opportunity for the behaviour (Opportunity; O) and want or need to carry out the behaviour more than other competing behaviours (Motivation; M). In general, young people and their parents/carers are highly motivated to access technology as it usually results in improved glycaemic control (Crabtree et al., 2023) and reduced management burden. The primary barriers to technology use likely relate to opportunity as access to technology is inconsistent nationally and internationally (e.g. Gajewska et al., 2020), and capability, as completion of structured education is typically mandated before pumps are facilitated. Although the COM-B model has been applied to improve the use of technology for conditions like hearing loss (e.g. Barker et al., 2016), our current understanding of technology use is insufficient to comprehensively map barriers and facilitators to the COM-B model.

Thus, while supra-theories such as the COM-B model, and technology-specific models like the UTAUT model, are useful in some contexts, their relevance to understanding diabetes technology use among young adults with T1D is uncertain. Instead, we draw here on the developmental psychology literature conceptualizing adolescence and young adulthood as periods of rapid development, self-focus, identity exploration and instability (e.g. Arnett & Mitra, 2020) to qualitatively explore young people's experiences of technology use for T1D. As the transition-of-care from paediatric to adult diabetes services is a vulnerable time for T1D management, we focus on young people preparing for or with recent experience of this transition-of-care. Our findings will advance existing literature by understanding how diabetes technology affects the day-to-day lives of young people with T1D.

METHODS

Design

A cross-sectional qualitative study using online individual semi-structured interviews will be conducted, allowing participants to participate from a quiet place of their choosing. At the time of submission, ethical approval for the study has been granted from one of the relevant Research Ethics Committees.

Participants

The study addresses a relatively narrow question, with a specific population, informed by an established theoretical perspective. Therefore, based on disciplinary norms and on the Malterud et al. (2016) information power guidance, we aim to recruit 30–40 young people living with T1D; the final sample size is dependent on the quality of dialogue achieved from individual interviews. Eligible participants will be between the ages of 16 and 21, enrolled in a paediatric clinic, a structured transition clinic, or within 1 year of their first adult clinic appointment at one of four hospital sites (within two hospital groups): and use diabetes technology (e.g. CGM, hybrid closed-loop system) in managing their diabetes. This age range was chosen to facilitate the participation of young people either side of the significant transfer of care from paediatric to adult clinics. Additionally, participants will be required to have had their diagnosis of T1D for at least 12 months and be able to speak and read English to facilitate informed consent. Participants will be purposively recruited via a member of their diabetes care team during their routine diabetes care.

Procedure

Participants will be approached via the diabetes team at paediatric, transition, or adult clinics (depending on their age), during their routine care and invited to participate in the research study. An information sheet will be provided to any young person interested in taking part. Young people will be required to sign and return a consent form; for those aged 16–17 years, a parental assent form will additionally be required.

The semi-structured interview guide has been developed (see Table 1 below), drawing on relevant literature (e.g. Arnett & Mitra, 2020; Fioretti & Mugnaini, 2022; O'Donoghue et al., 2024) and from the

TABLE 1 Interview schedule for semi-structured qualitative interviews.

Interview questions	Prompts
Can you tell me a bit about yourself and your experience with diabetes?	How long have you had diabetes, and when were you diagnosed? How has diabetes impacted your daily life? Were you always using technology to manage your diabetes?
How do you feel about transitioning to adult services?	Would you say its gone smoothly? Can you describe your experiences with the transition clinic? (Only relevant to those in structured transition clinics)
Can you tell me a bit about the diabetes technology you use?	*How do you feel about using technology?* Why did you start using it? How does it impact your daily life? How does it fit into your daily routine? How do you feel about the reliability of the technology you use?
Does anyone else have access to your data?	Who? How do you feel about this? How do you see this changing over the next few years? Do you feel like using technology has changed your relationship with your diabetes care team?… How? Prompt: Ask about parents if not mentioned
How do you find using your tech in social situations/public? Example: out for a family meal/out at the cinema with friends	Is there anyone else you would talk to about technology?
Who provides you with support in managing your diabetes with your tech?	Have you received training/education on using these devices? Have you got information about tech outside of your diabetes team? If so, from where?
How has the transition process been while using your technology?	Do you have any worries about transitioning with technology? Is there anything that would help you during this?
What is different about your life now that you are using diabetes technology?	Prompt: Is it easier to manage late nights or alcohol use? How do you see yourself using your diabetes technology within the next 5 years?
Is there anything else you think is important for us to know about technology?	What are the benefits? What are the challenges? How do you manage these challenges?

multiple perspectives of the research team (including people with lived experience of diabetes, academic researchers and healthcare professionals involved in diabetes care). The interview schedule has been piloted with three young people and refined to enhance the schedule flow and to include additional probes relating to feelings about technology. The interview schedule will act as a guide and may not be followed rigorously when participants are forthcoming about relevant topics.

The semi-structured interviews will be conducted virtually over Microsoft Teams by FO'D, a PhD researcher not involved in patient care. Virtual interviews will allow participants to take part at their convenience and ensure that participation is separate from clinical care.

Data analysis

The interviews will be recorded and auto-transcribed in Microsoft Teams and reviewed for accuracy by FO'D. NVivo will be used to organize data for analysis. Framework analysis (Ritchie & Spencer, 1994) is an analytical approach not bound to any epistemological position, and it allows for both predetermined factors and data-driven themes in guiding the development of an analytic framework. This aligns with the aims of our study, as we have some predefined areas that we wish to explore but also want to remain open to discovering unexpected areas of young people's experiences.

TABLE 2 Initial categories for the framework analysis.

Category	Description
Identity formation and development	Insights relating to how the young person sees (or does not see) their diabetes as part of their identity (e.g. use of person-first or identity-first language; living with diabetes vs. being diabetic); how do they disclose their diabetes or use of technology to others
The impact of the current treatment on quality of life	To what degree is the current treatment burdensome, or facilitative in achieving a good quality of life, and achieving the milestones of *adolescence and young* adulthood (e.g. social participation)
Health behaviours and lifestyle considerations	Has engagement or anticipation of engagement in health behaviours changed because of current treatment (e.g. alcohol use); additionally, lifestyle considerations (e.g. travel)
Challenges associated with current treatment	For example, difficulties in adapting to changes in treatment plans, coping with tech. failures; support for transitions in treatment, burden and cognitive load
Development of independence in diabetes management	What 'independent' management means to the young person, the success with which independent management has been achieved (if this is a goal), parental involvement in management, shifts in this involvement, parental or other access to data from diabetes technology
Transfer-of-care from paediatric to adult services	Relating specifically to the transfer of care from paediatric to adult services, perspectives on and feelings about this transfer, how does technology relate to these aspects

Framework analysis involves five key steps, including familiarization, identifying a thematic framework, indexing, charting and mapping and interpretation (Ritchie & Spencer, 1994). Familiarization with the data will involve listening to recordings and reviewing interview transcripts and field notes. A preliminary thematic framework (Table 2) has been generated based on developmental literature (e.g. Arnett & Mitra, 2020), alongside the diabetes-specific literature (e.g. Habenicht et al., 2021; O'Donoghue et al., 2024) and will be supplemented from initial impressions from the interview transcripts. This preliminary framework will then be piloted on a subset of interviews and reviewed before applying the framework to the data in the indexing stage, which involves organizing the chunks of data into the framework categories. The next stage, charting, involves summarizing the chunks of data and arranging them into a structured framework matrix. In this matrix, every column represents a category within the framework, while each row corresponds to an individual participant. The final stage, interpretation and mapping, aims to pull together key characteristics of the data to effectively map and interpret the data set as a whole (Ritchie & Spencer, 1994). This process will be facilitated by checking the summaries of the framework matrix against the original data to facilitate interpretation and identification of patterns in the data. The research team will discuss the interpretations and patterns identified before summarizing the key themes.

AUTHOR CONTRIBUTIONS

Ann-Marie Creaven: Conceptualization; funding acquisition; methodology; formal analysis; project administration; supervision; data curation; writing – review and editing; writing – original draft; validation. **Fay M. O'Donoghue:** Conceptualization; methodology; data curation; investigation; writing – original draft; writing – review and editing; project administration; validation; formal analysis. **Eimear C. Morrissey:** Methodology; writing – review and editing; writing – original draft. **Aisling T. O'Donnell:** Writing – review and editing; methodology. **Tomás P. Griffin:** Conceptualization; funding acquisition; writing – original draft; writing – review and editing; methodology; project administration; supervision.

FUNDING INFORMATION

This study is funded by an Irish Research Council New Foundations Award to AMC.

CONFLICT OF INTEREST STATEMENT

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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REFERENCES

American Diabetes Association Professional Practice Committee. (2023). 7. Diabetes technology: Standards of care in diabetes—2024. *Diabetes Care*, *47*(Supplement_1), S126–S144.

American Diabetes Association. (2024). *Introduction and methodology: Standards of care in diabetes—2024*. https://diabetesjournals.org/care/issue/47/Supplement_1

Arnett, J. J., & Mitra, D. (2020). Are the features of emerging adulthood developmentally distinctive? A comparison of ages 18–60 in the United States. *Emerging Adulthood*, *8*(5), 412–419. https://doi.org/10.1177/2167696818810073

Barker, F., Atkins, L., & de Lusignan, S. (2016). Applying the COM-B behaviour model and behaviour change wheel to develop an intervention to improve hearing-aid use in adult auditory rehabilitation. *International Journal of Audiology*, *55*(sup3), S90–S98. https://doi.org/10.3109/14992027.2015.1120894

Courtney, A., Smith, D., & Forde, H. (2023). Real-world outcomes of continuous glucose monitoring in adults with diabetes mellitus attending an Irish tertiary hospital. *Irish Journal of Medical Science*, *192*(6), 2763–2768.

Crabtree, T. S. J., Griffin, T. P., Yap, Y. W., Narendran, P., Gallen, G., Furlong, N., Cranston, I., Chakera, A., Philbey, C., Karamat, M. A., Saraf, S., Kamaruddin, S., Gurnell, E., Chapman, A., Hussain, S., Elliott, J., Leelarathna, L., Ryder, R. E. J., Hammond, P., … Wilmot, E. G. (2023). ABCD closed-loop audit contributors. Hybrid closed-loop therapy in adults with type 1 diabetes and above-target HbA1c: A real-world observational study. *Diabetes Care*, *46*(10), 1831–1838. https://doi.org/10.2337/dc23-0635

Dadgar, M., & Joshi, K. D. (2018). The role of information and communication technology in self-management of chronic diseases: An empirical investigation through value sensitive design. *Journal of the Association for Information Systems*, *19*(2), 86–112. https://doi.org/10.17705/jais1.00485

Department of Health. (2024). NCEC National Clinical Guideline No. 17 Adult type 1 diabetes mellitus (V2). http://health.gov.ie/national-patient-safety-office/ncec/

Fioretti, C., & Mugnaini, C. (2022). Living with type 1 diabetes mellitus in emerging adulthood: A qualitative study. *British Journal of Health Psychology*, *27*(4), 1226–1240. https://doi.org/10.1111/bjhp.12596

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Addison-Wesley Publishing Company.

Flynn, G. (2023, September 6). *Insulin pump use in Ireland*. Blood Sugar Trampoline. https://bloodsugartrampoline.com/blog/2023/8/16/insulin-pump-use-in-ireland

Gajewska, K. A., Bennett, K., Biesma, R., & Sreenan, S. (2020). Low uptake of continuous subcutaneous insulin infusion therapy in people with type 1 diabetes in Ireland: A retrospective cross-sectional study. *BMC Endocrine Disorders*, *20*(1), 92.

Griffin, T. P., Gallen, G., Hartnell, S., Crabtree, T., Holloway, M., Gibb, F. W., Lumb, A., Wilmot, E. G., Choudhary, P., & Hussain, S. (2023). UK's Association of British Clinical Diabetologist's Diabetes Technology Network (ABCD-DTN): Best practice guide for hybrid closed-loop therapy. *Diabetic Medicine*, *40*(7), e15078.

Habenicht, A. E., Gallagher, S., O'Keeffe, M. C., & Creaven, A. M. (2021). Making the leap and finding your feet: A qualitative study of disclosure and social support in university students with type 1 diabetes. *Journal of Health Psychology*, *26*(2), 260–269. https://doi.org/10.1177/1359105318810875

Health Information and Quality Authority (HIQA). (2023, September 29). *Rapid Health Technology Assessment of Continuous Glucose Monitoring in Adults with Type 1 Diabetes Mellitus*. https://www.hiqa.ie/sites/default/files/2023-09/T1D-Report-September-2023.pdf

Holt, R. I. G., DeVries, J. H., Hess-Fischl, A., Hirsch, I. B., Kirkman, M. S., Klupa, T., Ludwig, B., Nørgaard, K., Pettus, J., Renard, E., Skyler, J. S., Snoek, F. J., Weinstock, R. S., & Peters, A. L. (2021). The management of type 1 diabetes in adults. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetologia*, *64*(12), 2609–2652.

Karnowski, V., von Pape, T., & Wirth, W. (2011). Overcoming the binary logic of adoption. On the integration of diffusion of innovations theory and the concept of appropriation. In A. Vishwanath & G. Barnett (Eds.), *The diffusion of innovations. A communication science perspective* (pp. 57–76). Peter Lang.

Malterud, K., Siersma, V. D., & Guassora, A. D. (2016). Sample size in qualitative interview studies: Guided by information power. *Qualitative Health Research*, *26*(13), 1753–1760. https://doi.org/10.1177/1049732315617444

McSharry, J., Byrne, M., Casey, B., Dinneen, S. F., Fredrix, M., Hynes, L., Lake, A. J., & Morrissey, E. (2020). Behaviour change in diabetes: Behavioural science advancements to support the use of theory. *Diabetic Medicine: A Journal of the British Diabetic Association*, *37*(3), 455–463. https://doi.org/10.1111/dme.14198

Morrissey, E. C., Casey, B., Hynes, L., The D1 Now Young Adult Panel, Dinneen, S. F., & Byrne, M. (2021). Supporting self-management and clinic attendance in young adults with type 1 diabetes: Development of the D1 now intervention. *Pilot and Feasibility Studies*, *7*, 186. https://doi.org/10.1186/s40814-021-00922-z

Morrissey, E. C., Dinneen, S. F., Lowry, M., de Koning, E. J., & Kunneman, M. (2022). Reimagining care for young adults living with type 1 diabetes. *Journal of Diabetes Investigation*, *13*(8), 1294–1299. https://doi.org/10.1111/jdi.13824

O'Donoghue, F., Creaven, A. M., Connolly, M., McCaffrey, A., Crotty, C., Neylon, O., & O'Gorman, C. (2024). Diabetes "on the side-lines with normal life": A qualitative study of adolescents' experiences of living with and managing type 1 diabetes. *Irish Medical Journal*, *117*(3), 938.

Olsson, S., Otten, J., Blusi, M., Lundberg, E., & Hörnsten, Å. (2023). Experiences of transition to adulthood and transfer to adult care in young adults with type 1 diabetes: A qualitative study. *Journal of Advanced Nursing*, *79*(12), 4621–4634. https://doi.org/10.1111/jan.15740

Ritchie, J., & Spencer, L. (1994). Qualitative data analysis for applied policy research. In B. Bryman & R. Burgess (Eds.), *Analyzing qualitative data* (pp. 187–208). Routledge.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425–478. https://doi.org/10.2307/30036540

How to cite this article: Creaven, A.-M., O'Donoghue, F. M., Morrissey, E. C., O'Donnell, A. T., & Griffin, T. P. (2025). Diabetes technology use in young adults living with type 1 diabetes in Ireland: A qualitative interview study. *British Journal of Health Psychology*, *30*, e12803. https://doi.org/10.1111/bjhp.12803