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Complete List of Authors:	Papoutsi, Chrysanthi; University of Oxford, Nuffield Department of Primary Care Health Sciences Colligan, Grainne; Queen Mary University of London, Blizard Institute, Barts and The London School of Medicine and Dentistry Hagell, Ann; Association for Young People's Health Hargreaves, Dougal; University College London, UCL Great Ormond St. Institute of Child Health Marshall, Martin; Department of Primary Care and Population Health Vijayaraghavan, Shanti; Barts Health NHS Trust Greenhalgh, Trish; University of Oxford, Nuffield Department of Primary Care Health Sciences Finer, Sarah; Queen Mary University of London, Blizard Institute, Barts and The London School of Medicine and Dentistry; Barts Health NHS Trust

Promises and perils of group clinics for young adults living with diabetes: a realist review

Chrysanthi Papoutsi PhD,[1] Grainne Colligan MSc,[2] Ann Hagell PhD,[3] Dougal Hargreaves,[4] Martin Marshall MD,[5] Shanti Vijayaraghavan FRCP,[6] Trisha Greenhalgh FMedSci ,[1] Sarah Finer PhD[2,6]

[1] Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, England, UK

[2] Centre for Primary Care and Public Health, Blizard Institute, Barts and The London School of Medicine and Dentistry, Queen Mary University of London, London, England, UK

[3] Association for Young People's Health, London, England, UK

[4] UCL Great Ormond St. Institute of Child Health, University College London, London, England, UK

[5] Department of Primary Care and Population Health, University College London, London, England, UK

[6] Barts Health NHS Trust, London, England, UK

Corresponding author:

Dr Sarah Finer, Centre for Primary Care and Public Health, Blizard Institute, Barts and The London School of Medicine and Dentistry, Queen Mary University of London, United Kingdom, Yvonne Carter Building, 58 Turner Street, London, E1 2AB, +44 (0)20 7882 7326, s.finer@qmul.ac.uk

Abstract

Background: Group clinics are becoming popular as a new care model. This evidence synthesis, using realist review methodology, examined the potential role of group clinics in meeting the complex needs of young adults living with diabetes.

Research Design and Methods: We followed a theory-driven, realist approach to evidence synthesis. Three reviewers screened the articles resulting from a systematic literature search across 10 databases. To draw on lessons from a broader literature, we also included studies on wider group-based processes such as structured diabetes education. Included papers were coded and iteratively analysed using a realist logic. By following the established RAMESES quality standards, we developed theoretically-informed explanations of how and why group clinics could work for young people with diabetes.

Results: 131 papers met our inclusion criteria. Models of group-based care varied significantly and incorporated different degrees of clinical and educational input. Providing a safe space for interaction in a developmentally appropriate way was deemed important for sustained engagement of young adults with their care. Group clinics were valued by patients when they brokered connections and facilitated useful exchange of experiences. However, engagement was not always sustained if individual needs were not fulfilled in a timely and time-efficient manner. Substantial invisible work was required to overcome implementation challenges.

Conclusions: In contrast to widespread rhetoric proposing group clinics as a solution to increasing demand and financial pressures in health systems, this review suggests that successful implementation requires careful work to address complex patient needs and sustain engagement.

Introduction

The global rise in diabetes prevalence is expected to have serious consequences across healthcare systems. It is estimated that by 2045, healthcare expenditure on diabetes will reach USD 776 billion (1). In the UK the cost of diabetes care is expected to account for 17% of the total health resource expenditure in 2035⁄2036 (2). A large proportion of these costs relates to managing diabetes complications, such as retinopathy, neuropathy, diabetic foot and cardiovascular disease, which lead to reduced quality of life and premature mortality (1). Alternative approaches to care provision are necessary to stem what has been described as a ‘titanic struggle’ against the burgeoning personal and systemic impact of diabetes (3).

Group clinics (also known as shared medical appointments) have been proposed as a way to address rising healthcare costs and diminishing resources, with the potential to improve efficiency and to provide opportunities for peer support and social learning, compared to usual care focused on one-to-one interactions between patients and healthcare professionals (4, 5). Numerous studies discuss group clinics delivered in a variety of formats and targeted at different patient populations (6-8).

In diabetes, experimental studies of group-based care for adults have shown improvements in glycaemic control, problem-solving ability and quality of life and reduced time commitment for clinicians, compared to standard one-to-one consultations (9, 10). Similarly, systematic reviews of group care for diabetes highlight clinical benefits (lower HbA1c, blood pressure) and improvement in patient-reported outcomes (7, 8). Story-sharing interventions for minority ethnic groups have also resulted in higher attendance and patient enablement, compared to structured self-management education (11, 12).

With diabetes prevalence (both type 1 and 2) rising in young adults (13) there is a need to learn from alternative models of care and to re-design service delivery to better support this patient group. In England, despite overall improvements in diabetes care processes for young people under 25, emergency hospital admissions increased for the 20-24 age group between 2005/6 to 2015/16 (14). This increase is explained by a range of poor health outcomes across a variety of clinical and psychosocial parameters for this patient group, including widening inequalities (14-16). There are recognised barriers to regular clinic attendance and engagement for young adults, such as diabetes-related psychological distress, lack of care continuity and poor satisfaction with the health service, lack of developmentally appropriate consultations and fear of complications (17, 18). In addition to the direct impact of unmet healthcare need in this age group, evidence suggests that patterns of poor engagement with health services in adolescence and young adulthood often persist into adult life (19). Novel approaches to care delivery are urgently needed to address the specific health and self-care needs of young adults in tune with their developmental stage and life circumstances, and to improve their outcomes and experiences.

In this paper we use a realist approach to synthesise evidence on group clinics for young adults with diabetes, rather than older age groups. A realist review allows us to extend beyond de-contextualised lists of barriers and facilitators to understand ‘how, why, for whom and in what circumstances’ group clinics might work for this age group (20). This approach follows the tradition of narrative reviews that aim to increase understanding, rather than summarise data (21). We aim to build on previous evidence of clinical benefit to understand how group clinics need to be implemented in practice so these benefits can be realised for different types of patients and in different circumstances. The realist review underpins a theoretical and participatory approach to the co-design and evaluation of group clinics as part of the Together study, a wider programme of work testing feasibility and implementation of group clinics for young adults living with diabetes (22).

Aims

This review aims to explore how, why, for whom and in what circumstances group clinics may work for young adults living with diabetes (type 1 and 2).

Review questions

1. What are the 'mechanisms' by which group clinics (could) meet the complex health and social needs of young people living with diabetes?
2. What are the important 'contexts' which (could) determine whether the different mechanisms produce intended outcomes?
3. In what circumstances are group clinics likely to provide a better way of supporting diabetes self-management than traditional care?

Methods

Our methods are based on previous realist reviews and on the RAMESES standards (20, 23). Realist reviews typically start with an initial set of assumptions, i.e. a programme theory, about how an intervention is assumed to be working. These assumptions are developed further by drawing on secondary qualitative and quantitative data (theory building) and become refined as the analysis of this data progresses (theory refinement). A basic principle for scaffolding the analysis of the literature is that the resources offered by programmes interact with the underlying reasoning of individuals (mechanisms). This interaction leads to certain outcomes depending on pre-existing contextual or structural factors (also see Glossary in Appendix 1).

Data sources and searches

We performed literature searches in Embase (OvidSP), MEDLINE (OvidSP), PsycINFO (OvidSP), Web of Science Core Collection, ASSIA (Proquest), Cinahl (EBSCOHost) Cochrane Database of Systematic Reviews (Cochrane Library), Cochrane Central Register of Controlled Trials (Cochrane Library) and Dissertations & Theses Global (Proquest). An information specialist devised and tested the search strategy based on previous systematic reviews (see Appendix 2 for an example of the search strategy) (24).

Study selection

Following two rounds of screening (title/abstract and full-text) by one reviewer (CP), articles meeting inclusion criteria were classified as core (i.e. on group clinics primarily focusing on 16-25 year olds), highly relevant (e.g. on group education for 16-25 year olds or similar age groups) and less relevant (e.g. group visits or education in very different age groups) – based on their potential to contribute to programme theory. A 10% random sub-sample of papers was reviewed by two additional reviewers with different expertise (GC, AH) to ensure consistency.

As is standard in realist reviews, inclusion and exclusion criteria were refined as screening progressed (20, 25). Studies published in English from 1999 were included if they focused on group-based care (in any setting) for young people (aged 16-25) with diabetes, other group-based processes such as group education, and qualitative experiences of young patients living with diabetes and transition to adult services. Studies were excluded when they described one-to-one interventions or educational programmes without a component of group interaction, when they referred to patient groups radically different to young adults (e.g. much younger children or older adults), when they only discussed in-patient or home-based education, when they had a very specific focus (e.g. exercise programmes or family planning), or when they described low-resourced healthcare systems.

Data extraction and quality assessment

One reviewer (CP) read all articles included in full-text screening and conceptually coded data relevant for programme theory development using the qualitative data management software NVivo 11 (QSR International) until theoretical saturation was reached. A 10% random sub-sample of coded articles was reviewed by a second reviewer (GC) for consistency and disagreements were solved by discussion. Descriptive study characteristics are presented in Appendix 3. At the point of inclusion based on relevance, the trustworthiness and rigour of each study was assessed as appropriate for different study designs (20).

Data synthesis and analysis

Following conceptual coding, we applied a realist logic of analysis which meant iteratively identifying sections of coded text and interpreting if they functioned as Contexts (C), Mechanisms (M), Outcomes (O), or if they supported the configurations between them (Context-Mechanism-Outcome Configurations or CMOCs). In doing this, we sought to interpret and explain young adults' reasoning and responses (i.e. mechanisms in a realist logic of analysis) to ‘resources’ becoming available through group clinics and to identify the specific contexts where these mechanisms are more likely to be ‘triggered’. By moving between data and programme theory, we were able to refine our explanations of why certain patterns seemed to be occurring under specific contexts, related to group-based care. The final programme theory consists of evidence-informed propositions, drawing on literature, substantive theory and professional and patient expertise. Our synthesis was also informed by substantive theory, mainly ecological theories of supported self-management and strong structuration theory (26-28), critical perspectives on patient expertise and experiential knowledge (29) and articulation work to denote the ‘hidden’, invisible adjustments and alignments necessary to successfully carry out tasks in socio-cultural settings (30, 31).

Stakeholder input

Refinement of the programme theory was discussed repeatedly as part of a wider co-designed research programme, with representation from people living with diabetes, health professionals and wider stakeholders (e.g. policy makers).

Findings

Search results

The database search identified 1641 potentially relevant records. Two articles were removed as duplicate entries. Title and abstract screening excluded 1366 records that did not fulfil the inclusion criteria. Subsequent full-text screening resulted in 112 references, which were further categorised according to their potential to contribute to programme theory development (4 core papers, 35 of high relevance, 73 of low relevance – as explained in the methods section). An additional 19 articles were added following recommendation from experts, targeted searches (e.g. on peer support) and citation tracking. A total of 131 papers were reviewed for programme theory building and refinement. The flowchart diagram for the study is presented in Figure 1.

[Figure 1 here]

Of the 131 articles, 32 used quantitative and 29 used qualitative methods, 12 employed mixed methods, and there were also 2 books, 45 reviews, 6 position papers and 5 papers describing frameworks or models of group-based care interventions. Distinct literature on group clinics for young adults with diabetes was sparse, but studies of group-based structured education and group clinics in a wider age group offered additional sources of data, along with work on young people's experiences living with the condition and on transitional care. Group clinics were described differently: as group clinics, shared medical appointments, group medical visits, cluster visits, and drop-in groups. Some papers describe group care for young people that involved a clinical component (32-35), but in most cases group interactions were only discussed as part of educational programmes (36-39), or as a component of larger multifaceted interventions (40). Intervention studies provided little detail on how group-based care was set-up and delivered within existing services.

Group clinics for young adults with diabetes – how, why, for whom and in what circumstances?

The following sections present the synthesis of the literature across a number of areas, each underpinned by one or more CMOCs explaining how and why group clinics may (or may not) work for young people living with diabetes. The 8 CMOCs are described in Table 1 with illustrative quotes supporting our interpretations. Selected supporting references can be found in Appendix 1.

[Table 1 here]

Sharing experiences

As a model of care that intends to bring patients together to engage in meaningful sharing and interaction, group clinics play a symbolic role in recognising the significance of patient expertise and supportive peer relationships. This shift towards care as a site for collective action is generally well received by younger patients, who report high levels of satisfaction (34, 35, 40). Sharing the experience of diabetes self-management between peers leads to increased understanding and learning (CMOC1) (32, 34-36, 41, 42). Real personal experiences help contextualise abstract medical advice which can lead to better self-management (32, 42).

Young adults who feel isolated in or negative about their self-management, and with diabetes distress may draw encouragement from peer support in group interactions, subsequently leading to more confidence and motivation (CMOC2) (32, 36, 42, 43). This is often assumed to result from role-modelling by patients who present themselves as more successful (43). The literature commonly highlights empowerment as a way to explain how group clinics and other peer interactions contribute to behaviour change (44). However, emphasis on individual empowerment of behaviour change and self-management may neglect the social, professional and cultural contexts in which patients are embedded.

Self-management as a social practice

Negotiating established norms in social settings with the need to effectively organise self-management may require additional support and guidance. Group clinics are assumed to provide a space for experimentation and reassurance – when a behaviour is normalised in the group, it might become easier to perform it in public (45, 46). Group interactions also allow clinicians to acquire a sense of how young adults interact with their peers in the context of self-management and to identify opportunities for supporting patients' emotional and motivational needs (43, 47). Especially for those experiencing their diagnosis and self-management practices as stigmatising, peer support in group clinics may help instil a sense of normalcy, which could lead to re-thinking self-monitoring and management in social settings (CMOC3) (24, 25, 36, 41, 45, 46, 48, 49).

What counts as shared experience?

For group clinics to work, the literature suggests a need to instil a sense of connection and affiliation between participants, and that this is most likely to develop when group participants are invited on the basis of common characteristics or shared experiences so that patients can relate to each other (CMOC4) (32, 50, 51). This is reinforced in a previous realist review which suggests there is an *'implied need for homogeneity within the group in order to harness shared norms and values'* (25). What homogeneity means for young adults living with diabetes is less clear. 'Homophily' – i.e. the degree to which people perceive others to be similar to them – may be a more suitable concept to underpin an analysis of group influence, as described in the diffusion of innvations theory (52).

Developmental stage, time since diagnosis, life stage (e.g. moving to university) or treatment options (e.g. insulin pump therapy) are assumed to be important in allowing young adults to interact more easily (51). There is, however, little data to show which of these characteristics may actually make a difference in practice. Group homogeneity or homophily does not just relate to creating a sense of affinity based on pre-existing characteristics, but also to ensuring that topics of interest to all participants are discussed in the group (32).

Diffusion of innovations theory also highlights that ideas may flow less readily within a social system when there are too many similarities between people, therefore 'heterophily' also becomes important (52). In practice it may be difficult to match participants based on background so building a sense of affinity will depend on how discussions are facilitated to foreground commonalities and build on differences (6). Knowing patients well enough to be able to understand how they might fit (or not) into a specific (albeit diverse) group and fostering interactions in ways that not only focus on shared experiences but also help reconcile contradictions may help young people feel affinity with others (53).

The role of relationships

Bringing people together in a way that allows connection and affinity to develop requires significant skills and in-depth relational knowledge of patients and their circumstances. The literature suggests that successful group clinics emerge from good pre-existing relationships between patients and clinicians (53-55). Young adults feel they can trust their clinician, who knows them well enough to suggest group clinics as a way to benefit their own individual circumstances and to bring them together with other people who can share valuable expertise. This relational introduction to group clinics could also counteract potential anxieties for patients who may fear that group clinics are purely used a means to cut costs compared to one-to-one care.

When young adults have a good relationship with their clinicians and perceive service provision to be collaborative, helpful, respectful and characterised by mutual understanding, it is more likely they will feel safe in exposing vulnerabilities and that they will perceive added value and usefulness from their interactions with services providers. In turn, this may may lead to increased engagement with the service and increased attendance (CMOC5) (53-55).

Provision of developmentally appropriate care

The literature further acknowledges that young adults are going through a life stage where they are experimenting with their identities in-between childhood, adolescence and adulthood, testing boundaries and keeping their options open (53, 55). Although necessary for their development, this experimentation often '*become[s] labelled as problematic [and] problem saturated stereotypes of young people are allowed to dominate'* (48). Young adults living with diabetes may have specific vulnerabilities in addition to their diabetes, including experiencing eating disorders and mental health difficulties, a lack of supportive relationships, and perceptions of low self-efficacy and control (55). In a healthcare system that values consistency, attendance and adherence, adapting services for the needs of young adults needs to be an ongoing and flexible process, and should recognise the physical, cognitive, symbolic and socio-emotional work involved in self-management (49).

Service providers are commonly advised to deliver young adult care in an age- and developmentally-appropriate manner, using a confidential and non-judgmental way manner (56); '*empathic, non-confrontational'* interventions and careful use of language (55); and emphasising emotional and motivational needs (43, 47). Studies also recognise that young adults may prioritise short-term gain over long-term implications and may respond more positively when care extends beyond biomedical aspects of living with diabetes to include young adults' personal and professional priorities (53, 54, 56). In this way, young adults may see added value in attending, which could in turn lead to increased engagement (48, 49, 53). Group clinics have the potential to support this developmentally-appropriate care, creating a safe space for discovering what it means to be living with diabetes, through one's own experiences and through the experiences and interpretations of others. Emphasis on positive aspects of self-management, such as how it can help young adults achieve dietary freedom or better manage their exercise regime, is also deemed important in building confidence, self-esteem and optimism (CMOC6) (57). Participation, however, needs to be treated as a dynamic process and priorities need to be continuously reassessed and negotiated to maximise the potential for continued engagement.

Engagement and sustainability

Existing literature indicates wide variability in group attendance, with interest dissipating as patient needs and circumstances change (25, 32, 35, 45, 50, 58). Despite their benefits, group clinics may not be sustainable if patients feel their individual needs are not fulfilled to the extent needed and in a timely manner (58). According to the literature, it is often individual attention as part of group-based care that leads to improvement and satisfaction. With time, people who engage in group sessions, make continuous judgments about the added value of these sessions to their own individual needs, which leads them to decide whether they will keep engaging with the group (CMOC7) (25, 32, 35, 45, 58).

Therefore, group clinics need to ensure expectations are managed and individual needs are adequately attended to, rather than focusing on a collective approach alone. This generates questions about the potential for group clinics to replace individual appointments (25, 35, 45, 58). Although previous studies with adult diabetes groups report positive effects on clinical and patient-reported outcomes, such improvements have not yet been identified in younger groups (7, 8). Given the lack of long-term studies, it remains unclear whether engagement in group clinics translates to improved glycaemic control or perceived quality of life for young adults, especially for those transitioning to adult care (34, 45).

Other questions arise when considering group clinics for age groups <19 years; literature suggests parents are active participants who attend the majority of group clinic appointments, and whose presence increases discussion of significant diabetes-related topics (35). There are concerns, however, as to whether having parents in the group clinic may lead young patients to take a more passive stance (33). Some interventions include separate parent-only groups to allow ongoing parental involvement where needed, while still allowing space for young adults to take ownership of their care and share openly with their peers (32, 48). A combined approach may also help manage family relationships without detracting from the value of group clinics as a peer-based model (48, 57).

Unintended consequences

Evidence on the potential of group clinics to support people to ask questions is contradicting: some patients feel more comfortable contributing questions, while others are more reserved in a group context (34, 35).Others have suggested peer support may negatively affect an individual's sense of self (48). Mismatch of expectations may lead young adults to feel they cannot rely on their peers and may have negative consequences on group formation and engagement.

Some studies suggest that young adults in most need (e.g. those with the highest HbA1c, low self-esteem, or more signs of diabetes-related distress) are less likely to engage with diabetes services, whether individual- or group-based (40, 54). For young adults who have negative perceptions about their ability to self-manage or who face diabetes-related distress, fear they may be diagnosed with complications or that they will be judged by fellow patients, may lead to further disengagement (CMOC8) (40, 54).

Group clinics may also have other unintended consequences by normalising risky behaviours, sharing negative experiences detrimental to diabetes care, or reacting adversely to advice given by figures of authority. Managing these group dynamics is important to avoid negative outcomes (59).

Hidden implementation work and practical considerations

Running group-based care in healthcare services traditionally designed to deliver one-to-one consultations is described as challenging. Established infrastructure and administrative processes have to be adjusted to fit the new approach, while continuing to support individualised care. This requires significant effort and introduces additional workload, which some studies suggest balances out any time efficiencies gained through group-based care (50). Despite best efforts to coordinate group clinics and ensure good group composition, non-attendance, late cancellation and participation attrition are common and result in resource waste (50).

Practical constraints to group-based clinics are widely reported, such as the lack of suitable space to accommodate groups and need to use external facilities (42, 57). ‘Hidden’ operational work is necessary to ensure clinics are set up appropriately, with health professionals briefed, content planned, and attendance confirmed, among other tasks (6). ‘Hidden’ clinical work is also required as clinicians will need to ‘triage’ for patients requiring further individual attention in the context of the group interactions (25).

Delivery of group clinics require a wider skill set, different from that required when carrying out individual clinical consultations. Groups need to be led by someone in a facilitator role who can engage patients in discussion and manage group dynamics to allow experiences to be shared, to ensure patient needs are met either as part of the clinic or individually; to resolve any contradictions or disagreements with sensitivity; and to sustain a pleasant, positive and safe learning environment (25, 36, 41, 42, 51). These skills expose additional training needs that need to be fulfilled for staff to be able to deliver group clinics for young adults (53, 55).

Discussion

Summary of findings and comparison with previous literature

The 8 CMOCs described above synthesise a broad range of literature and allow us to explore the mechanisms by which group clinics might meet the needs of young people living with diabetes, the contexts in which this might work, and the circumstances in which this is likely to add value over traditional care models. The following themes emerge when consolidating and summarising the CMOCs:

1. Placing relationships at the core, without forgetting the individual

In line with other reviews on group-based care, we highlight the important role of therapeutic relationships in the care of young adults with diabetes, not just between doctors and patients, but also between peers (25). Whilst group clinics may seem to offer an opportunity to harness these different therapeutic relationships, our review suggests that reality is more complex. Peer support does not emerge automatically in group interactions, but occurs as a result of carefully crafted interventions that take in account the need to draw on homophily and to harness difference. In-depth knowledge of patients' circumstances and good pre-existing relationships with clinicians allow attention to socio-ecological aspects of coping with diabetes, rather than focusing solely on self-management as an individual behaviour (28). This means that emphasis on role modelling may be beneficial but can be sustained only when the social aspects of self-management are not neglected (49).

Despite significant policy interest in group clinics as a replacement for one-to-one consultations, our review reinforces that individual attention should be equally valued and prioritised. Group clinics seem to work only on the basis of addressing individual patient needs – either by bringing together groups homogeneous enough to be able to discuss issues of common interest or by addressing individual needs outside the group clinics. There is little evidence to suggest that replacing individualised care with group clinics would lead to positive experiences for young adults. Booth et al suggest that group clinics may be more successful for specific period of times to fulfil clearly identified needs, rather than as a long-term solution for patient care (25). More work is needed in this area to investigate the right balance between one-to-one and group-based care specifically for young adults with diabetes.

2. Negotiating patient knowledge and identity

Beyond therapeutic relationships, group clinics become sites for collectively framing, normalising or contesting the different types of biomedical and patient knowledge underlying diabetes management (29, 60). Patients bring their own practical knowledge about how to deal with aspects of their condition and debate their techniques with others who have devised different ways of doing things and with clinicians who might be trying to reconcile experiential aspects with core biomedical concepts. This process of '*knowing together'* evolves as people compare their experiences and translate clinical knowledge, for example by discussing the devices they use to support diabetes self-management (29). The group clinic makes it easier to bring to focus competing priorities and to articulate ways for situating these in the context of living with diabetes. Other studies have discussed this process by framing it as 'vicarious learning' or 'learning by doing', but they have not adequately considered the influence of the group on negotiating knowledge and patient identities (24, 25).

Many young adults will have recently arrived at a stage of independence in their diabetes self-management. Instead of just sharing practical knowledge about the condition, group clinics also act as a platform to collectively develop values and norms about what it means to attend adult diabetes care and being an adult diabetes patient. In the existing literature there is more emphasis on group clinics modelling a notion of patients as empowered, in that they can responsibly and proactively negotiate their care (and fulfil their individual needs) in the context of a group interaction. This draws attention to specific dimensions of patient-hood and may require careful management to ensure young adults are benefiting.

3. Hidden implementation work

Our review suggests that thinking about group clinics as the sum of multiple individual consultations is misguided. Group clinics constitute a completely different way of organising care and with this come different requirements for operational and administrative resources, space for consultations, facilitation skills, documentation systems, as well as time investment in getting to know patients and bringing them together in groups meaningfully. This includes careful co-ordination between members of the multidisciplinary team and appropriate individual management of patients who seem to require extra attention. Given the additional work required, the role of group clinics in creating efficiencies in the health service requires further research.

It is easy to underestimate the effort required in setting up and delivering good care through group clinics, because it remains unarticulated and hidden. Temporal, material and integrative aspects of articulation (31) are all present in research examining the feasibility of running group clinics. However, few of these studies report on the interventions in enough depth to allow full appreciation of the complexities involved in setting up and sustaining this new model of care. There is need to better understand how wider cultural, professional and material changes are required to establish group clinics as a mainstream model of care.

Lessons learned

Group clinics have been studied across a range of conditions but have received less attention in the context of diabetes care for young adults, despite the urgent need for better care models to improve the poor health outcomes in this patient group. Drawing on a broad literature, this review presents lessons learned towards tailoring group-based care interventions for the specific needs and requirements of this age group.

Involvement in group clinics on the basis of good pre-existing relationships with health professionals seems to be key in retaining young adults' engagement with the service. Carefully crafted therapeutic relationships between patients and health professionals are based on flexibility, openness, non-judgmental language and understanding of developmental goals and competing priorities. Group composition and facilitation relies on good knowledge about patients – not just clinical information, but relational knowledge about their personality, motivations and social context.

There are significant challenges to implementation and substantive invisible work is required to establish successful group clinics for young adults. Resource implications, impact on pre-existing processes, additional skills and infrastructure requirements would need to be evaluated and costed. Iterative co-design of group-based care may help towards a clear value statement for patients that would enhance the perceived usefulness of the model and would lead to sustained engagement and sustainability.

Strengths and limitations

This review fulfils a clear and specific need in generating actionable evidence on how and why group clinics may work for young adults living with diabetes. To do this we are drawing our interpretations on a wider range of data than previous realist reviews, which looked across conditions or focused only on a small number of studies. Although this has significantly expanded the evidence base feeding into this review, many of our interpretations derive from literature on group-based education and would need to be examined further. Under-reporting of the content and delivery of interventions in the published literature and emphasis on clinical outcomes rather than psychosocial measures have also hindered a more detailed analysis.

Further research

Better reporting of interventions and more long-term ethnographic studies would provide a more detailed understanding of how and why group clinics work (or not) for young adults. This realist review has already provided a foundation for the ongoing development and evaluation of a new care model using group clinics for young adults with diabetes as part of a larger programme of work undertaken in a multidisciplinary diabetes clinic in the UK.

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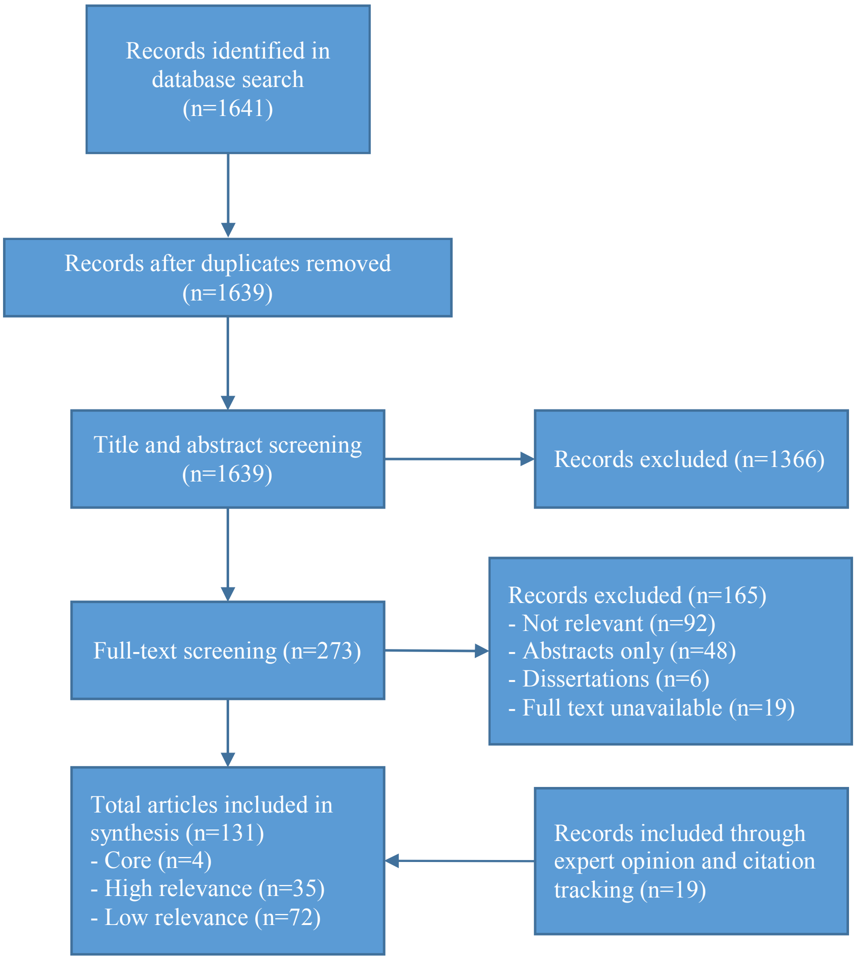


Figure 1: Study flowchart

CMOC 1: When young adults, who do not normally have the opportunity to share experiences with peers living with diabetes, find a space to connect and share openly with others (C), this might make it more likely for patients to feel supported (M) and comfortable (M), and could in turn lead to perceptions of increased understanding and learning (O).

CMOC 2: When group interactions enable peer support, young adults who feel more isolated, experience negative perceptions of self-management and/or face diabetes-related distress (C), may draw encouragement from each other (M), which could subsequently lead to more confidence and motivation in their self-management (O).

CMOC 3: Peer support in group clinics for young adults who experience their diagnosis and self-management as socially stigmatising (C), may help instil a sense of normalcy (M), which could lead to re-thinking self-monitoring and management in social settings (O).

CMOC 4: Where group clinic bring together participants who have common characteristics or shared experiences (C), it is assumed that a sense of affinity is more likely to emerge between group members (M), which could lead to increased sharing and sustained interest as participants will be able to relate to each other's experiences (O).

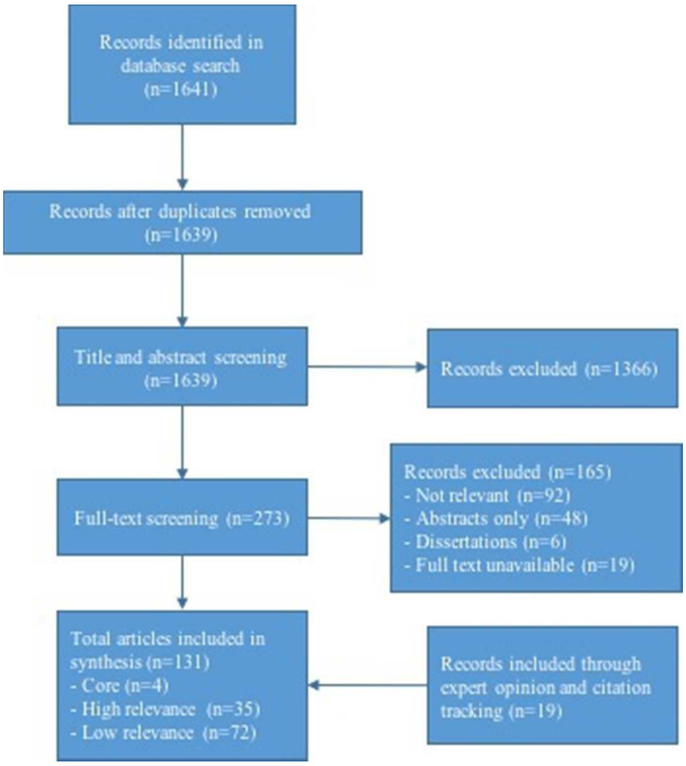
CMOC 5: In contexts where young adults have previously experienced a collaborative, helpful and respectful relationship with their clinicians, characterised by mutual understanding (C), it is more likely they will feel safe in exposing vulnerabilities (M) and that they will perceive added value and usefulness from interactions with services providers who know them well (M), which may lead to increased engagement with the service (O) and increased attendance (O).

CMOC 6: An increased emphasis on positive aspects of self-management and developmentally tailored attention to sensitive emotional needs over other priorities, for young adults who remain ambivalent about their role as diabetes patients (C), may help young adults slowly build self-esteem (M) and take a more active role in their self-management (O).

CMOC 7: With time people who engage in group sessions (C), make continuous judgments about the added value of these sessions to their own individual needs (M), which leads them to decide whether they will keep engaging with the group (O).

CMOC 8: For young adults who have negative perceptions about their ability to self-manage or who face diabetes-related distress (C), fear they may be diagnosed with further health problems (M), may lead them to disengage from the service (O).

Table 1: Context-Mechanism-Outcome Configurations (CMOCs).



Study flowchart

123x137mm (72 x 72 DPI)

Online-Only Supplemental Material

Appendix 1

Glossary

Contexts: settings, structures, environments, conditions or circumstances that trigger behavioural and emotional responses (i.e. mechanisms) for those affected.

Mechanisms: the way in which individuals respond to and reason about the resources, opportunities or challenges offered by a particular programme, intervention or process. Mechanisms are triggered in specific contexts and lead to changes in behaviour.

Outcomes: impacts or behaviours resulting from the interaction between mechanisms and contexts.

Context-Mechanism-Outcome Configurations (CMOCs): relationships between the building blocks of realist analysis, i.e. how mechanisms are triggered under specific contexts to result in particular outcomes.

Programme theory: a set of theoretical explanations or assumptions about how a particular programme, process or intervention is expected to work.

Appendix 2

Example search strategy

Date: 14 February 2017

Database: Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R)

Interface: OvidSP

Coverage: 1946-present

Hits: 909

1 Young Adult/

2 Adolescent/

3 (adolescen* or teen* or young people or young men or young women or young male? or young female? or young adult? or youth?).ti,ab.

4 1 or 2 or 3

5 exp Diabetes Mellitus/

6 diabet*.ti,ab.

7 5 or 6

8 *Group Processes/

9 Group Processes/ and "Appointments and Schedules"/

10 (group adj2 (visit* or clinic? or appointment? or care or meeting?)).ti,ab.

11 (gmv or gma).ti,ab.

12 ((shared or share or sharing) adj2 (appointment? or visit*)).ti,ab.

13 cluster visit*.ti,ab.

14 (group? adj2 (workshop? or class* or course? or train* or educat*)).ti,ab.

15 exp Self Care/ and (health education/ or patient education as topic/)

16 exp Self Care/ and Group Processes/

17 ((self care or selfcare or self manag* or selfmanag* or self monitor* or selfmonitor*) adj5 (workshop? or class* or course? or meeting? or train* or educat*)).ti,ab.

18 ("Dose Adjustment For Normal Eating" or dafne).ti,ab.

19 ("Diabetes education and self-management for ongoing and newly diagnosed" or desmond).ti,ab.

20 ("Beta Cell Education Resources for Training in Insulin and Eating" or bertie or streetwise or lifewise).ti,ab.

21 x-pert.ti,ab.

22 (conversation map* or "journey for control").ti,ab.

23 (self care or selfcare or self manag* or selfmanag* or self monitor* or selfmonitor*).ti,ab.

24 ((group? adj2 (support or meeting)) or (peer? adj2 (support or group?))).ti,ab.

25 (education* adj3 (intervention? or program*)).ti,ab.

26 24 or 25

27 23 and 26

28 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 27

29 4 and 7 and 28

Appendix 3

Table 2: Descriptive study characteristics

	Article	Year	Country	Type of paper	Aims/research questions	Study description and methods	Sample
1.	**Abolfotouh et al(1)**	2011	Egypt	Research	To assess quality of life (QoL) and glycemic control in adolescents with type 1 diabetes and to investigate the impact of an educational program.	A quasiexperimental study with nonrandomized experimental and control groups was conducted in which a total of 503 adolescents with type 1 diabetes completed a questionnaire using the Diabetes Quality of Life Instrument for Youth. Adolescents were then assigned to experimental and control groups. The experimental group was subjected to four 120-minute sessions of an educational program over a period of 4 months.	The sample included 503 adolescents, of whom 218 (43.3%) were males and 285 (56.6%) were females. About half of the adolescents (49.5%) were early adolescents (ages 12 to less than 14 years old), 39.6% mid-adolescents (ages 14–16 years old), and 10.9% late adolescents (ages 17 years or more). Overall, the mean age of the patients was 14.63 ± 2.23 years.

2.	**Abualula et al(2)**	2016	US	Systematic review	To evaluate the effectiveness of diabetes self-management education interventions with a skills development component on the quality of life of adolescents with type 1 diabetes.	Six databases were systematically searched – 14 studies published between 1994 and 2014 met the inclusion criteria.	Studies varied in geography, publication date, funding, sample size, and QOL scale used. The sample sizes of the studies ranged from 19 to 503 adolescents, and there were similar proportions in participation between males and females. Interventions included structured and unstructured diabetes education programs.
3.	**Albano et al(3)**	2008	Italy	Systematic review	To identify the recent characteristics and the developments of therapeutic education in diabetes.	Four databases were systematically searched – 80 articles met the inclusion criteria.	39,624 patients in total (range from 24 to 10,000 patients) with majority of adult patients (81%) - elderly patients (6.7%), children (6.7%) and adolescents (5%) represent only a minority of the sample.
4.	**Altundag et al(4)**	2016	Turkey	Research	To evaluate the effects of group interaction and training in the adaptation process to disease in adolescents with type 1 diabetes mellitus (T1DM).	Experimental study with pre- and post-test control groups in the pediatric endocrine clinic of a university hospital.	38 adolescents (study group n=18, control group n=20) with T1DM between the ages of 12 and 14 years

5.	**Anderson et al.(5)**	2003	US	Research	This study presents a clinical perspective on the challenge of improving diabetes education and care during the young adult period, focussing on the importance of the developmental changes that occur during this transitional phase of life. It presents developmentally-based practice principles for the young adult period.	The authors took a developmental perspective on young adulthood to understand its impact on diabetes management and engagement in therapy.	n/a

6.	Attari et al(6)	2006	Iran	Research	To investigate the effect of stress management training on glycaemic control in patients living with Type 1 diabetes	A quasi experimental study with nonrandomized experimental and control groups was conducted in which 60 patients completed a 26 item stress management questionnaire. HbA1 levels were measured simultaneously for all participants before the study. The study group attended 8, 2 hour sessions with 10-15 participants, over a 3 month period on stress management. The class format was discussion and mutual talk, under the supervision of a psychiatrist. At the end of each session there was homework to prepare for the next visit.	60 type 1 diabetics (16-30 years) were matched for age and sex and divided in to a study group (n-=30, mean 19.7 (3.29) [16-30]) and a control group (n=30, mean 20.8 (9.52 [16-30]).

7.	**Beer et al(7)**	2014	UK	Research	To develop, trial and evaluate an age-appropriate self-management programme called Working with Insulin, Carbs, Ketones and Exercise to Manage Diabetes (WICKED)	Phase 1: Participants attended a one-week DAFNE course, and were offered follow-up at six weeks. A focus group with the participants took place at the end of the course and interviews were carried out with facilitators both before and after the course. Phase 2: Development of a structured education course specific to the requirements of young people with diabetes. Phase 3: Evaluation of the new course using written accounts from participants and content analysis.	Phase 1: Seven young people aged 16–21. Phase 2 and 3: Nine young people aged 16–21 years attended the one-week course and took part in evaluation.

8.	**Bleakly & McKee(8)**	2010	Northern Ireland	Research	To discuss the development and results of an education programme for adolescents with type 1 diabetes.	Focus group to include adolescents in structuring their own education sessions. Four 2-hour after school sessions at weekly intervals in the local leisure centre. The sessions involved a mixture of group discussions, reflection, and practical application. The learning needs of each individual were assessed through an initial multiple choice knowledge questionnaire adapted by the diabetes team, which included questions on carbohydrate foods, insulin action and hypoglycaemia treatment. An identical questionnaire at the end of the 4 weeks provided a tool to assess knowledge gained.	Eight adolescents and four parents attended and received information regarding the proposed content of the education sessions. Of these adolescents five attended the educational programme on four consecutive sessions. The target age group was 14- to 16-yearolds with type 1 diabetes on multiple daily injection (MDI) therapy or wishing to commence MDI therapy.

9.	**Booth et al(9)**	2015	UK	Systematic review	To examine evidence for the use of group clinics in patients with chronic health conditions.	Systematic review of evidence from randomised controlled trials (RCTs) supplemented by qualitative studies, cost studies and UK initiatives, including realist analysis.	MEDLINE, EMBASE, the Cochrane Library, Web of Science and CINAHL, 1999 to 2014. Systematic reviews, randomised controlled trials, qualitative studies, studies reporting costs and evidence specific to UK settings were eligible for inclusion.
10.	**Cahill et al(10)**	2016	US	Scoping review	To explore the research literature on self-management interventions for children and youth with diabetes.	The authors searched 6 databases – 11 studies met the inclusion criteria.	The majority of studies focused on children age 14-18 years and provided self-management education, self-management support, or both.
11.	**Campbell et al.(11)**	2016	UK	Research	To evaluate the effectiveness of interventions designed to improve the transition of care for adolescents from paediatric to adult health services.	Cochrane-style systematic review	Adolescents between 12 and 19 years with any chronic condition requiring ongoing clinical care, who are leaving or transitioning from paediatric to adult healthcare service.

12.	**Casey et al(12)**	2011	Ireland	Research	To identify the key factors impacting on persons with Type 1 diabetes ability to assimilate the Dose Adjustment For Normal Eating (DAFNE) DAFNE principles into their daily lives and how these factors change over time.	Longitudinal descriptive qualitative study	Interviews were undertaken with 40 participants who had attended DAFNE in one of 5 study sites across Ireland, at 6 weeks, 6 and 12 months after completion of the programme. About one quarter of participants were between 20-30 years of age.
13.	**Céspedes-Knadle et al(13)**	2011	USA	Research	To describe the development and implementation of “Teen Power” a novel group intervention for diabetic teens and their caregivers, designed to improve medical adherence in teens with T1 diabetes, using an information-motivation-behavioural skills model.	2 groups in study: adolescent group and caregiver group. Groups meet once weekly (120 min) for 10 consecutive weeks. All group sessions begin with 30 minutes all together for unstructured mealtime followed by 90 minutes in separate groups for process- and skills-based activities that target diabetes-specific barriers to optimal medical and mental health outcomes.	Not reported.

14.	**Chaney et al(14)**	2012	Northern Ireland	Research	To establish adolescents' beliefs regarding the need for structured diabetes education and their views on how such a programme should be organised and what topics need to be addressed.	Exploratory qualitative study using five focus group interviews across three hospital trusts.	A total of 21 adolescents between 13–19 years were interviewed.
15.	**Christie et al(15)**	2016	UK	Research	To assess the feasibility and efficacy of a clinic-based structured educational group programme for child and adolescent diabetes patients.	Pragmatic, cluster-randomized controlled trial to assess the efficacy of a clinic-based structured educational group incorporating motivational interviewing (MI) and solution-focused brief therapy (SF) to improve long-term glycemic control, quality of life and psychosocial functioning in children and adolescents with T1D. A process evaluation collected data from key stakeholder groups.	28 pediatric diabetes services were randomized to deliver the intervention or standard care. 362 children (8–16 years) with HbA1c≥8.5% were recruited. Ninety-six of the 180 young people recruited to the intervention arm (53%) attended at least one module.

16.	**Christie et al(16)**	2014	UK	Research	To assess the feasibility of providing a clinic-based structured educational group programme incorporating psychological approaches to improve long-term glycaemic control, QoL and psychosocial functioning in a diverse range of young people.	Pragmatic, cluster randomised control trial with integral process and economic evaluation. Process evaluation using questionnaires, semistructured interviews, informal discussion following observation sessions, fieldwork notes and case note review.	Twenty-eight paediatric diabetes services across London, south-east England and the Midlands. Forty-three health-care practitioners (14 teams) were trained in the intervention. The study recruited 362 children aged 8–16 years, diagnosed with T1D for > 12 months, with a mean 12-month HbA1c level of ≥ 8.5%.
17.	**Clancy et al(17)**	2007	USA	Research	To evaluate perceptions of care delivered through group visits to disadvantaged patients with type 2 diabetes	A randomised control trial where 186 patients with uncontrolled type 2 diabetes were assigned to receive care in group visits or usual care for 12 months. Perceptions of care received were measured at baseline, 6 months and 12 months using the Primary Care Assessment Tool (PCAT), the Diabetes-Specific Locus of Control (DLC) survey and the Trust in Physician Scale (TPS).	186 adult patients with a HbA1c level of ≥ 8.0% took part. Group visit attendees n=96, usual care attendees n=90. Mean age 56.1 years (26.5-80.7).

18.	**Coffen & Dahlquist(18)**	2009	US	Systematic review	To demonstrate the complexity of the type 1 diabetes regimen and to highlight the role of the diabetes educators.	Three databases were searched for articles about self-management of type 1 diabetes in young people. Task analysis to break down the different activities involved in diabetes management was conducted, drawing on relevant literature. Little information is provided on the specific processes followed in the review.	The paper focuses on children and adolescents but does not define the group further.
19.	**Colson et al(19)**	2016	France	Systematic review	To describe the content and outcomes of structured diabetes education programmes and to assess compatibility with recommendations of the International Society for Pediatric and Adolescent Diabetes.	Integrative review based on Cochrane recommendations. Thirteen databases were searched for evaluations of education programs (2009-2014) and 43 papers met the inclusion criteria.	Educational programmes for youths with T1DM <18 years old and their families.

20.	**Davidson et al.(20)**	2004	US	Research	To describe stressors and self-care challenges reported by adolescents with type 1 diabetes who were undergoing initiation of intensive management.	Content analysis of coping skills training transcripts generated by Grey and associates were used to describe adolescents' perspectives of stressors and self-care challenges associated with having type 1 diabetes.	A convenience sample of six teens (5 males and 1 female) aged 13-17.7 years with type 1 diabetes were drawn from a wider study, "Nursing Intervention to Implement DCCT Therapy in Youth (Grey et al., 1998" based on the availability of transcripts.
21.	**Davis & Vitagliano(21)**	2015	US	Position paper/commentary	To introduce the model of group visits for adolescents with type 1 diabetes.	n/a	n/a

22.	**Davis et al(22)**	2008	USA	Research	Review of 9 papers on “group visits in diabetes” and exploration of associated practical issues.	Pilot study to test out practicalities of group visits for diabetes in a Midwest academic medical centre and a West Coast family medicine residency. 2 organisational models: a 90-minute nurse-practitioner led group visit of six to nine patients, and a second approach using a preliminary medical assistant visit and three patients seen together by a primary care physician in an hour long session.	Not reported

23.	**Day(23)**	2007	UK	Review and intervention description	The paper discusses current group education programmes available to young people with diabetes and presents a new intervention.	Phase 1: The education programme was designed for use with groups of between two and six individuals aged 13–18 years, with the oldest participant to date being 17 years. Without exception, young people were changing from a regimen of mixed insulin given twice a day before breakfast and before evening meal to MDI. Phase 2: Groups of up to 20 young people with type 1 diabetes aged 11 years and over were invited to attend two formal education sessions, the first held during the summer holiday before they changed to senior school and the second around 2–3 months after they had changed school.	Phase 1: The uptake of these sessions was approximately 98 %, mainly because the young people had already requested the change to the new regimen and were therefore highly motivated to attend the sessions. Phase 2: Various attendance levels have been seen from 30–80%. [no further information on the sample or participants provided]

24.	**Debaty et al(24)**	2008	France	Research	To assess quality of life in adult type 1 diabetic patients for one year following a hospital educational programme	Prospective single-centre study using the DQOL scale, sent by post and completed anonymously by the patients before the start of the programme, and three, six and 12 months afterwards.	77 patients included – 46 men (60%) and 31 women (40%), with a mean age 36.9±13.5 years
25.	**DeCoster & Cummings (25)**	2005	US	Review of interventions	To demonstrate the potential of clinical social workers to meet psychosocial needs of adults with type 2 diabetes.	Three databases were searched for articles on evidence-based interventions or programs appropriate for clinical social work in diabetes. 27 papers were included in the review.	27 evidence-based interventions or programs appropriate for clinical social work. Variety of samples included in each of the studies.

26.	**Di Battista et al.(26)**	2009	US and Canada	Research	To examine the association between social anxiety and adherence to diabetes self-care and quality of life and to determine the effects of fear of hypoglycemia on these associations in adolescents with type 1 diabetes.	Questionnaires were administered: Social anxiety scale for adolescents, the diabetes quality of life scale, and the summary of diabetes self-care activities questionnaire, and the hypoglycaemia fear survey. Pearson correlations were computed to test the hypothesis that social anxiety would result in decreased adherence and diabetes related quality of life and multiple regressions were performed to examine the relationship between social anxiety and adherence behaviours. Boys and girls were compared on their level of social anxiety.	Seventy-six adolescents (33 boys, 43 girls), between 13-18 years of age (mean age 15.9 (1.44) years), with type 1 diabetes recruited from 2 pediatric outpatient clinics in Tennessee and Toronto.

27.	**Dickinson & O'Reilly(27)**	2004	US	Research	To gain a better understanding of what it means for adolescent females to live with type 1 diabetes	Van Manen's phenomenological framework was used to guide the project of inquiry. Unstructured, one-on-one interviews were conducted and participants' accounts were transcribed and analyzed for themes	10 adolescent females, aged 16 and 17 years, with type 1 diabetes recruited from a diabetes camp.

28.	**Doe(28)**	2016	UK	Research	To investigate how the type of support provided by peers may moderate the relationships between peer support and diabetes outcomes	A cross-sectional research design is utilised. Participants were asked to complete a questionnaire battery which included the Berlin Social Support Scale, the Diabetes Social Support Questionnaire-Friends Version, the Self-Care Inventory –Revised. A recent measure of HbA1c was also taken. Linear regressions were used to look at the impact of global peer support on self-care, glycaemic control,; diabetes specific support, self-care and glycaemic control. Finally, those with high versus low HBA1c were compared on their levels of social support.	90 participants, aged 15–18 years and were recruited from two general hospitals in England. There were 37 males and 53 females.

29.	**Doherty & Dovey-Pearce(29)**	2005	UK	Research (Review (?))	To provide a brief overview of recent research into the impact of diabetes upon adolescent development and the specific psychological difficulties associated with diabetes.	n/a	n/a
30.	**Dovey-Pearce et al(30)**	2005	UK	Research	To describe and understand the considered opinions of 19 young adults with diabetes who were receiving secondary care services about the provision of diabetes services for young people.	Qualitative user involvement study using semi-structured interviews and a focus group with service users.	n = 19; male n = 8; female n = 11; age range = 16– 25 years; mean age = 19.9 years; SD ± 3.12 years
31.	**Dovey-Pearce et al.(31)**	2007	UK	Research	First, to describe and understand the influence of diabetes upon psychosocial development and second, to highlight the implications for healthcare teams.	Qualitative semi-structured interviews were used.	People aged 16–25 registered with one secondary care diabetes service, across two districts in north-east England were contacted. Nineteen interviews were conducted and analysed using a Framework Approach.
32.	**Dovey-Pearce(32)**	2015	UK	Commentary	To contribute to debates about improving care for young people.	n/a	n/a

33.	**Due-Christensen et al(33)**	2011	Denmark	Research	To test whether patients with Type 1 diabetes would join support groups and benefit by improving psychosocial functioning, regardless of their HbA1c levels.	Concurrent mixed methods study. Self-reported psychosocial functioning and HBA1c were measured at the beginning and end of the support group and at 6- and 12-month follow-up. At the last session, the patients answered five open-ended questions about their perception of the format and outcome of the intervention. After each support group, a focus group interview was conducted between 1 week and 2 months after the last session.	Convenience sample n= 54 patients (43 women and 11 men). The mean age of the participants was 43.8 (10.5) years
34.	**Edelman et al(34)**			Systematic review	To summarize the effects of Shared Medical Appointments (SMAs) on staff, patient, and economic outcomes and to evaluate whether the impact varied by clinical condition or specific intervention components.	25 articles were included in the review.	16 studies evaluated SMA interventions in patients with diabetes mellitus and 3 evaluated SMAs in older adults with high utilization of medical resources.

35.	**Ellis et al.(35)**	2016	UK	Systematic review	The review addressed the following question: ‘What are adolescents’ views or experiences of living with type 1 diabetes?’	Five databases searched for relevant articles between 2004-2014, with 8 papers included in the review and findings presented in narrative form.	Adolescents with diabetes type 1 aged 13-17 years, although some studies included participants aged 11-18 years.
36.	**Elwyn et al(36)**	2001	UK	Book	Aims to provide a practical guide to small group work in organisational, educational and research settings.	n/a	n/a
37.	**Ersig et al.(37)**	2015	US	Research	The purpose of this study was to identify stressors of teens with Type 1 diabetes (T1DM) and their parents related to the impending transition to adulthood.	Qualitative interviewing. Open ended questions were asked to identify every day and illness-related stressors among teenagers with Type 1 diabetes and their parents. Qualitative descriptive analysis identified themes in interview transcripts	15 teens with T1DM and 25 parents seen in one paediatric diabetes clinic.

38.	**Fernandes et al.(38)**	2014	US	Research	To determine patients' and parents' perceptions regarding the delivery of transition education and perceived barriers to transfer to adult oriented care.	Self-report survey (30 multiple choice and one free response question). Parent and patient responses were compared. Content analysis was employed for the free response question.	155 16–25 years old with various childhood onset chronic diseases (convenience sample) and their parents/guardians (104).
39.	**Fitzpatrick et al(39)**	2013	US	Systematic review	To examine the published literature on the effect of problem-solving interventions on diabetes self-management and disease control.	Two databases were searched and the authors followed citations from reference lists. Twenty-four studies met inclusion criteria.	Adult and children populations, including multiethnic samples or racial/ethnic minorities

40.	**Floyd et al(40)**	2016	USA	Research	To determine whether shared medical appointments (SMAs) with multicomponent interventions utilising multidisciplinary teams, improve glycaemic control and psychosocial outcomes in poorly controlled adolescent type 1 diabetes.	In this pilot study, groups of 3-6 subjects and their families came together to 3 SMAs and 1 individual appointment every 3 months over a 9 month period. Group session content was guided by participants and peer support enabled through discussion. Statistical analysis looked at QOL, adherence and retrospective and prospective glycaemic control as outcome measures.	37 subjects enrolled and 32 completed 3 of 4 visits. Subjects were aged between 12-16 (mean 13.7± 1.1)years with type 1 diabetes for ≥ 1 year and a HbA1c 0f 7.5-11%

41.	**Foster et al(41)**	2007	UK	Systematic review	To systematically assess the effectiveness of lay-led self-management programmes for people with chronic conditions.	Cochrane review. Eight databases were searched for randomised controlled trials (RCTs) comparing structured lay-led self-management education programmes for chronic conditions against no intervention or clinician-led programmes.	Seventeen trials involving 7442 participants. The interventions shared similar structures and components but studies showed heterogeneity in conditions studied, outcomes collected and effects. There were no studies of children and adolescents, only one study provided data on outcomes beyond six months, and only two studies reported clinical outcomes.
42.	**Gage et al(42)**	2004	UK	Systematic review	To categorise programmes offered to adolescents, assess their outcomes and cost-effectiveness and identify areas where knowledge is lacking.	Narrative review of studies on educational and psychosocial programmes for adolescents with diabetes. Eleven databases were searched and 64 empirical papers meeting the inclusion criteria were identified.	Programmes that seek to meet the particular needs of adolescents. 58% of studies had fewer than 40 participants.

43.	**Graue et al(43)**	2005	Norway	Research	To examine the effects of group visits and computer-assisted consultations on quality of life and glycaemic control in adolescents with Type 1 diabetes.	The intervention group was invited to a 15-month programme comprising group visits and computer-assisted consultations. The control group was offered traditional out-patient consultations. Outcomes included changes in HbA 1c and the adolescents' assessment of generic and disease-specific health-related quality of life measured by the Child Health Questionnaire (CH Q-CF87) and the Diabetes Quality of Life Questionnaire (DQOL), respectively.	One hundred and one adolescents (55/46) agreed to participate, mean age 14.2 years (SD 1.5), mean diabetes duration 6.5 years (SD 3.6, range 1–16 years), mean HbA1c 9.3% (SD 1.4, range 6.1–12.8%).

44.	**Grey et al(44)**	2009	US	Research	Describes the development and initial evaluation of a standard diabetes education program for youth with type 2 diabetes and their families.	Part of a randomized parallel group clinical trial designed to evaluate the relative efficacy of 3 treatments for type 2 diabetes in youth age 10 to 18 years are (1) metformin alone, (2) metformin plus rosiglitazone, and (3) metformin plus an intensive lifestyle intervention called the TOD2AY Lifestyle Program (TLP).	218 participants, with a mean of 14.3 years of age (±2.1 years), and 63% female.
45.	**Ha Dinh et al(45)**	2016	Australia	Systematic review	To review the evidence on using the teach-back method in health education programs for improving adherence and self-management of people with chronic disease.	Eight databases were searched and 12 papers included for analysis. Results are presented in narrative form.	Adults aged 18 years and over with one or more than one chronic disease.
46.	**Hampson et al(46)**	2000	UK	Systematic review	To evaluate the effectiveness of behavioral interventions for adolescents with type 1 diabetes.	Eleven electronic databases were searched for evaluations of behavioural interventions.	Adolescents (age range 9–21 years) with type 1 diabetes

47.	**Hampson et al(47)**	2001	UK	Systematic review (full HTA report)	To examine the effectiveness of behavioral interventions for adolescents with type 1 diabetes.	Eleven electronic databases were searched. 64 reports describing 62 studies were identified as meeting the inclusion criteria. Effect sizes were calculated for randomised controlled trials. Pre-post studies were discussed in narrative form.	Adolescents (age range 9–21 years) with type 1 diabetes
48.	**Hill-Briggs(48)**	2003	US	Systematic review	To review the literature on problem solving and diabetes self-management, present selected psychological theories of problem solving and develop an applied model of problem solving in chronic illness self-management.	Two databases were searched for studies on problem solving and its relation with disease self-management. Eleven papers were included in the review.	Variety of samples, including children and adolescents.
49.	**Hilliard et al.(49)**	2012	US	Review and conceptual development	The authors review recent conceptualizations of resilience theory in the context of type 1 diabetes management and control and present a theoretical model of pediatric diabetes resilience.	n/a	n/a

50.	**Hilliard et al(50)**	2016	US	Review of interventions	The paper summarizes the evidence base for established diabetes skills training programs, family interventions, and multisystemic interventions, and introduces emerging evidence for technology and mobile health interventions and health care delivery system interventions.	Descriptive overview of interventions	Children and adolescents with Type 1 diabetes (T1D) and Type 2 diabetes (T2D) and their families.
51.	**Hinder & Greenhalgh(51)**	2012	UK	Research	To produce a richer understanding of how people live with diabetes and why self-management is challenging for some.	Ethnographic study supplemented with background documents on social context. Participants were shadowed at home and in the community for 2-4 periods of several hours interviewed (sometimes with a family member or carer) about their self-management efforts and support needs; and taken out for a meal. Detailed field notes were made and annotated. Data analysis was informed by structuration theory.	30 people with diabetes (15 type 1, 15 type 2), aged 5-88, from a range of ethnic and socio-economic groups

52.	**Hoddinott et al(52)**	2010	UK	Research	To propose a framework for the design and process evaluation of health improvement interventions occurring in a group setting to assist practitioners, researchers and policy makers.	Based on team experiences of conducting systematic reviews, intervention, mixed method and ethnographic studies of groups for breastfeeding and weight management and a literature review, a framework for health improvement group design and delivery evolved.	The framework was developed using studies the team had been involved in.
53.	**Housden & Wong(53)**	2016		Systematic review (update)	To identify association between delivery of group medical visits (GMVs) and physiologic, self-care and system outcomes.	8 databases were searched and 33 articles were included in the review	Patients aged 16–80 years with type 1 or 2 diabetes.
54.	**Housden et al(54)**	2013		Systematic review	To assess the effectiveness of group visits for patients with diabetes.	Systematic review and meta-analysis – 8 databases were searched and 26 studies were included in the review.	Patients aged 16–80 years with type 1 or 2 diabetes.

55.	**Hynes et al.(55)**	2015	Ireland	Research	To develop a theory explaining attendance of young adults at a hospital-based diabetes clinic	Interviews conducted with young people with diabetes and their service providers. Interviews were audio-recorded, transcribed and analysed according to grounded theory methodology.	Young adults (21) with type 1 diabetes and service providers (8) from one hospital-based diabetes clinic
56.	**Hynes et al(56)**	2016	Ireland	Systematic review	To synthesise findings on barriers and facilitators to clinic attendance among young adults (15–30 years) with type 1 diabetes.	Four electronic databases were searched and a total 12 studies met the inclusion criteria. Findings are presented in the form of narrative synthesis.	Young adults (15–30 years) with type 1 diabetes mellitus.

57.	**Jaber et al(57)**	2006	USA	Research	Summary of current group visit research and development of suggestions for furthering this care model.	Systematic, electronic review of the literature, 1974 – 2004 via PubMed and Medline databases. Further articles were obtained by reviewing bibliographies of articles gathered through the database search. The qualitative review was organised by sequentially describing the effect of all reviewed interventions on each of the following health outcomes (if measured): patient satisfaction, health services utilization, quality of care, health behaviours, physical function /depression /quality of life, disease-specific outcomes, physician satisfaction, and cost of care.	16 papers including prospective observational studies and randomized controlled clinical trials.

58.	**Jaber et al(58)**	2006	USA	Research	To describe current group visit models and to discuss the unique advantages and challenges group visits present for physicians based on four-year experience.	Description of locally developed group visit programs for asthma, osteoporosis and lipids management. Challenges identified included: 1) billing 2) waiting time and patient flow 3) confidentiality 4) dropout rates.	≥ 240 patients (mostly female in their mid-50's)

59.	Keers J et al(59)	2004	The Netherlands	Research	To determine the effect of the Multidisciplinary Intensive Education Program (MIEP) on glycaemic control and quality of life and gain insight into the mechanisms of effect.	This pilot study took 51 patients through the MIEP over 12 days with group sessions and individual counselling facilitated by the diabetes education team. Primary outcome variables were glycaemic control (HBA1c) and quality of life measured with the RABND-36 scale. The Diabetes Symptom Checklist (DSC) measured diabetes related symptoms and a Dutch version of the health locus of control scale were used along with the number of severe hypoglycaemic occurrences to assess secondary outcomes. The data was anlysised using paired *T*-tests and regression analysis.	58 patients, 18-70 years (mean 49.10) enrolled and 51 patients completed the program and were evaluated. To fit the criteria HBA1c had to be>7.5% for at least a year and/or frequent or severe hypoglycaemia and/or psychosocial limitations resulting from diabetes. Selection was based on medical reports and an admission interview

60.	Keers J et al(60)	2006	The Netherlands	Research	The study has 2 aims. 1) to determine the effects of the Multidisciplinary Intensive education Program (MIEP) on glycaemic control, Hr-Qol and in facilitators of empowerment (i.e. coping and attribution of control over diabetes), immediately after the intervention and at a 1 year follow up. 2) to determine whether intended increases in empowerment are related to a positive HBA1c and Hr-Qol outcomes directly after MIEP and at 1 year follow up.	MIEP was made up of 10 days of group sessions (6-9 patients/group) and some individual support. Follow up visits take place at 6 weeks, 12 weeks and 1 year. Participants in the program completed a baseline assessment and had their first measurements taken following a successful admission interview. Follow up questionnaires were mailed to participants at 3months and 1 year. The data was anlysised using independent *T*-tests and regression analysis.	99 patients completed MIEP and 231 non-referred outpatients consented to provide reference values.

61.	**Keough et al.(61)**	2011	US	Research	The purpose of this study was to examine differences in self-management behaviors (Collaboration with Parents ,Diabetes Care Activities, Diabetes Problem Solving, Diabetes Communication, and Goals) between early, middle, and late adolescence. The role of regimen and gender as covariates in self-management behaviors was also examined.	Secondary analysis on demographic, illness-related and self-management variables, with a cross-sectional descriptive survey design. Participants were analysed to determine self-management behaviours in the early, middle and late adolescence. Unadjusted differences by stage of adolescence in self-management behaviours were estimated using ANOVA.	504 participants aged 13-21 years from the Self-Management of Diabetes-Adolescent instrument development study, who had been diagnosed with Type 1 diabetes for at least a year, were not pregnant and had no condition/chronic illness that could affect how the individual cared for his/her diabetes.

62.	**Kichler et al(62)**	2013	US	Research	To implement the Kicking in Diabetes Support Project intervention to determine the impact of this treatment on improving psychosocial adjustment and diabetes management among adolescents with T1DM and their parents.	Combined peer- and family-based group therapies using a wait list control design methodology. General psychosocial and diabetes-related variables were assessed at baseline, immediately posttreatment, and 4 months posttreatment.	30 adolescents with T1DM for at least 6 months between 13 and 17 years of age, who were patients of a diabetes clinic in a large, midwestern hospital and their parents. Mean age at study participation was 15.17 years (SD = 1.34 years). Fifty-three percent of the adolescents were girls.
63.	**Kime et al.(63)**	2013	UK	Research	To develop a self-care intervention programme with the involvement of young people with type 1 diabetes or asthma.	Focus group study.	87 young people, aged 12–17, and seven young adult facilitators, aged 18–25, with type 1 diabetes or asthma.
64.	**Kirk et al(64)**	2013	UK	Systematic review	To review research on the effectiveness of self-care support interventions for children and young people with asthma, cystic fibrosis and diabetes.	Seventeen electronic databases were searched and 15 papers met the inclusion criteria. The results were narratively synthesized.	Children and young people aged 0–16 years diagnosed with one of the following long-term conditions: asthma, cystic fibrosis and diabetes.

65.	**Kirsh et al(65)**	2017	USA	Research	To build upon existing evidence base, which suggests that shared medical appointments (SMA's) are effective and explore how they are effective in terms of the underlying mechanisms of action and under what circumstances.	Realist Review methodology was chosen to uncover how and for whom and under what circumstances SMAs work and to synthesize the literature on SMAs, which included a broad search of 800+ published articles. Nine main mechanisms that serve to explain how SMAs work were theorized from the data immersion process and configured in a series of context-mechanism-outcome configurations (CMOs).	71 high quality primary research articles were identified to build a conceptual model of SMAs. 20 of those were selected for an in depth analysis using realist methodology.
66.	**Lavoie et al(66)**	2013	Canada ??	Research	To explore dimensions identified as key in the patient-centred literature in the context of primary health care services delivered in a group setting.	Report of qualitative study nested in larger mixed methods study of group medical visits (GMV's). Key format and process-oriented elements identified in GMVs, and on their link to improved outcomes are presented.	63 participants completed in-depth interviews, (providers n=34, patients n=29)

67.	**Lawton & Rankin(67)**	2010	UK	Research	To understand how and why structured education programmes work for patients with diabetes and other chronic diseases.	Six five-day DAFNE courses were observed in five centres across the UK and in-depth interviews conducted	30 patients aged 18-59 years were interviewed
68.	**Leelarathna et al(68)**	2011	UK	Systematic review	To answer the following questions: What are the effects of intensive treatment programmes, psychological interventions, and educational interventions in adults and adolescents with type 1 diabetes? What are the effects of different insulin regimens or frequency of blood glucose monitoring in adults and adolescents with type 1 diabetes?	At least 3 databases were searched and 42 systematic reviews, RCTs, or observational studies met inclusion criteria.	Adults and adolescents with type 1 diabetes
69.	**Lirussi(69)**	2010	Italy	Systematic review	To evaluate the effectiveness of interventions to improve glycaemic control in ethnic minority groups.	Four databases were searched, along with additional survey datasets.	Ethnic minority groups living in high-income countries, as compared with people with type 2 diabetes in the general population.

70.	**Løding et al(70)**	2007	Norway	Research	To describe the elements and results of peer-group support and problem-solving training in the treatment of adolescents with type 1 diabetes and their parents.	Preliminary interviews, self-report questionnaires and medical record review for HbA1c values	A total of 19 adolescents with type 1 diabetes (13–17 years of age) and their parents participated in the intervention.
71.	**Lovell(71)**	2012	UK	Research	To describe the development of an educational programme for children and young people with diabetes – the "SKIP" course – and to present findings from feedback by participants.	The "SKIP" course was initially trialled in two sessions. Young people and parents gave written comments in an anonymous feedback form. PDSNs and dietitians gave their reflections and views at a team meeting. Following the trial, 4 SKIP sessions have been organised (with 20 participants in total).	All children and young people who were newly diagnosed with diabetes (aged 14 months to 15 years), their parents or carers and siblings were considered for invitation. [no other information provided]

72.	**Lyons et al.(72)**	2013	US	Review	The review identifies barriers to successful transition and provides a checklist for streamlining the process.	Review of articles related to transition to adult diabetes care and physical and psychosocial assessment of adolescents with diabetes – one database searched. Desktop review (“internet search”) of online transition resources.	Youth with diabetes mellitus.
73.	**Mallow et al(73)**	2015	USA	Research	The aim of the study was to explore the impact of Diabetes Group Medical Visits (DGMVs) on biophysical outcomes of care in uninsured persons with diabetes.	Retrospective study using convenience sampling of those who attended DGMVs and usual care. Intervention group patients received DGMVs during the study time frame and met inclusion criteria. Usual care patients were randomly selected from diabetes patients receiving usual care in the study time frame who met the inclusion criteria.	53 patients attended DGMVs and 58 attended usual care in the study. All were aged 18 or over.

74.	**Mannucci et al(74)**	2005	Italy	Research	To assess the feasibility and efficacy of an Interactive Educational and Support Group programme (IESG) for patients with type 1 diabetes.	The Interactive Educational and Support Group (IESG) was designed as a semi-structured, long-term, open, group education programme. The programme included features of a self-help group, but also provided structured information about the condition. Pre- and post assessment of metabolic control and diabetes related quality of life.	Age range: 30.7±8.4 (mean±SD)

75.	**Markowitz & Leffel(75)**	2011	US	Research	The authors implemented and evaluated a support group for young adults with Type 1 diabetes as a pilot project	Youth with diabetes participated in monthly, professionally led support groups for 5 months. Questionnaires were completed pre-and post-group and chart review data were collected regarding glycaemic control and visit frequency in the year before and after group participation.	15 young adults with Type 1 diabetes (18–30 years) (93% female, 92% white). Mean age was 26 ± 3.3 years, diabetes duration was 10.6 ± 8.0 years (range 1–22 years). Participant s were highly educated (> 85% obtained a bachelor's degree or higher), 80% were single and 93% had no children. The majority were seen in an adult diabetes clinic (75%), with the remainder treated by paediatric providers. The majority (86%) had never before participated in any diabetes support group or community-based programme.
76.	**Mead & MacNeil(76)**	2004	USA	Research	To present a perspective on peer support that defines its difference and also maintains its integrity to the movement from which it came.	Written reflection to offer some thinking about practice and evaluation standards that may help different types of peer initiatives sustain real peer support values in action.	N/A

77.	**Mejino et al(77)**	2012	Netherlands	Research	This study examined the perspectives and experiences of patients, parents, and health care providers with shared medical appointments (SMAs) for children and adolescents with type 1 diabetes.	Survey questionnaires and an online focus group	Fifty-two patients, 8 parents, and 36 health care providers participated. Participating patients (26 boys, 26 girls) were between 8 and 18 years old (mean [M] = 13.08, standard deviation [SD] = 2.51). One or two parents (n = 41) per patient were present in six SMAs (range 4 to 11 parents), regardless of the patients' age. However, patients under the age of 12 years (n = 14) were always accompanied by their parent(s) during an SMA.
78.	**Mulvaney et al.(78)**	2008	US	Research	To document barriers and facilitators of self-management as perceived by adolescents with type 2 diabetes.	Between 2003 and 2005, 6 focus groups were used to elicit responses from adolescents with type-2 diabetes related to their self-management. Transcripts were coded by 3 reviewers. Qualitative analyses were conducted using NVIVO software.	Adolescents aged 13 to 19 years were recruited from an academic medical center diabetes clinic.

79.	**Murphy et al(79)**	2011	Ireland	Research	To understand the experience of participants in the Dose Adjustment for Normal Eating programme and to identify factors that influence participants' implementation of the self-management guidelines.	Qualitative interviews with 40 participants in Ireland.	Adults with type 1 diabetes who had completed a Dose Adjustment for Normal Eating programme (around one quarter of participants were aged between 20-30 years).
80.	**Murphy et al(80)**	2006	UK	Systematic review	To update the existing database of psychoeducational interventions (post 1999).	27 articles describing the evaluation of 24 psycho-educational interventions. Effect sizes are calculated and data summary tables presented.	Children and young people with Type 1 diabetes (children defined as those aged 5–11 years and young people as aged 12–18 years).
81.	**Newman(81)**	2012	US	Commentary	Presents the perspective of a school nurse on the needs of adolescents with diabetes and experience with group meetings.	n/a	Students with diabetes type 1 or 2, aged 15-17 years old.
82.	**Noffsinger (82)**	2009	US	Book	Presents the history of group visit models and proposes ways to successfully implement group clinics.	n/a	n/a

83.	**Noordman & van Dulmen(83)**	2013	Netherlands	Research	To examine informational and emotional patient–provider and patient–patient communication sequences (i.e. cues and subsequent responses) during Shared Medical Appointments (SMAs) for children and adolescents with type 1 Diabetes Mellitus (T1DM) and their parents.	Video-recordings were made. Communication sequences, including informational and emotional cues and responses were rated using an adaptation of the Medical Interview Aural Rating Scale.	57 children/adolescents with T1DM and 36 healthcare providers participated in ten SMAs in seven Dutch hospitals. Mean age in years (SD; range) 14 years (SD: 2.6; range: 8–18). One or both parents (n = 41, range: 4–11 parents) from 35 children/adolescents were present in six protocolled SMAs. During four SMAs none of the parents were present.
84.	**Norris et al(84)**	2002	US	Systematic review	To review the effectiveness and economic efficiency of self-management education interventions for people with diabetes, including interventions in settings outside the home, clinic, school, or worksite.	Five databases were searched and 30 studies were included in the review.	Various, including adults, young people and children.
85.	**O'Hara et al(85)**	2016	Ireland	Systematic review	To synthesize the evidence regarding the effectiveness of interventions aimed at improving clinical, behavioural or psychosocial outcomes for young adults with Type 1 diabetes.	Five electronic databases were searched and 18 papers were included in narrative synthesis.	Young adults aged between 15-30 years with Type 1 diabetes

86.	**Pals et al(86)**	2016	Denmark	Research	The objective of the study is to explore the effects of Next education (NEED), a participatory patient education approach in diabetes education.	A quasi experimental design using intervention and control sites was used to carry out a realist evaluation on NEED to help gain insight into the mechanisms by which the patient education approach functioned. Data were collected through questionnaires, interviews and observations. Data was analysed using descriptive statistics, logistic regression and systematic text condensation.	8 intervention sites n=193, 6 control sites, n=58.

87.	**Paterson & Thorne(87)**	2000	Canada	Research	To describe the developmental evolution of expertise in the self-management of diabetes as it was portrayed in a research study about expert self-management of persons with long-standing Type 1 diabetes. Grounded theory study which assumed that the insider perspective on the complex process of self-management is accessible through interpretive research methods	Participants had an initial interview and subsequently audio-taped their daily self-management decisions for 3 lots of one week periods (throughout one year). Transcripts were used as prompts for additional interviews. At the end of the research, all participants attended a 2 hour focus group interview where findings were shared and participants were invited to reflect on them. Analysis of the transcripts was guided by traditional constant comparative analytic techniques.	22 individuals with long standing (>15 years) Type 1 diabetes, identified as expert self-management decision makers. Caucasian. 14 women and 8 men, ranged 24-81 years (M=43.3). 18 had high-school or post-secondary education and 8 had one or more diabetes-related complication.

88.	**Piana et al(88)**	2010	Italy	Research	To introduce a narrative-autobiographical approach in the care and education of adolescents with type-1 diabetes.	Adolescents attending one 9-day summer camp in 2004, 2005, or 2006 participated in structured daily self-writing proposals on diabetes, integrated with daily interactive self-management education. They later filled in questionnaires on their experiences at the camp and using the autobiographical approach (50 responses/53.2% response rate). Elicited texts were also analysed using content analysis.	Ninety-four adolescents with type-1 diabetes (age 13–18 years).
89.	**Pillay et al(89)**	2015	Canada	Systematic review	To determine the effects of behavioral programs for patients with type 1 diabetes on behavioral, clinical, and health outcomes and to investigate factors that might moderate effect.	Six electronic databases were search and 47 papers were included in the review.	Studies focusing on youths (median 13.5 years) and adults (30-49). No studies focused on young or older adults.

90.	**Plante & Lobato(90)**	2008	US	Systematic review	To review the efficacy of group-based psychological interventions for children and adolescents with type 1 diabetes.	Two electronic databases were searched and 31 articles were included in the review.	Children and young adults (age range 8-23 years) with type 1 diabetes.
91.	**Povlsen & Ringsberg(91)**	2008	Sweden	Research	To explore how young adults with a non-western immigrant background and type 1 diabetes since childhood/adolescence have perceived learning to live with the disease, with special focus on health education and support	A mixed quantitative and qualitative design was applied. This included data on metabolic control for 2002–2006 and semi-structured interviews in 2006 with eleven strategically selected young immigrants. Data were analysed using qualitative content analysis	Eleven non-western immigrants, defined as persons or descendants of persons with immigrant or refugee back-ground originating from countries outside Western Europe, North America and Australia, participated in the study. These were six women and five men aged 17–28 years, who had been diagnosed with type 1 diabetes between the age of 10 and 17 years.
92.	**Powell et al(92)**	2015	US	Review	To provide an overview of new approaches to diabetes care	n/a	n/a

93.	**Price et al(93)**	2016	UK	Research	To assess the effect of a 5-day structured education course (Kids in Control of Food; KICk-OFF) on biomedical and psychological outcomes in young people with Type 1 diabetes.	Cluster-randomized trial involving 31 UK paediatric centres	Participants were 11-16 years of age and had Type 1 diabetes for at least one year.

94.	**Pyatak et al.(94)**	2016	US	Research	The authors identified and treated young adults with type 1 diabetes who had been lost to follow-up during their transfer from paediatric to adult care, comparing their clinical, psychosocial, and health care utilization outcomes to participants receiving continuous care (CC) throughout the transition to adult care.	Individuals in their last year of paediatric care (CC group, n ¼ 51) and individuals lost to follow-up in the transfer to adult care ("lapsed care" [LC] group, n ¼ 24) were followed prospectively for 12 months. All participants were provided developmentally tailored diabetes education, case management, and clinical care through a structured transition program. The groups were then compared on diabetes care visits, glycemic control, episodes of severe hypoglycemia (defined as requiring assistance and/or change in mental status), emergency department visits, hospitalisations, and psychosocial outcomes.	Participant criteria: age 19-25 years at the time of study enrolment; (2) diagnosis of type 1 diabetes according to American Diabetes Association criteria for at least 2 years; and (3) participant not pregnant at the time of study enrolment or planning pregnancy within the next 12 months

95.	**Ramdas & Darzi(95)**	2017	UK	Research	To explore why given the effectiveness of group interventions, doctors are not routinely using them to treat physical and mental conditions?	Short report, which identified and discusses four crucial components ((1) rigorous scientific evidence supporting the value of shared appointments, 2) easy ways to pilot and refine shared-appointment models before applying them in particular care settings, 3) regulatory changes or incentives that support the use of such models, 4) relevant patient and clinician education), which may be missing from group interventions and the authors believe are necessary for any highly innovative service-delivery model to become standard.	N/A

96.	**Rankin et al.(96)**	2011	UK	Research	To inform future educational interventions, the authors explored patients’ accounts of the education and information they had received since diagnosis, and the reasons behind gaps in their diabetes knowledge	Semi-structured interviews were conducted with 30 type 1 diabetes patients enrolled on a structured education programme in the UK. Data were analysed using an inductive, thematic approach.	30 participants aged 18-56 (16 females and 14 males) were recruited from six courses across five diabetes centres in the UK.
97.	**Rankin et al(97)**	2014	UK	Research	To explore patients' experiences of, views about and need for, social support after attending a structured education programme for type 1 diabetes.	Repeat qualitative interviews following completion of the Dose Adjustment for Normal Eating course and grounded theory analysis.	30 adult patients with type 1 diabetes recruited from Dose Adjustment for Normal Eating courses (age: 36.1mean± 11.6SD; range 18–56).
98.	**Rankin et al(98)**	2012	UK	Research	To explore the support needs of patients with type 1 diabetes after attending a structured education programme.	Repeat qualitative interviews following completion of the Dose Adjustment for Normal Eating course. Data were analysed inductively.	30 adult patients with type 1 diabetes recruited from Dose Adjustment for Normal Eating courses (age: 36.1mean± 11.6SD; range 18–56).

99.	**Raymond et al(99)**	2015	US	Research	Feasibility and acceptability pilot study of Team Clinics that was carried out before beginning a randomized, controlled trial of this program.	Satisfaction survey	92 patients participated in Team Clinic (mean age 15.82 ± 2.1 years, 43% female, 60% non-Hispanic white, 24% Hispanic/Latino, 6% black; reflective of the overall clinic population)

100.	**Reitz et al(100)**	2012	USA	Research	The purpose of the study was to evaluate the effect of a diabetes support and education group visit program on, HBA1c concentration, low-density lipoprotein concentration, BP targets and weight changes several months after program commencement.	A quasi-experimental matched controlled pre- and post-study design was used to compare differences in the measured outcomes between the diabetic patients in the group visit program and those in a matched comparison group. The baseline variables of each group, and the changes from baseline, with adjustment for baseline values during the follow-up period of 7 months, were compared with the Cochran Mantel Haenszel (CMH) statistic. The number of office visits during the follow-up period was also compared. The level of significance for group comparisons was set at an alpha value of less than 0.05. SAS Enterprise Guide 4.1 was used for data analysis.	Group visit program (n=52) and comparison group patients (n=236) were drawn from family practice, ≥18 years and had type 2 diabetes with at least one visit to the practice in the preceding year.

101.	**Rijswijk et al(101)**	2010	Netherlands	Research	The following research questions were addressed: 1. What are the differences between a traditional individual outpatient visit and an SMA for children and adolescents with type 1 diabetes in: a. the amount of diabetes-related topics discussed? b. the conversational contributions of the participants? 2. How do children and adolescents assess the social and informational aspects of an SMA?	Videotapes of 42 individual outpatient visits and 5 SMAs with 31 children or adolescents were collected and observed using a checklist of topics. Survey questionnaire on views about participation in the SMAs.	Participating patients were between 6 years and 19 years of age and participated in different age groups, of 6–12 (children) and 13–19 years (adolescents). // The patients were on average 12.8 (SD 2.8; range 6–19) years of age in the individual consultations and 12.3 (SD 2.7; range 8–18) years in the SMAs (ns). Parents participated in all SMAs.
102.	**Ritholz et al(102)**	2011	US	Systematic review	To understand how qualitative research contributes to an increased understanding f behavioural diabetes.	The paper synthesises findings in narrative form.	Children, adolescents, and adult patients with both type 1 and type 2 diabetes

103.	**Robinson(103)**	2015	UK	Research	To gain greater insight into the experience of being diagnosed with type 1 diabetes during adolescence, and the factors that influence how a young person makes sense of the condition over time.	Unstructured interviews were conducted and results were analysed using Interpretative phenomenological analysis	Eight adults, aged 28–36 years who were diagnosed with diabetes during adolescence
104.	**Rostami et al.(104)**	2014	Iran	Research	This study escribes and explores the experiences of support in Iranian adolescents with T1DM in order to provide culture and context specific research of T1DM in order to improve knowledge of how cultural factors influence the provision of support to adolescents with T1DM.	Semi-structured interviews were used and content analysis was conducted A semi-structured interview schedule was developed to guide group discussions based on the research questions	Purposive sampling was used to identify participants who were 10-19 years old, had T1DM for at least two years and had no other chronic diseases. 7 males and 3 females were recruited at two diabetes management clinics in Iran.

105.	**Sadur et al(105)**	1999	USA	Research	To evaluate the effectiveness of a cluster visit model led by a diabetes nurse educator for delivering outpatient care management to adult patients with poorly controlled diabetes.	Randomised control trial. Intervention subjects received multidisciplinary outpatient diabetes care management in cluster visit settings of 10–18 patients/month for 6 months. The outcomes available for the study included post intervention HbA1c levels; self-reported measures of self-care practices, self-efficacy, and satisfaction with general medical care and with diabetes specific care; measures of utilization of inpatient and outpatient services before , during, and after the 6-month intervention through the end of 1997; and total costs of care for the same periods	Participants aged 16-75 years with HBA1c concentration >8.5% or no HBA1c measurement for the previous year, were randomised to an intervention group (n=97) or a usual care group (n=88).

106.	**Sattoe et al(106)**	2015	Netherlands	Systematic review	To provide a systematic overview of self-management interventions (SMI) for young people with chronic conditions.	Six databases were searched and 86 studies were included in the review – of those 16 articles referred to diabetes.	Young people (aged 7–25 years) with somatic chronic conditions or physical disability, including diabetes.
107.	**Sawtell et al(107)**	2015	UK	Research	To assess the feasibility, acceptability, fidelity, and perceived impact of the structured educational group program Child and Adolescent Structured Competencies Approach to Diabetes Education (CASCADE).	Mixed methods process evaluation, embedded within a cluster randomized control trial in 28 pediatric diabetes clinics across England. The evaluation used multiple methods, including questionnaires, observation and qualitative interviews.	362 children participated, aged 8-16 years with type 1 diabetes.
108.	**Schilling et al(108)**	2002	US	Systematic review	To clarify the concept of self-management of type 1 diabetes in children and adolescents.	Three databases were searched and ninety nine references were reviewed.	Children and adolescents aged 6-17 years.

109.	**Schillinger et al(109)**	2008	USA	Research	To examine whether tailored self-management support (SMS) strategies reach patients in a safety net system. Variation by language, literacy and insurance was explored.	An effectiveness study of SMS nested within a randomized trial among diverse diabetes patients in a safety net system. English-, Spanish- and Cantonese-speaking diabetes patients were randomized to weekly automated telephone disease management (ATDM) or monthly group medical visits (GMVs). Those randomised to ADTM received weekly phone calls (6-12mins) in their native language for 9 months. Those in the GMV arm received language specific GMVs monthly for 9 months. These sessions' 6-10 participants and lasted approximately 90 minutes.	Patients who were older than age 17; had ICD-9 codes consistent with type 2 diabetes; spoke English, Spanish, or Cantonese; made ≥1 primary care visit in the prior year; and had ≥1 hemoglobin A1c value (HbA1c) - Age (years): M (SD) 55.4 (11.9)

110.	**Schmidt et al.(110)**	2016	Germany	Research	To test the effects of a generic transition-oriented patient education program on adolescents’ health service participation and quality of life (QoL).	The authors conducted a controlled trial comparing participants of 29 transition workshops with treatment as usual. A two-day transition workshop was carried out at 12 sites in Germany, focusing in standardized modules on adjustment to adult care settings, organization of future disease management, career choices and partnership. Study outcomes were health-related transition competence, self-efficacy, satisfaction with care, patient activation and QoL. Measures were assessed at baseline and six-month follow-up. Repeated measurement covariance analysis using age as a covariate was conducted.	274 adolescents (16.8 mean age, SD = 1.76) diagnosed with type I diabetes (DM), Cystic fibrosis (CF) or inflammatory bowel disease (IBD)

111.	**Schultz et al.(111)**	2017	US	Research	To examine which components of transition programs are effective in improving outcomes following transfer	Systematic review/meta-analysis	11-26 years old with type 1 diabetes

112.	**Sequeira et al.(112)**	2015	US	Research	To evaluate the efficacy of a structured transition program compared with usual care in improving routine follow-up, clinical, and psychosocial outcomes among young adults with type 1 diabetes	Young adults with type 1 diabetes in their last year of pediatric care were recruited from three clinics. Intervention group participants (n = 51) received a structured transition program incorporating tailored diabetes education, case management, group education classes, and access to a newly developed young adult diabetes clinic and transition website. Control group participants (n = 30) received usual care. The primary outcome was the number of routine clinic visits. Secondary outcomes included glycaemic control, hypoglycaemia, health care use, and psychosocial well-being. Assessments were conducted at baseline, and 6 and 12 months.	81 young adults (51 in intervention group and 30 in control group) diagnosed with type 1 diabetes for at least two years, aged 19-25. Participants had to be receiving routine diabetes care by an assigned provider, and 4) in the last year of pediatric care, defined as anticipating transition to adult care within the next year.

113.	**Serlachius et al.(113)**	2011	Australia	Research	To explore stressors in people with T1DM and gain feedback on adapting a generic coping skills programme.	Focus groups were conducted	13 adolescents (13-17) with T1DM
114.	**Skinner et al.(114)**	2000	UK	Research	To examine whether peer support and illness representation mediate the link between family support, self-management and well-being.	Participants were recruited and followed over 6 months. They completed questionnaire assessments on self-management, well-being and social support.	52 adolescents(12-18 years old) with Type 1 diabetes
115.	**Smaldone et al(115)**	2006	US	Research	To examine characteristics of patients with type 1 and type 2 diabetes and conclude whether group education classes should be separated by type of diabetes.	Quantitative study measuring clinical markers, self-care behaviours, psychosocial outcomes, food choices and physical activity.	101 patients with type 1 diabetes (mean age 44 and SD 12.4 years) and 107 patients with type 2 diabetes (mean age 57 and SD 9.2 years).
116.	**Soni & Ng(116)**	2014	UK	Systematic review	To examine the key aspects of improving metabolic control in children and young people.	Findings are described in narrative form – other methodological details are missing.	Children and young adults < 20 years.

117.	**Spencer et al.(117)**	2013	UK	Research	To explore the social environments young people with type 1 diabetes inhabit, and the potential influence of these environments on their glycaemic control.	In-depth interviews were conducted. An interpretive phenomenological approach was taken to explore the experiences of young people with type 1diabetes and their parents.	20 White British people (9 male, 11 female) aged 13-16 years attending a paediatric clinic in North-West England and 27 parents (7 male, 20 female). The female parent/guardian alone took part in 13 interviews, and both parents took part in seven interviews.
118.	**Spencer et al.(118)**	2013	UK	Research	To explore adolescents' and parents' experiences of living with Type 1 diabetes from an interpretive phenomenological perspective	In-depth interviews were conducted, underpinned by interpretive phenomenology	20 adolescents (13-16, 9 male, 9 female) with Type 1 diabetes from a diabetes clinic in North West England, and 27 of their parents
119.	**Thorpe et al(119)**	2013	US	Systematic review		One database was searched and 129 articles met criteria for inclusion.	Patients with type 1 or 2 diabetes and no restrictions on age.

120.	**Tierney et al.(120)**	2008	UK	Research	To explore patients’ responses to developing and managing cystic fibrosis-related diabetes and to contrast their views with those of individuals with type 1 diabetes mellitus.	Semi-structured telephone or face-to-face interviews were conducted with patients who had cystic fibrosis-related diabetes or type 1 diabetes mellitus, during which, they discussed diagnosis and management of diabetes. Framework analysis was employed to identify themes and to consider similarities and differences between the two groups.	Participants were derived from a larger sample of patients taking part in a questionnaire-based study comparing episodes of hypoglycaemia and quality of life between patients with CFRD and T1DM. Participants had to be 18-60, diagnosed with diabetes for at least 3 months and being treated with insulin. 23 interviews were conducted with 11 CFRD (5 male, 6 female) and 12 T1DM (6 male) participants.

121.	**Vachon et al(121)**	2007	USA	Research	To describe the development and implementation of a multifaceted program in an inner-city healthcare centre designed to improve access to care and empower patients to take a more active role in managing diabetes.	Description of Diabetic Rewards Issued Via Everyone (DRIVE), a monthly open-access, multi-station group visit program based in an economically deprived neighbourhood west Chicago. The group visit format intended to maximize provider productivity, increase the clinic's capacity to see a greater number of patients, provide patients a setting in which to learn more about diabetes, nutrition and self-management and to leverage the interactions among patients in group meetings to help prompt changes in their self-management through peer influence and experience.	DRIVE day participants n=294, patients with diabetes who have not attended a DRIVE day n=443

122.	**Viklun & Wikblah(122)**	2009	Sweden	Research	To explore teenagers' perceptions of factors affecting decision-making competence in diabetes management.	Qualitative interviews with teenagers with type 1 diabetes shortly after that completed an empowerment education programme. Interviews were analysed using qualitative content analysis.	31 teenagers (17 girls and 15 boys) with type 1 diabetes, aged 12–17 years.
123.	**Viklund et al(123)**	2007a	Sweden	Research	To determine the effects of an empowerment programme on glycaemic control and empowerment.	Randomised pre-/post-test design with repeated measures. The empowerment education programme consisted of six 2-h group sessions. Main outcome measures: HbA1c, empowerment and parental involvement.	Thirty-two teenagers with Type 1 diabetes (12-17 years), including involvement from parents.

124.	**Viklund et al(124)**	2007b	Sweden	Research	To evaluate whether diabetic teenagers participating in a group educational programme, ‘the schooner programme’, differ from non-participants in attitudes towards diabetes and self-care, and to evaluate the impact on the attitudes, HbA1c and treatment of the programme.	Intensive educational programme run on a sailing ship. The study used a ‘reference’ group and compared attitudes towards diabetes and self-care, glycaemic control and looked at the role of social networks.	A total of 90 young people (mean age 15.5 years (SD = 0.9) attended the programme

125.	**Vissenberg et al(125)**	2016		Research	To study whether the group-based intervention Powerful Together with Diabetes (PTWD) changed social support and social influences, and which elements of the intervention contributed to this.	Qualitative Process evaluation. Social network-based intervention PTWD developed, which aimed to stimulate social support for self-management and diminish hindering social influences on self-management among socioeconomically deprived patients. The intervention group (IG) was compared with a standard group-based educational intervention (control group, CG). Qualitative in-depth interviews with participants and interviews with group leaders were conducted.	51 in-depth interviews were carried out (participants n=27, group leaders n=24)
126.	**Waller et al(126)**	2005	UK	Research	To assess adolescents' and their parents' views on the acceptability and design of a new diabetes education programme.	Focus group study.	Twenty-four children and 29 parents attended one of eight separate focus groups.

127.	**Weinger K(127)**	2003	USA	Report/ research	Description of different group medical visit models	Summary of seven papers looking at five group medical visit models	n/a
128.	**Wiley et al(128)**	2014	Australia	Research	To describe the experience of diabetes education from the perspective of young adults with type 1 diabetes.	Survey questionnaire and focus group study.	150 respondents to the survey questionnaire (30.5% aged 18–24 years) and 33 participants in the focus groups (mean age was 25.1 years).
129.	**Williams & Pace(129)**	2009	Canada	Systematic review	To determine whether problem based learning (PBL) is an effective educational strategy in chronic disease management.	Integrative literature review - five databases were searched and thirteen papers were included in the review.	Six studies involved children, adolescents or adults with diabetes
130.	**Wong S al(130)**	2015	Canada	Research	To report whether group medical visits (GMVs) for chronic conditions, have tangible benefits for providers and patients	Descriptive study including in-depth interviews with patients attending and providers facilitating GMVs and direct observation. Five primary care practices in rural towns and four First Nations communities participated. Interpretive, thematic analysis was conducted.	34 providers and 29 patients were interviewed. Mean age of patients was 62 years old, mostly female and married. The three most common chronic conditions reported by patients were diabetes (n = 9), high blood pressure (n = 8) and arthritis (n = 7).

131.	**Yeoh et al(131)**	2015	UK	Systematic review	To review educational, technological and pharmacological interventions aimed at restoring hypoglycemia awareness (HA) in adults with type 1 diabetes.	Systematic review and meta-analysis - seven databases were searched and 43 studies met the inclusion criteria.	Adults over 18 years.

Appendix 4

Table 3: Illustrative quotes

CMOC 1	When young adults, who do not normally have the opportunity to share experiences with peers living with diabetes, find a space to connect and share openly with others (C), this might make it more likely for patients to feel supported (M) and comfortable (M), and could in turn lead to perceptions of increased understanding and learning (O). (13, 21, 67, 74, 77, 99, 101, 115, 130)
	Most patients (87%) indicated they had learned from fellow patients, fellow patients helped them to understand the information better (75%), and they learned to ask questions (42%) (Table 6). (77) *Group programmes of patient education have the advantage of stimulating interactions among participants, which enhance the efficacy of education: peer listening improves learning, while the opportunity to share one's experience about the disease with others provides an effective psychological support [6]. Interactive formats are thought to be superior to more traditional, lesson-style group programmes, because they are more effective in enhancing interaction among patients [7]. (74)* *Teen Power offered teens and caregivers the opportunity to negotiate this balance through dialogue with others who share similar life experiences. In this way, the group promoted social support and networking. Indeed, this was the first opportunity for the majority of participants to meet other diabetic teens and to dialogue with a young adult diabetes mentor. Effective diabetes management can be particularly difficult for teens at a young developmental stage. The Teen Power intervention offers these adolescents specific activities and workshops, as well as an opportunity to learn from their peers. (13)* *A self administered satisfaction survey from patients indicated that 96% felt more supported, 82% better understood information compared to during*

	regular appointments, 82% felt more comfortable asking questions, 88% would recommend Team Clinic to others, and 84% wanted to attend another Team Clinic. (99) *Surrogate question answering Wider evidence suggests that patients will often be reluctant to ask questions within a one-toone consultation. Within a group context they may find that a more active participant is more able to vocalise their own concerns. Patients therefore become vicariously exposed to information that would not otherwise be forthcoming. (9)* *As an SMA lasts longer than an individual appointment and mutual interaction is actively sought, SMAs may provide more opportunity to discuss relevant diabetes-related topics and to invite patients to raise current health issues themselves. In this way, SMA patients learn from each other and pick up information about topics they were afraid to ask or never thought of asking. We therefore expect that the children and the adolescents feel more at ease and more stimulated to contribute to the conversation when they hear their fellow patients talking about a certain topic. (101)* *In the majority of the patients, their fellow patients also helped them to understand the information better, which is highly relevant given the complex and multidimensional nature of the disease. Yet, contrary to expectations, in only a minority of the patients the presence of others helped them to ask questions.(101)* *The participants' conversational contributions in the different types of visits suggest that there is more balance in the input of the different participants during SMAs. This could, however, be ascribed primarily to the higher*

	conversational contribution of the team members and does, so far, not indicate that SMAs provide a more safe environment for child patients to speak up. In addition, the fact that in SMAs silences lasted half as long as in individual visits, may suggest a more effective use of time, but may also diminish opportunities of communicating empathy and providing space, which are both strongly related to silences [18]. (101) *A programme that would engage young people was stated as being essential. The use of practical sessions was considered to be very important as it was felt that young people learned more by doing than just talking. Lectures about the subject areas to be addressed were discouraged with many adolescents stating that they would simply 'turn off' or not return after the first session. Group discussion, practical demonstrations and fun activities were identified as the most fruitful means of delivery for this age group (14)* *Rather than repeating health education messages (e.g., reasons for a high HbA1c) across several individual visits, providers taught to the whole group at once, witnessed reinforcement of key messages by patients sharing their own experience and, in addition, reported more opportunities for in-depth patient–provider interactions. (130)* *According to the providers, patients react more openly during SMAs and thereby facilitate this learning process. (77)* *Furthermore, parents (37.5%) want their child to attend SMAs in order to enhance their relationship with other patients with type 1 diabetes. (77)* *Group education classes stimulate learning by allowing adults to incorporate their own experiences with diabetes into class discussion and, thus, actively*

	engage in the learning process (5). (115) *Both learning communities and SMAs foster increased knowledge, self-efficacy, a greater understanding of the medical condition, and coping skills. (21)*

CMOC2	When group interactions enable peer support, young adults who feel more isolated, experience negative perceptions of self-management and/or face diabetes-related distress (C), may draw encouragement from each other (M), which could subsequently lead to more confidence and motivation in their self-management (O). (67, 77, 81, 130)
	Patients attending GMVs reported increased confidence and skills in managing their health within their personal and social context. One patient stated: "… you come out of the group feeling much more self-confident … you've got your batteries recharged and you can really go till the next group … it's [GMV] more motivating … you want to do more yourself and rely less on others … but then you always realize there's others out there to help you if needed." (Patient #16) (130) *As well as helping to raise their self-esteem, and overcome feelings of isolation, patients talked about how the group interactions had also enhanced their capacity to comprehend and assimilate information during the course. (67)* *"Group was the one place I could really open up and talk about my diabetes and feel good about it." (81)* *Openness like this encouraged the group to talk about relationships and sharing responsibilities. (70)* *According to the parents (37.5%), SMAs are only useful when children act openly and are committed, not when SMAs are seen as unpleasant. (77)* For young adults who experience denial towards their diagnosis – group clinics can provide a safe space to discover what it means to live with diabetes. (81)

CMOC 3	Peer support in group clinics for young adults who experience their diagnosis and self-management as socially stigmatising (C), may help instil a sense of normalcy (M), which could lead to re-thinking self-monitoring and management in social settings (O). (9, 13, 31, 51, 65, 67, 70, 90)
	Injecting insulin was not a value-neutral medical procedure but a social practice which people with diabetes deemed appropriate or inappropriate in different contexts. (51) *Also, compared to individual treatment, practice of key diabetes management skills within the social context of a therapeutic group may be more effective for generalization of the skills adolescents need to apply in peer social settings. (90)* *A review of behavioral interventions found that almost one half of the treatments for adolescents with diabetes were delivered in group formats (Hampson et al., 2000). Interactions with peers who share the experience of diabetes, which may be more difficult to arrange through individual therapy, may foster a sense of normalcy (Citrin, Zigo, LaGreca, & Skyler, 1982). (90)* *SMAs help patients break from their cognitive dissonance pertaining to their illness, and coming out of concealing or normalizing their conditions [29]. (65)* *[…] the selfcare behaviours that they are being encouraged to pursue are likely to feel at odds with the prevailing social norms for their age group (31)* *In this context involvement of patients in their own monitoring, particularly where this requires hands-on engagement with monitoring equipment, may be*

	both a practical and symbolic way of getting them to start to engage with their own management. (9) *For example, teens who openly engaged in diabetes management behaviors within the group setting appeared to have a positive influence on peers who were reluctant.* (13) *Some adolescents reported that they had fewer objections to measuring their glucose values and injecting insulin in public after the intervention [peer-group support and problem-solving training]. (70)* *[…]interactions not only enhanced the depth and breadth of learning which took place, but also, at a deeper and more fundamental level, they led to transformations in course participants' perceptions of, and orientations to risk (and risk-taking), and, associatedly, their conversion into insulin dose-adjusting subjects. (67)*

CMOC4	Where group clinic bring together participants who have common characteristics or shared experiences (C), it is assumed that a sense of affinity is more likely to emerge between group members (M), which could lead to increased sharing and sustained interest as participants will be able to relate to each other's experiences (O). (21, 23, 77, 107, 115)
	[…] patients can benefit from attending a group which offers an accumulated pool of experience. However, this consideration needs to be balanced against that of ensuring that group sizes are not so large that opportunities for interactions between participants, or for the daily review of individual data, are compromised, as this may reduce a SEP's effectiveness. (67) *For parents (62.5%), SMAs should preferably be attended by patients with similar ages, attitudes, problems, and types of insulin treatment.* (77) [intended to ensure topics of interest to all participants will be covered in full.] *To maximize the benefit of group education, participants must be able to relate to each other's shared experiences to inform or influence their own behavior (5).* (Smaldone, Ganda et al. 2006) *SMAs for adolescents who continue to meet together are similar to those that participate in a learning community. The group bonding and camaraderie that develop over time can lead to identity within the group, and give adolescents the opportunity to share common struggles (Eisenstat et al., 2012). (21)* *They did not perceive age-banding as having the function of allowing interaction with peers in the clinic setting. This is supported by the findings from a qualitative study carried out by Datta (2003). She suggested that older*

	adolescents and young adults are not generally comfortable with shared activities, and that these have limited attractiveness, especially when arranged by staff. (30) *During SMAs with adolescents, the team and group members address transition issues over time, making the process less stressful. (Davis and Vitagliano 2015)* *For adolescents, an SMA can be seen as a step to independence. As one parent reacted: "My influence during medical visits is gradually decreasing. This is very important". (77)* *Difficulties in delivering the intervention particularly occurred when sessions had groups of participants with a wide age range or group numbers were very small. 'The first group that we ran had two girls and a boy and the boy was at the younger end of the teenage years and the girls were at the older, it was unfortunate because we didn't have that many patients as part of the study so it was very difficult then to get the groups sorted out so we kind of had to put them together. […] He was just a bit of a silly boy in that…I don't mean horribly, he was lovely, but just kind of played the fool a little bit whereas the girls were older and a similar age and a lot more grown up about it all.' (Site educator) (107)* *According to an equal number of parents, the topics discussed during an individual appointment are more tailored to the individual patient. If their child experiences unusual problems, these problems are more easily addressed during an individual appointment. It is important to parents that their children receive sufficient individual attention from health care*

	providers during an SMA. (77) *Our opinion is that the time built into our SMA model for individual attention during goal setting, history and physical, and wrap-up allowed for flexibility to personalize group sessions based on recurrent themes among the individuals, leading to these improvements. (40)* *At times there were common issues and therefore group discussion of blood glucose levels were relevant but on the whole this component became less rather than more important as time went on. (12)* *There were a few patients who thought if the GMV had too many people that patients' time was not used appropriately because they needed to listen to too many patients' health concerns. (130)* *SMAs were also valued negatively by some parents (25%) when patients are present who do not want to participate or when patients do not interact with each other. (77)*

CMOC5	In contexts where young adults have previously experienced a collaborative, helpful and respectful relationship with their clinicians, characterised by mutual understanding (C), it is more likely they will feel safe in exposing vulnerabilities (M) and that they will perceive added value and usefulness from interactions with services providers who know them well (M), which may lead to increased engagement with the service (O) and increased attendance (O). (29, 30, 55)
	Meeting service providers at appointments with whom young adults had a relationship reinforced their engagement with the clinic, indicating that a reciprocal relationship existed between relationships and engagement. In addition, engagement positively influenced young adults' diabetes-related perceptions and behaviours, preventing a cycle of inadequate self-management, distress, and non-attendance from developing. *'If you were having a tough time with your bloods they'll schedule times to ring you over a few weeks and they'll keep in contact with you until you have it under control again, which is great like, so you always have somebody there.' Young adult 6, female, age 26, 50–75% attendance (55)* *By continuing to deliver diabetes services to young adults using existing models, high rates of clinic non-attendance are likely to persist, as the findings of this study suggest that young adults actively respond only after experiencing collaboration with, and support from, service providers. (55)* *Once a relationship existed, experiences with supportive and understanding service providers made young adults more likely to attend the diabetes clinic despite feelings of distress, due to the knowledge and confidence they had that they would benefit from attending.(55)* *Other participants, who relied more on secondary care services, described a*

	level of disengagement because of the lack of staff continuity, characterised by feeling like a passive participant in consultations and questioning the benefits of the advice given or of attending appointments: … [Y]ou're telling this doctor about your diabetes, and the next time, you're telling another doctor and they just preach to you the same things … If there's not a patient–doctor build-up, then you think, 'Well, why should I bother coming?' (Female, 22 years) *(30)* *Participants highlighted continuity of contact as helpful:* *… [T]he trust and everything is already there … If not, that's a slight resentment: someone walks through the door, and 5 minutes later, they're telling you to cut this out and do that. It's like, 'Who are you to tell me?' (Male, 21 years)* *She was there on the end of the phone … I could talk to her and she knew the basic background of my family, how I had become pregnant, everything – that I'd lost a baby beforehand … and she was with me through that as well, so she was brilliant … just listened and helped. (Female, 22 years) (30)* *The data suggest that continuity of contact would allow a young person to feel that their situation was understood without the need to retell their history. This would appear to result in an increased level of trust, perceived usefulness of contact, ease with which the young person can negotiate the practicalities of clinics, make telephone contact between clinics and the amount of rapport within the relationship. (30)* *The quality of the relationship with the health care professional was seen to be essential. The style of the consultation and the attitude of the health care*

	professional working with the young person were seen to be at the core. This involved seeing the same person and developing trust and rapport as well as including family, friends and partners when required, in a manner that was flexible and responsive. (29)

CMOC6	An increased emphasis on positive aspects of self-management and developmentally tailored attention to sensitive emotional needs over other priorities, for young adults who remain ambivalent about their role as diabetes patients (C), may help young adults slowly build self-esteem (M) and take a more active role in their self-management (O). (14)
	A majority of our time, however, was devoted to focusing on the emotional and motivational needs of the students, which are equally important. As one teen remarked in one of the meetings, "We know about diabetes care, we learned that at the hospital. If we don't want to take care of ourselves, no one is going to make us do it. Only we will, when we are ready." (81) *Participants also highlighted the importance of having a programme which could inspire and motivate them to take an active role in their diabetes management because they want to, rather than because they have to. (113)* *The Teen Power curriculum was designed to promote the development of health promoting behaviors among Type 1 diabetic teens by simultaneously targeting medical adherence and psychosocial barriers in order to optimize positive treatment outcomes.(13)* *Ambivalence appears to be an issue and it seems 'clinical styles that are respectful, acknowledge choices and ambivalence and do not increase resistance seem to be logical'.*[33] *Interventions are empathic, nonconfrontational, use reflections, develop self-efficacy and highlight discrepancies from the young person's perspective. (29)* *Sensitive use of language is also essential; for example, we can discuss 'choices and behaviours' rather than 'problems or issues' unless labelled by the young person in that way. (29)*

	[…] an adolescent at a stage of development prior to the development of more abstract styles of thinking would not find discussions about the long-term complications of diabetes meaningful. Instead he or she might feel confused and overwhelmed and may withdraw as a means of self-protection. (29) *[…] during regular follow-up visits, young patients often behave in a passive way to back out of their responsibility to take care of their disease(101)* *the effect this has on their engagement with services can be hard for health care professionals to manage as it can result in the young person oscillating between engagement and interest in diabetes and detachment and disinterest. (29)* *It is suggested that this results in blurred social boundaries where young people in these age groups are sometimes considered as children and sometimes considered as adults, rather than being allowed to flourish in their own right, somewhere in-between. As a result, the oscillation, transaction and ambiguity, normative and necessary for development, become labelled as problematic, as they do not clearly fit with the social constructions of childhood or of adulthood, and problem saturated stereotypes of young people are allowed to dominate. (31)* *Doctors often spend much time and effort trying to achieve control, minimise disease progression, and reduce complications of chronic illness. Young people, on the other hand, are far more interested in achieving the developmental tasks of adolescence.' They conclude that broadening the disease-focused perspective would achieve better health outcomes and reduce*

	the conflict between the perspective of the professional and the young person. (29) *They could also have additional, specific psychological vulnerabilities to manage, associated with the demands of diabetes, such as eating problems, social isolation, fear of stigma, poor intimate relationships, depression, poor self-efficacy and low perceived control (29)* *"When I went into college I think as most people do, diabetes became the last thing on my mind, I didn't care, I didn't want to know about it." Young adult 6, female, age 26, 50–75% attendance (55)* *'He tells me he plays football and goes to the gym. He doesn't make any special preparation for doing sports. Mum says he takes Lucozade with him. Asghar insists he doesn't and then Mum says he drank a whole bottle before football. She gets frustrated with him "What about the time I chased after you because you'd taken four bottles!""I was taking them for my mates" Mum looks disgruntled - "They're too expensive to give them to your mates".' Field notes from home visit to Asghar, age 16, type 1 diabetes for 7 years, IMD score 67.1 Lucozade is a commercial carbonated carbohydrate drink which many participants used to treat hypoglycaemic attacks, but which is also marketed as a sports drink. By handing out bottles to his friends, Asghar may have successfully de-medicalised his treatment and achieved social gain, but this trade-off had a very different social meaning for his mother, who was struggling to feed a family of six on state benefits. (51)*

CMOC7	With time people who engage in group sessions (C), make continuous judgments about the added value of these sessions to their own individual needs (M), which leads them to decide whether they will keep engaging with the group (O). (9, 12, 70, 74, 77, 98, 101, 109)
	However, while patients, in their follow-up interviews, highlighted some benefits to be gained from attending follow-up sessions in a group, most indicated a preference and need for one-to-one support. This included M7, who described group-based follow-ups as mitigating opportunities for patients to: "talk about their own individual circumstances ... everyone's an individual and I think everyone has individual needs... and events happening in their lives" (M7.3). Several patients also expressed dissatisfaction with reviews of blood glucose readings at six week follow-up sessions. While patients had collected blood glucose data for six weeks, the requirement for all patients' readings to be reviewed meant there was only time to examine their most recent results. M14, for instance, described how educators had reviewed blood glucose readings that he had gathered over the preceding two or three days, which, he suggested, could result in a focus applied to an unrepresentative sample of results collected over "a very small period of that six weeks". (98) *Self-help groups can improve the psychological status and health-related QoL of patients [10–12], but fail to modify metabolic control [10, 12]. In fact, the format of the self-help group is not efficient for the transmission of structured knowledge, which is also required for the improvement of metabolic control [3]. Interactive group programmes which also include the provision of technical information by health professionals in a more structured format, with a pre-defined schedule of topics, could be more effective in the*

	improvement of metabolic control [13]. (74) *Parents (25%) also value the privacy of an individual visit, particularly when discussing personal problems. (77)* *[…] some patients also identified themselves as not wanting to attend more Gmvs because they did not want to talk about their issues, nor hear other patients' issues in a group. (130)* *Any instance in which such public disclosure is bad for the patient may result in negative outcomes. For some patients who already have high levels of self-efficacy and who are private by nature, the SMA environment may prove to be stressful in ways that private clinical encounters are not. (65)* *A relevant proportion of patients invited did not attend group sessions. A low participation rate seems to be common for long-term educational programmes, particularly when dealing with established cases. (74)* *In other accounts, patients sought and/or expressed a preference for individualised and tailored support, provided by specialists, that was responsive to changes in their personal circumstances and lifestyles. For example, F2 described having needed, and received, regular and intensive educator support after she became pregnant, to review and change quick-acting ratios and basal insulin doses, to control unstable and fluctuating blood glucose readings. (98)* *Most of these participants reported that they rarely met outside the group and interest in the group appeared less important as time went on. Over time for many participants there was a shift from working and learning with others to*

	solving my issues and the need to focus on me again. "Not really I mean at this stage I'm not sure how much more group work would actually be of benefit to me" (P9-096 12 months). "I think I find now after all this time the group session there's not as much said as before, because it's the same kind of people having the same kind of problems. And you kind of think now it might be better off just to speak to the expert rather than listen to - again like in the beginning it was - you learnt an awful lot from everybody else, but now I don't think so much now"(P13-100 12 months). (12) *Most participants reported that the group education sessions became less important over time as participants required individual one to one responsive practical support and advice available as needed, focusing on their unique concerns. These findings are substantiated in other studies [8,48,49]. In particular, participants in this study reported that they wanted timely access to the right health professional when they were making real efforts to change but were being hampered by a transient problem they did not know how to manage. The need for timely support to resolve crises that threaten patients' ability to self manage has also been highlighted by other writers [33,36]. (12)* *To add, although patients did not mind the extra time investment and they would recommend others to participate in an SMA as well, only half of them would choose an SMA again next time. This latter finding may suggest that SMAs and individual visits complement rather than replace each other, and may therefore need to be offered interchangeably to guarantee high quality diabetes care as well as visit adherence.(101)* *The present study shows that group interventions for adolescents with type 1*

	diabetes are effective when combined with individual consultations. Discussing certain personal issues may feel more appropriate in an individual consultation, while other issues may be more suitable for discussion with peers in groups.(70) *Our qualitative study adds to Smith et al's concerns about promoting group-based support in diabetes clinical practice, particularly if this support is offered in isolation from other types of inputs and interventions. We have also provided insights into why group-based follow-ups may not necessarily be a popular or effective approach – albeit in this instance, through a focus on type 1 diabetes patients. Specifically, we have shown that a group-based approach may be incompatible with patients' need for individualised input from health professionals post-course, to accommodate their specific and personal experiences of applying their treatment regimens in everyday life. (98)* *There were few long-term studies examining the effectiveness of group medical visits for diabetes care. Fifteen of the 26 studies were 12 months or less in duration, and 6 studies were up to 2 years in duration. The study with the longest duration followed patients for 5 years after the intervention. Therefore, the long-term or sustainable outcomes of group medical visits are unclear, and it is difficult to know if the outcomes were maintained for a substantial length of time after the intervention. (54)* *A significant proportion of those invited decline, largely because they do not recognise benefits against the perceived advantages of an individual consultation. (9)*

	However, effort should be put into ways of improving access to the intervention. First, more personalised information about the intervention and advantages of participation could have been presented to the adolescents and parents. Second, more effort might have been put into the issue of motivating them to be willing to meet with others unfamiliar to them. Third, using incentives and various forms of rewards for participation might encourage participation. (70) *When comparing the two forms of SMS [self-management support], we found that the ATDM [automated telephone disease management] model not only reached a greater proportion of the target population than the group medical visit model, but it also yielded particularly high rates of engagement for those with limited literacy and limited English proficiency. For health system planners and practitioners in health education and health promotion, this suggests that the relative accessibility and targeting of the ATDM technology, combined with its proactive nature and hierarchical logic, can provide a strategy to reverse the inverse care law and reduce health care disparities. (109)* *Most patients (n = 45) appeared to be satisfied with the SMA directly after having attended the SMA (M = 4.22, SD = 0.81). Their satisfaction tended to decrease after 3 months (M = 3.76, SD = 1.15; t (28) = 1.94, P = 0.06) (77)* *Perversely those least likely to communicate or engage in a group setting may be the very ones who are most need supplemental individualised care. (9)*

CMOC8	For young adults who have negative perceptions about their ability to self-manage or who face diabetes-related distress (C), fear they may be diagnosed with further health problems (M), may lead them to disengage from the service (O). (15, 43, 55)
	Even with the moderate intensity of our programme, a certain number of adolescents chose not to participate or were lost during follow-up, giving the intervention a completion rate of 39 of 55 patients, or 71%. Adolescents lost during follow-up in both the intervention and control groups had significantly lower scores on self-reported self-esteem and general health in the generic measurement, a worse perception of diabetes-related impact, and higher HbA1c. These adolescents appeared to have less self-confidence and perceived a greater impact of the disease than did the other participants. This suggests that there might be problems in reaching adolescents with these particular problems. (43) *Dissatisfaction among young adults with the perceived quality of their self-management was described by some young adults as a motivator, and by others as a significant barrier, to clinic attendance. 'I should be going to the clinics, but the fear that I have is that they're [service providers] going to turn around and go well you've the signs of diabetes eye disease or your kidney function isn't as good as it should be; that's what terrifies me.' Young adult 7, female, age 22, <50% attendance (55)* *Take up was particularly low for those young people with the highest HbA1c. Those who attended had significantly lower mean baseline HbA1c scores than those who did not attend (9.52% (81 mol/mol) vs 10.33% (89 mmol/ mol), p<0.01). (15)*

	Previous research has highlighted that seemingly innocuous behaviours have been interpreted as intrusive and an accusation of incapability by adolescents when delivered by parents (Seiffge-Krenke et al., 2013). It is possible that these behaviours elicit the same reaction when conveyed by peers. (28) *Close friends that can take a supportive role in a measured way are seen as helpful but those that worry about diabetes or overly monitor the young person's self-care behaviours, are seen as unhelpful. (31)*

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